

59

THE MISCELLANY

OF



THE TRICHINOPOLY DISTRICT MEDICAL ASSOCIATION
(REGISTERED)

Editor: DR. M. C. CONDILLAC, M.M., M.R.C.S.

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1938

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CONTENTS

- I. TESTS FOR RENAL EFFICIENCY by Dr. V. IRAVATHAM -
- II. THE PHYSICAL BASIS OF "BILIOUSNESS" AND "WIND
 ROUND THE HEART" by SIR ARTHUR HURST, D.M., F.R.C.P. -
- III. THE SERIOUSNESS OF TUBERCULOSIS IN INDIA AS
 SHOWN BY A STUDY OF INCIDENCE AND TYPE by P. V.
 BENJAMIN, M.B., B.S. (MADRAS), T.D.D. (WALES) -
- IV. ASSOCIATION NOTES:
 - (1) MONTHLY MEETINGS - - - - -
 - (2) ACCOUNTS - - - - -

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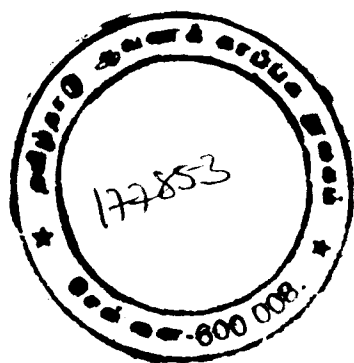
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Editor: Dr. M. C. CONDILLAC, M.R.C.S.

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Tests for Renal Efficiency

BY

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HAVING made a complete clinical examination of the patient, and having found protein in the urine together with an abnormal deposit, the medical practitioner may desire to extend his examination by applying tests of renal efficiency. Viewed in this light, i.e., as an extension of the clinical examination, renal efficiency tests are often of great value. Naturally in the majority of cases the chemical tests simply confirm the opinion already drawn from the clinical examination, but in so doing they give additional confidence. Occasionally the chemical tests are indispensable, or necessitate a revision of the conclusions drawn from the clinical examination.

Objects of Kidney Function Tests

- (1) Differential diagnosis from non-renal diseases.
- (2) In unilateral disease, diagnosis of the side affected.
- (3) Estimate of degree of damage to each kidney separately, or estimate of damage to one kidney and "proof" that the other is functionally efficient.
- (4) Estimate of total damage: estimate of risk of uraemia.
- (5) Repeated estimations of kidney function (unilateral or combined) at intervals as an aid to prognosis; or,
- (6) As an aid to treatment.

Conditions of Testing

Tests may involve the examination of the "combined urine" from the bladder, with or without catheterisation; or of the segregated urines obtained by ureteric catheterisation, or of the blood. Lastly examinations of blood and urine may be combined in order to ascertain the state of affairs on both sides of the kidneys.

The substance estimated may be an ordinary constituent of the blood and of the urine; or it may be an artificial product administered by mouth or parenterally for the purpose of the test, e.g. dye tests. In practice estimations on the urine have very largely been given up, owing to the difficulty of obtaining a complete collection of the twenty-four hours' urine. Finally, provocative tests may be employed. In such tests, relatively large doses of substances are administered in order to force the kidney to work hard. In this way some measure of the reserve power of the renal tissue is obtained; the kidney is working at a disadvantage, and defects in function may be rendered obvious which would escape notice using other tests. An example of a provocative method is the urea concentration test.

The Functions of the Kidneys

The main functions of the kidneys are:—

- (1) **EXCRETION** of
 - (a) Waste products of metabolism.
 - (b) Poisons, chemical and bacterial (these may or may not have been rendered innocuous by the liver before reaching the kidneys).
 - (c) Other foreign substances.
- (2) Regulation of the **OSMOTIC PRESSURE** of the blood chiefly by control of salts excreted, especially chlorides.
- (3) Regulation of the **HYDROGEN-ION CONCENTRATION** of the blood.
- (4) **CONSERVATION OF THE BASES**—particularly sodium of the blood and body-fluids. The chief macha-

nism is the conversion of urea into ammonium carbonate in the kidneys; a double exchange then takes place, the ammonium salt is excreted in the urine and the sodium is conserved as bicarbonate in the blood.

- (5) **KIDNEY SYNTHESIS**, for example, the conjugation of benzoic acid with glycine to yield hippuric acid (benzoyl glycine).

Tests Employed

- (1) The urea concentration test (Macleod and De Wesselow).
- (2) Blood Urea.
- (3) The Blood Urea clearance test. (Van Slyke.)
- (4) Dye tests.
 - (a) Indigo-carmin.
 - (b) Phenol Red or Phenolsulphonephthalein.
- (5) Chlorine content of Blood and Urine.
- (6) CO₂ combining power of Plasma. (Alkali reserve plasma bicarbonate)
- (7) Blood cholesterol.
- (8) Indicaemia.
 - (a) Diazo Test,
 - (b) Oxidation to Indigo Blue.
- (9) Blood Non-protein Nitrogen.
- (10) Blood Creatinine.
- (11) Urinary Creatinine.
- (12) Blood Uric Acid.
- (13) Diastase Tests.
- (14) Sugar content of Blood and Urine.

The Urea Concentration Tests

Principle—The object of this test is to force the kidneys to **CONCENTRATE** urea by flooding the blood with urea, and by withholding fluids for eight to twelve hours beforehand.

Technique—(a) Performance of Test in Ward, etc.

Nothing to drink overnight, e.g. nothing after 10 P.M.
Next morning at:—

- 5-58 a.m. Empty bladder completely.
Label specimen "O".
- 6 a.m. Drink the dose of urea.
- 7 a.m. Empty the bladder again.
Label specimen "1"
- 8 a.m. Pass urine again.
Specimen "2."
- 9 a.m. Pass urine once more.
Specimen "3."

(b) Laboratory Determinations.—Measure the volume of urine in cubic centimetres and estimate the percentage of urea in each of specimens 1, 2, and 3. The volumes are measured in order to detect excessive diuresis. The hypobromite method for the estimation of urea is sufficiently accurate for clinical purposes, in that only relatively gross variations in urea concentration have any significance.

Urea prescriptions for an adult:—

R Urea	15 gm.
Tincture of orange	1 C.C.
Water.....to	100 C.C.

Interpretation of Results

(a) Concentration of urea. The information required is the MAXIMUM CONCENTRATION of urea. It does not matter whether this occurs in the first, second or third hour. Usually the maximum is found in the second or the third hour but occasionally in the first hour. It is, therefore, advisable to determine the percentage of urea in each of the three hours, but if time is pressing the second or third hour sample may be analysed first, and if satisfactory further analysis may be omitted.

Normally the maximum concentration exceeds 2.5 per cent frequently being greater than 3%. Figures between 2.5 and 2 per cent may be regarded as within the boundary zone. Their significance should be carefully assessed in the light of

all the evidence available, and if any doubt remains as to the efficiency of the kidneys, further tests should be performed, e.g. an estimation of the blood urea. Figures below 2 per cent generally indicate renal inadequacy always assuming that the test has been properly executed.

Value of the Test

On account of its simplicity the test has been used extensively in all branches of urinary disease. It is very useful in clinical work, and undoubtedly will reveal the presence of a serious degree of renal inefficiency in the vast majority of cases.

The urea concentration test is a provocative test. That is to say, by flooding the blood with urea an attempt is made to provoke the kidneys to excrete urea at higher concentrations than on an ordinary diet. It is possible that in the case of a damaged kidney such provocation makes a call upon some of its "reserve." Possibly for this reason the urea concentration test is more sensitive than many other tests, such as the blood urea test.

(To be continued)

The Physical Basis of "Biliousness" and "Wind Round the Heart"

BY

SIR ARTHUR HURST, D.M., F.R.C.P.
Senior Physician to Guy's Hospital

[From the *British Medical Journal*]

"BILIOUSNESS" OR A "TOUCH OF LIVER"

AMONG the commonest conditions of which patients complain is a "touch of liver" or a bilious attack. As neither is mentioned in most text-books of medicine, it is natural that a recently qualified doctor should conclude that there is no such thing and should be driven to explain to the sufferer that what he puts down to his liver is really a disorder of his stomach, his bowels, or his nerves. But the patient remains unconvinced, and when next he wakes up with a dull headache, a dirty tongue, no appetite for breakfast, and the conviction that life is not worth living, he will tell his wife that his bad temper is due to his liver, and the doctor be damned. It is a curious fact that there is no equivalent in French or German for the word "liverish" or a "touch of liver," though a bad-tempered Frenchman is said to be "un-bilieux." There is also no record of the word "liverish" being used in England before the first quarter of the nineteenth century, and I am inclined to think that it was introduced by soldiers and civilians who came home to nurse their damaged livers in Cheltenham and Bath, as it was in India that the frequency of hepatic abscess first led Army surgeons to recognize the premonitory symptoms of a disordered liver.

I believe that the patient who says he is liverish is often correct, and that functional disorders of the liver are actually far more common than organic diseases. The liver has more ways in which it can be attacked than any other organ. Poisons absorbed from the stomach, intestines, gall-bladder, and spleen reach it in the blood of the portal vein; poisons

and organisms in the systemic circulation are conveyed to it by the hepatic artery; infections may ascend the bile ducts from the duodenum, especially in the presence of achlorhydria, and infection may be carried by lymphatics from the wall of the gall-bladder.

Alcohol is the commonest cause of liverishness, but there are many others. The intestinal toxæmia which results from the habitual abuse of purgatives, though never from untreated constipation, and all forms of food poisoning and intestinal infections, such as those with typhoid and various parenteric bacilli and with *Amoeba histolytica*, as well as such general infections as septicaemia and malaria, may injure the liver. With the exception of alcohol and amoebiasis they rarely produce enough damage to give rise to symptoms unless two or more are associated together. But an acute "liver attack" may occur in all these conditions as a result of indulgence in an amount of alcohol which formerly would have had no ill effect, and indiscretions in diet, fatigue, and excitement are often contributory causes. A patient of mine, a man of 58, found it difficult to decide whether a bad liver attack was too high a price to pay for his sole pleasures in life, betting at race meetings and gambling at Monte Carlo, both of which invariably brought one on even if he drank no more alcohol than usual.

The liver is well provided with means for dealing with toxins and bacteria, but it is not always capable of destroying them when they arrive in excess. The hepatic cells are then damaged and their functional capacity is impaired. The damage in the early stages is not irreparable, and although microscopical examination would doubtless reveal the presence of structural changes, they are at first of a type from which complete recovery can take place. The ordinary clinical methods of physical examination do not give any safe guide to the diagnosis of these early stages of hepatic disorder, but fortunately in the laevulose test we have a means of recognizing them. Our experience of over a thousand cases at New Lodge Clinic in which the possibility of hepatic insufficiency required consideration has led us to regard it as a very reliable test of liver function. We now consider a combined one-hour and two-hour

rise in the blood sugar of more than 25 mg. per 100 c.cm. after taking 50 grammes of laevulose as suspicious, and of more than 30 mg. as certain evidence of hepatic insufficiency.

Alcoholic Hepatosis

It is obvious that cirrhosis of the liver is only the last phase of a very long-standing disease, the early stages of which have passed unrecognized. As the condition is one of toxic degeneration rather than inflammation it is more suitably described as hepatosis than hepatitis. Whereas the death rate per million living from cirrhosis of the liver has fallen from 248 in 1902 and 185 in 1912 to 81 in 1922 and 50 in 1932, alcoholic hepatosis is quite common, especially among the well-to-do. The familiar symptoms of "the morning after the night before" are the symptoms of acute alcoholic hepatosis, and the laevulose test shows that definite hepatic insufficiency is present and disappears completely within a few days. Table I shows the results of the laevulose test in five healthy young men on the morning before a "night out" compared with the morning after. In each case there was a greater rise in blood sugar with the second test than with the first, which showed an actual fall in four instances. The rise was greatest in A and B, the only ones who felt any the worse for the experiment.

TABLE I
Blood Sugar in mg. per 100 c.cm. Fasting and One and Two Hours
after taking 50 grammes of Laevulose in Five Healthy Young Men,
(1) the Morning Before, and (2) the Morning After a
"Night Out"

	A	B	C	D	E	Total
(1) Fasting ...	86	80	100	100	94	
1 hour ...	88	71	98	111	111	
2 hours ...	74	64	95	87	105	
Total rise ...	-10	-25	-7	-2	28	-16
(2) Fasting ...	133	82	69	126	114	
1 hour ...	143	87	63	145	139	
2 hours ...	143	87	71	125	121	
Total rise ...	20	10	-4	18	32	+76

Habitual over-indulgence leads to a chronic alcoholic hepatosis, which is still capable of complete resolution even if it has been present for many months. It is only when it has continued without intermission for years that irreparable damage is done, but the nodular hyperplasia caused by new-formed liver tissue may even then compensate for this more or less completely, although areas of complete necrosis are gradually replaced by fibrous tissue, the first stage of cirrhosis having at last developed.

Over-indulgence in alcohol is a very elastic term, what is excess for any given individual depending upon the vulnerability of his liver cells, which varies greatly in different people. It has nothing to do with his general reaction to the effects of alcohol, as alcoholic hepatosis is not often associated with alcoholic psychoses or peripheral neuritis. The premonitory symptoms of cirrhosis are mainly hepatic in origin, through chronic oesophagitis and, less frequently, chronic gastritis may contribute to them; but the latter is not necessarily present, a normal curve of acidity without any excess of mucus being often obtained with a fractional test meal.

Young men and girls who indulge in cocktails three or four times a week may develop alcoholic hepatosis. Their anxious parents are apt to ascribe their sallow complexions, loss of appetite, mental torpor, and irritability to incipient consumption or other serious disease, but the well-marked hepatic insufficiency disclosed by the laevulose test and the tender and often slightly enlarged liver reveal the true nature of their malady. Complete recovery with disappearance of liver tenderness and return to a normal response to the laevulose test quickly follows a period of rest with a light diet and abstention from alcohol.

Table II gives some examples of the results of the laevulose test in alcoholic hepatosis before and after treatment. Patient No. 6 had drunk a bottle of champagne a day for twenty years, and was so ill that he was thought to be dying from some obscure abdominal complaint. His liver was large, hard, and very tender. After three months on a strict diet his liver was no longer palpable, and he returned home feeling perfectly fit

and able to play tennis and golf for the first time for five years. No. 7 had been drinking from one to three bottles of whisky a day for over a year, and also recovered completely.

The tender liver often aches, and a man "with a liver" has generally a fairly accurate knowledge of its surface anatomy. He is never jaundiced, and latent jaundice, as shown by a positive indirect Van den Bergh reaction is uncommon; when present it disappears as rapidly as the abnormal response to the laevulose test.

In early cases, after a short period of strict treatment, it is only necessary to forbid alcohol in any form between meals,

TABLE II

*Lævulose Tolerance Test in Alcoholic Hepatosis
Before and After Treatment*

Case	Sex and Age	Interval between Observations	Rise of Blood Sugar above Fasting Level in mg. per 100 c. cm. after taking 50 grammes Lævulose		
			1 hr. after	2 hrs. after	Combined 1 and 2 hrs.
1	F, 22	22 days	51 23	15 10	66 33
2	M, 32	32 "	45 6	89 30	134 36
3	F, 56	9 "	44 16	49 18	93 34
4	M, 49	9 "	44 15	7 -15	51 0
5	M, 56	20 "	49 13	0 -11	49 2
6	M, 52	3 months	73 0	71 -13	144 -13
7	M, 45	6 weeks	58 10	31 -6	89 4
8	M, 40	24 days	51 12	15 -22	66 -10

when it is rapidly absorbed and reaches the liver in a comparatively concentrated form. But in more advanced and chronic cases it is useless to advise anything short of complete and permanent abstinence. This advice is easier to follow than might be expected, as the patients are never dipsomaniacs and have no uncontrollable urge to drink. They drink for conviviality and because they like it or find it difficult to complete a business deal without celebrating it with a drink. A badly damaged liver is abnormally vulnerable to such toxins as alcohol, and even a small dose is poisonous. But more important is the psychological fact that with his first drink a man's judgment is impaired, and though he may have intended to take no more he will have a second and a third, and so on, *ad infinitum*. He is only safe when teetotal.

Amoebic Hepatitis

In 1923 Lieutenant-Colonel Gordon Covell published in the *Guy's Hospital Reports* a paper in which he showed that amoebic dysentery was always accompanied by hepatic insufficiency as measured by the lævulose test, even in the complete absence of symptoms pointing to disorder of the liver. Since that time we have always performed lævulose test in the many patients who, on returning home after long residence in the East, complain of general unfitness in the absence of any obvious organic disease. They look pale and sallow, though they are neither anæmic nor jaundiced and Van den Bergh's reaction is generally negative. They have frequent liver attacks—headache with a dirty tongue, anorexia, discomfort in the region of the liver, and constipation or alternating constipation and diarrhoea. The liver is often slightly enlarged and tender, and the lævulose test shows that hepatic insufficiency is present. Though alcohol and various infections may have contributed to this result the condition is mainly due to a mild chronic form of amoebic hepatitis. The patient may have had definite attacks of dysentery, but more frequently he has had nothing else than an occasional attack of diarrhoea, and sometimes not even that, yet the cæcum and ascending colon are often tender, and the appendix has generally been removed for "chronic appendicitis" without benefit. It is remarkable

that this condition, which never leads to abscess formation, can persist for several years after returning to England and yet be amenable to treatment. It often remains unrecognized owing to too much reliance being placed on the presence of cysts of *Entamoeba histolytica* in the stools as essential evidence of the existence of amebiasis.

Complete recovery follows a dozen injections of 1 grain of emetine. The patient not only loses his symptoms but the liver ceases to be palpable and the laevulose test shows that the hepatic insufficiency has disappeared (Table III). To avoid the risk of recurrence a second series of six injections of emetine should be given at the end of three months and then every six months for a couple of years.

TABLE III

*Laevulose Tolerance Test in Amoebic Hepatitis
Before and After Treatment with Emetine*

Case	Sex and Age		Rise of Blood Sugar above Fasting Level in mg. per 100 c.cm.		
			1 hr. after	2 hrs. after	Combined 1 and 2 hrs.
1	F, 53	Before treatment...	71	31	102
		After treatment ...	16	18	34
2	F, 40	Before treatment...	55	30	85
		After treatment ...	6	0	6
3	F, 33	Before treatment...	34	14	48
		After treatment ...	18	-2	16

Bilious Attacks and Migraine

What is called a bilious attack in a child is in most cases the equivalent of migraine in an adult. One or other parent is often a sufferer from migraine, and the child is likely to develop it when he grows up. The term "bilious attack" is apparently derived from a misinterpretation of the fact that it often terminates with bilious vomiting. There does, however, appear to be some obscure connexion between the liver and migraine in a proportion of cases in both children and adults (Hunt, 1933).

We have never found any sign of hepatic insufficiency as shown by the laevulose test, and Van den Bergh's test is negative both during and between the attacks. But when in the course of our investigations we aspirated a specimen of bile through Einhorn's tube after making the gall-bladder and bile ducts evacuate their contents by injecting magnesium sulphate into the duodenum, a number of adult patients asked to have the process repeated, as they felt clearer in their heads and altogether less "bilious" than they had done for months. In these cases the gall-bladder was often found to be tender, especially shortly before and during an attack. It is apparently the mechanical effect of unloading the liver of accumulated bile which has this unexpected result, as in every case the bile was quite normal and there was no evidence of co-existing cholecystitis or gall-stones. Such patients derive benefit from stimulation of biliary drainage by means of Epsom salts and olive oil. The former should be given in concentrated solution fasting every morning, the dose being the largest which can be taken without causing looseness, and a tablespoonful of the latter should be taken three times a day half an hour before meals.

A large proportion of sufferers from migraine know from experience that fatty food induces an attack, and among those who have not discovered this for themselves it is common to find that the exclusion of eggs, cream, fat meat, fried food, and chocolates helps to prevent migraine. It is interesting to observe that these are just the cholesterol-rich foods which frequently upset patients with diseases of the gall-bladder, and although there does not appear to be any special liability to cholelithiasis among the migrainous, it seems not improbable that a disordered liver may be one factor in the complicated pathogenesis of migraine.

"WIND ROUND THE HEART"

Aerophagy

There is no physical basis for the wind which troubles most people who complain about it; it is on their brains; and neither in their stomachs nor round their hearts. Nearly thirty years ago I described experiments which showed that the only adequate stimulus to the sensory nerves of the alimentary tract

is tension on the fibres of its muscular coat (Hurst, 1911). A slight increase gives rise to the sensation of fullness and a greater rise to pain. The tension depends upon the postural tone of the muscle fibres and the volume of the contents of the segment concerned. A sensation of fullness and pain may result from increased tone of the muscles with no change in the contents, or upon increase in the volume of the contents with constant tone. The sensation of fullness or pain can be relieved when some or all of the contents consist of gas, which can be evacuated by belching from the stomach or as flatus from the colon. Everybody has had experience of gaining relief in these ways, and consequently the average person is inclined to ascribe a sensation of fullness in the stomach or colon to wind, although in most cases it is due to other causes. Success confirms his suspicion, but instead of accounting failure to a wrong diagnosis he assumes that wind is present but cannot be expelled. In his futile attempts to eructate he swallows air until enough is present in his stomach to be easily and loudly evacuated. The relief which follows is partly psychological and partly due to the fall in intragastric tension. As the discomfort which initiated the aerophagy is often due to achalasia or spasm of the pyloric sphincter, the primary discomfort may be overcome, as the further rise in intragastric pressure resulting from the aerophagy may be sufficient to force the pylorus as well as the cardia. Sodium bicarbonate gives relief in precisely the same way as aerophagy: carbon dioxide is evolved by the action of the acid gastric juice, and the increased tension in the stomach forces gas through the cardia and fluid through the pylorus. In both cases the patient brings up gas, and it is difficult to convince him that this is not the product of fermentation in his stomach. But owing to the inhibiting action of free acid on bacterial activity and the continuous passage of food into the duodenum fermentation cannot occur; we have found that even in complete achlorhydria very little gas is produced by fermentation unless pyloric obstruction is also present.

Neurotic patients may get so much satisfaction from belching wind with a resounding noise that they continue to swallow air, and the whole process is repeated again and again. Eventually attacks of aerophagy occur without any preceding epigastric

discomfort, the condition then having all the characteristics of a tic. The action, though originally serving a useful purpose, no longer does so; its repetition depends upon the subconscious gratification which it gives to the patient, who is able to restrain it by an effort of will, but after a short time gives way to an overwhelming impulse to continue, though often ashamed of his weakness.

Aerophagy can be cured by explaining the true cause of the "flatulence" in language suited to the patient's intelligence. He is instructed to make no voluntary effort to eructate, however much he may desire to do so. At the same time an attempt must be made to discover and relieve the primary cause of the discomfort which led to the aerophagy, whether this is some form of functional dyspepsia or of organic disease, such as gastritis, ulcer, or cholecystitis.

Intestinal Carbohydrate Dyspepsia

The most common cause of intestinal flatulence is carbohydrate dyspepsia (Hurst and Knott, 1931). The envelopes of root vegetables are softened but unbroken by cooking. Under normal conditions amylase of the pancreatic juice penetrates the envelope in the small intestine and converts the starch into soluble sugars, which diffuse into the surrounding media and are absorbed. When owing to abnormally rapid passage through the small intestine some of the starch reaches the caecum the same thing happens there. But whereas in the relatively sterile small intestine very little undergoes fermentation, in the caecum and ascending colon bacteria are so active that fermentation occurs before the sugar has time to be absorbed. Gases and organic acids are produced, the former causing colonic distension and discomfort, and the latter, if in great excess, irritating the mucous membrane sufficiently to cause diarrhoea. The stools are acid, contain many starch granules, and produce much gas on incubation. During the day the gas collects in the splenic flexure and causes discomfort, which is often mistaken by the patient for gastric flatulence and so gives rise to aerophagy. During the night, when the splenic flexure is no higher than the pelvic colon and rectum, the gas moves onwards, and the discomfort in the lower abdomen is often enough to interfere

to the development of cicatricial narrowing, and eventually a gastrostomy was performed. This resulted in complete healing with disappearance of the occult blood from the stools. The cicatrization of the ulcer led to almost complete obstruction; this would probably have been overcome by gradual dilatation had he not developed a rapidly fatal attack of acute mania.

A similar condition of *aérogastrie bloquée* may result from dislocation of the cardia, which is generally caused by excess of gas in the neighbouring splenic flexure. The excess of gas escapes from the stomach when it can reach the pylorus on assuming the horizontal position. In the morning no excess is present, but with each meal the quantity increases until the afternoon, when the accumulation produces a rise of pressure sufficient to cause pain, the diaphragm at the same time being displaced into the thorax. Immediate relief follows the passage of a stomach tube. One patient with this condition had learnt to lie down at 3 p.m. every day when the pain was at its height. In half an hour he was comfortable, as the gas had passed into his small intestine, and after another hour he evacuated some of it per anum, but enough remained in his splenic flexure to maintain the dislocation of his cardia. Permanent relief occurred only after he had evacuated the gas from his stomach by a tube at 3 p.m. every day for a week, so that no excess passed through his pylorus to collect in the colon.

(b) MEGACOLON AND AÉROCOLIE BLOQUÉE

Megacolon is the result of interference with the normal neuromuscular mechanism controlling the last stage of the act of defaecation, in which the passage of faeces from the pelvic colon into the rectum causes the latter to contract and the sphincter ani to relax. When owing to degeneration of Auerbach's plexus or other causes the sphincter does not relax (achalasia), faeces and gas are retained, and the rectum and especially the more thin-walled pelvic colon become progressively dilated (Hurst, 1934b). The pelvic colon finally forms a huge loop, which reaches the left and occasionally the right dome of the diaphragm. Megacolon is the commonest cause of eventration of the diaphragm. I have seen thirty-five cases in private

practice—twenty-four in males and eleven in females, including four boys and one girl (so-called Hirschsprung's disease)—compared with two cases caused by congenital atrophy of the diaphragm and four cases of *aérogastrie bloquée*. It is remarkable how trivial the symptoms of megacolon may be, the condition often being recognized by the discovery of an enormous gas-containing loop of pelvic colon under the diaphragm in the course of a radiological examination of a patient suffering from nothing more serious than chronic constipation. In a minority of cases recurrent attacks of severe pain from partial volvulus of the dilated pelvic colon occur. Gradual dilatation of the anal sphincter and complete evacuation of the colon generally result in complete and permanent relief, although the pelvic colon remains abnormally distensible. In exceptional cases a partial twist of the uppermost part of the pelvic colon prevents the escape of the accumulated gas and painful attacks of partial volvulus may continue. It is sometimes possible to evacuate the air-lock by means of a tube. In other cases it may be necessary to excise the volvulus during a quiescent period. I have never found it necessary to advise sympathectomy.

The Seriousness of Tuberculosis in India as Shown by a Study of Incidence and Type

BY

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[From the Indian Medical Gazette]

OUR knowledge at present as regards the incidence of tuberculosis in India is very meagre, as there have been few scientific investigations and these very limited in extent. Apart from these few investigations, our main knowledge rests on general observations deduced from dispensary and hospital records and mortality statistics. As regards health in the large cities, because of the better facilities for collecting statistics there, it is known for certain that tuberculosis is exceedingly prevalent, but what the conditions are in the villages is largely a matter of conjecture. Many detailed surveys will have to be done over large and varied areas before we can get any real idea as to what is the actual state of affairs.

Tuberculin surveys

One of the ways of getting knowledge as to the extent and distribution of tuberculous infection is by tuberculin surveys of many thousands of people in different parts of India and in different communities, under differing conditions, urban and rural.

Ukil (1930) gives figures for a tuberculin survey of 6,500 individuals very predominantly urban, and a jail population, and a positive reaction was found varying from 11 per cent in those of five years and under to 75 per cent in those of 60 years and over. He also shows that the figures for rural areas are much less than for urban and that the positives increase as the conditions approach the urban.

Tuberculin survey of 6,665 individuals in South India

A tuberculin survey was carried out by the U. M. T. Sanatorium in parts of Chittoor District and its environs, 3,015 in 1937 (Benjamin, 1937) and 3,650 in the present year. In these two surveys were included three *taluk* headquarters towns with a population varying from 4,000 to 10,000, two large villages with a population each about 1,000, and a number of small villages with populations varying from 50 to 300. In some of the villages, the whole population was tested. In addition, the survey included four schools in Madanapalle, one in Vayalpad, two in Chittoor, two in Kolar Town in the Mysore State, and an industrial school in Katpadi in North Arcot District.

The test was done without any selection in the towns and villages, for all ages and both sexes. All communities, Hindus, Christians and Muslims, were included. The majority tested were of the poor and middle classes, as these formed the bulk of the population of the areas tested. But a number of well-to-do families was also tested.

In this tuberculin survey, the total number tested was 6,665, composed of Hindus 4,201, Indian Christians 1,668 and Muslims 796.

From these, 163 persons are omitted—Hindus 43, Christians 101 and Muslims 19—as they were coming into personal contact with tuberculous patients in the wards of the sanatorium during their daily work and, as such, were specially exposed to infection and could not be considered as a sample of the normal population.

There is no question of tuberculization of the villages proceeding from the sanatorium, as most of the villages and all the small towns tested were miles away from the sanatorium. It is interesting in this connection to note that 227 persons living in the sanatorium compound, but not attending on patients, showed a percentage of tuberculin positives similar to that seen in the village group.

Technique

The method used for the tuberculin test was that of von Pirquet, according to the modern technique, with a scarification of the skin about half an inch long through tuberculin already applied to the skin, using, of course, the usual aseptic precautions. Readings were generally taken after 48 hours, a few only being after 72 hours, and the intensity of the reaction was noted under different heads. A positive was recorded when there was palpable oedema and redness of a width of more than 2 mm. When the width was from 3-5 mm., it was noted as +; from 6-10 mm. as ++; over 10 mm. as +++. The tuberculin employed was Burroughs, Wellcome & Co., Old Tuberculin, Human (T).

We realize that the Mantoux intra-dermal test is the more sensitive, and has the advantage over the von Pirquet test, that in a particular individual successive tests can be done with graded doses and the results compared. This should be the test used when the group tested is under control, and it is amenable to such a test.

In the communities such as those with which we had to deal, it was impossible to use the Mantoux test involving an injection, except in a few educated individuals.

In this connection it is interesting to note that such an eminent tuberculosis worker as Bardswell (1938), in a recent tuberculosis survey in the island of Cyprus, had to abandon even the von Pirquet test, and do Morro's inunction test because of the difficulty of getting the co-operation of the population. Aeimbeck (1938) is of the opinion that the accuracy of the von Pirquet reaction, according to modern technique, is very good, and that the margin of error, when compared to the Mantoux test, is only 1.8 per cent in persons below the age of 15, and only 3 per cent between the ages of 16 and 30. The von Pirquet test has been variously estimated to be equivalent to 1 in 10,000 dilution used for Mantoux (Dow and Lloyd, 1931), and 1 in 2,000 (Matthews, 1931), and in the African survey reviewed by Cummins (1935) as roughly comparable to the intradermal test with 1 in 5,000 dilution of tuberculin.

TABLE I
Results of a tuberculin survey

Community	TOTAL						TOWNS						VILLAGES					
	Adults			Children			Adults			Children			Adults			Children		
	Number	Positives	Per cent	Number	Positives	Per cent	Number	Positives	Per cent	Number	Positives	Per cent	Number	Positives	Per cent	Number	Positives	Per cent
Hindus ...	1,995	730	36.6	2,163	214	9.9	1,401	562	40.1	1,664	183	10.9	594	168	28.3	499	13	6.2
Indian Christians...	701	227	32.4	866	92	10.6	574	192	36.9	647	72	11.1	127	35	27.6	219	20	9.1
Muslims ...	393	210	53.4	384	64	16.7	332	172	51.8	317	51	16.1	61	38	62.3	67	13	19.4
TOTAL ...	3,089	1,167	37.8	3,413	370	10.8	2,307	936	40.1	2,628	306	11.6	782	241	30.8	785	64	8.2

Analysis of findings

As a result of this tuberculin survey, we find that the average percentage of positives for the whole group is 37·8 for adults and 10·8 for children under 15 years of age. In small towns, children under 15 years of age showed 11·6 per cent positive and in the villages 8·2 per cent. Adults showed 40·1 per cent in the towns and 30·8 per cent in the villages. This is shown in Table I.

When we analyse the total number investigated according to different communities, we find that there is very little difference between the Hindu and Indian Christian groups, but a marked difference is found in the Muslim group, the percentage of positives being much higher in this group than in the two other groups, both in towns and villages, and also among adults and children. Compared with 36·6 per cent and 32·4 per cent positives for Hindus and Christians respectively, Muslims show 53·4 per cent positives for adults, and 16·7 per cent for children, as compared with 9·9 and 10·6 per cent for Hindu and Christian children. While among Hindus and Christians the percentage of tuberculin positives is higher in the towns than in villages, among the Muslims the opposite is found. The *purdah* system and special social habits among the Muslims may increase the chances for tuberculous infection and consequent higher percentage of positives in this community, but why the villages show a higher percentage than towns cannot be explained. As this group comprises only 777 individuals, it is too small a number on which to form any opinion; but it would be interesting to see in further investigations whether this higher percentage in the villages persists, and, if so, what are the special factors contributing to this.

It is of some importance to note the intensity of reaction. In Europe the intensity of reaction is not of such great importance among adults, but among small children an intense reaction is usually associated with active disease. Among Africans, the significance of a tuberculin reaction has been found to be similar to that among children in the European races. Hypersensitiveness to tuberculin is considered a serious matter in Africans and other primitive races, as this hypersensitiveness is not associated

with an immunity, but just the opposite, and, therefore, is a danger signal. What the significance of sensitivity to tuberculin means in India, we do not as yet know.

In Table II are given the reactions found in the investigation.

It will be seen from this table that 56·4 per cent of the positives were reactors with a reaction between 3 and 5 mm. wide; 31·5 per cent with a reaction of 6 and 10 mm. wide; and 12·1 per cent with a reaction of above 10 mm. wide. If we group the two stronger reactions together, we find that as regards community, Muslims have as many as 61·3 per cent of the strong reactions, whereas Hindus have 40·5 per cent, and Christians 37·6 per cent.

The higher percentage of strongly positive reactions among the Muslims coincides with a higher percentage of infection rate among the same community as shown by tuberculin tests.

It was possible to persuade 69 of those showing strong reactions, and a few with suspicious symptoms, to come to the sanatorium for x-ray and other examinations. Of these, seven were found to be suffering from active tuberculosis, five of them with cavities and positive sputum. Six of these seven were engaged in their ordinary work.

TABLE II

Strength of von Pirquet positive reaction

Community	Number	+	Per cent	+	Per cent	+	Per cent	++ and +++	Per cent ++ and +++
Hindus ...	944	562	59·5	280	29·7	102	10·8	382	40·5
Christians ...	319	199	62·4	81	25·4	39	12·2	120	37·6
Muslims ...	274	106	38·7	123	44·9	45	16·4	168	61·3
TOTAL ..	1,537	867	56·4	484	31·5	186	12·1	670	43·6

When we analyse the figures with regard to occupation (Table III), we find the highest percentage naturally among

those who attend on patients—then come the police, merchants and clerks, and those with indoor occupations. The group with the lowest percentage among adults is those engaged in agriculture. Those whose occupation could not be definitely ascertained and also those where the numbers were less than ten in any single group are all grouped together in the miscellaneous group.

It is evident from the figures given by the above survey that the villages in the area surveyed are no longer free from infection, and are not 'virgin soil' in the formerly accepted sense of the word, and yet this area is comparatively isolated with some of the villages about 25 miles away from rail and main roads, is sparsely populated, and has one of the best climates in South India.

TABLE III
Occupations and tuberculin positives

Occupation	Number	Positives	Per cent
Children under five years	465	17	3.6
School children	2,769	409	14.8
Ward boys	29	25	86.2
Ward ayahs	11	9	81.8
Police (constables and inspectors)	41	26	63.4
Clerks	52	31	59.6
Doctors (medical students)	23	13	56.5
Merchants	243	136	55.9
Cooks	53	25	47.2
Sweepers	30	14	46.7
House servants	85	39	45.9
Carpenters, artisans and goldsmiths	141	64	45.4
Tailors	108	49	45.4
Nurses and compounders	61	28	42.4
Hotel-keepers	15	6	40.0
Teachers	151	60	39.7
Peons	53	20	37.7
Housewives	542	184	33.9
Dhobies	44	13	29.6
Coolies	450	130	28.9
Agriculturists	441	116	26.3
Miscellaneous	853	246	28.8
TOTAL	6,665	1,660	

THE TYPE OF PULMONARY TUBERCULOSIS

Variation in type in different races

General observations of tuberculosis among European races and a study of their x-ray films, and post-mortem examinations, reveal that a comparatively large proportion of these show a tendency to chronic disease with localization, and marked fibrosis round tuberculous foci and cavities, but this state of affairs does not hold good for other races. Investigations done in America among the negroes and in Africa among the native population show an entirely different type of disease. A recent investigation done in Tanganyika (Wilcocks, 1938) shows a preponderance of cases of acute 'galloping consumption' and bilateral disease. Fibrosis is not common, and, when it occurs, does so chiefly in middle-aged people. The lung bases are frequently attacked. Cavitation is frequently seen, but it is rare to see a zone of fibrous tissue round these cavities. Massive consolidation is occasionally found, and miliary spread often occurs.

Type of disease found in patients in India

A detailed study has been made of the type of tuberculosis found in 2,158 Indian, Anglo-Indian and European patients admitted to this sanatorium since 1930, all of whom were diagnosed as suffering from pulmonary tuberculosis. With a view to the determination of type, the following points were studied: the amount of fibrosis, evidence of previously healed lesions, tendency to dissemination, the question whether one or both lungs were involved, the amount of cavitation, all as shown in x-ray films; the evidence of resistance to the disease as shown by the length of time between onset of symptoms and admission to the sanatorium, the activity of the disease as shown by blood examinations (Schilling count and sedimentation test).

The results are shown in table IV.

TABLE IV

Analysis in percentage of findings in 2,158 Indian, Anglo-Indian and European patients

	INDIANS		ANGLO-INDIANS		EUROPEANS	
	Number 2,021	Per- centage	Number 94	Per- centage	Number 43	Per- centage
Fibrotic ...	108	5.3	12	12.7	17	39.5
Exudative ...	1,879	93.0	81	86.2	26	60.5
Pleurisy ...	34	1.7	1	1.1	...	...
Previously healed lesions ...	321	15.9	30	31.9	19	44.2
Acute-initial, 1 to 24 months ...	1,560	77.2	67	71.3	27	62.8
Chronic-recrudescent ...	461	22.8	27	28.7	16	37.2
Localized ...	397	19.6	21	22.3	24	55.8
Moderately disseminated ...	783	38.7	45	47.9	16	37.2
Markedly disseminated ...	841	41.6	28	29.8	3	7.0
Unilateral ...	581	28.7	20	21.3	18	41.9
Bilateral ...	1,440	71.3	74	78.7	25	58.1
With cavities ...	1,482	73.3	61	64.9	21	48.8
Cavities with soft walls ...	1,395	94.1	50	82.0	13	61.9
Cavities with moderately hard walls ...	87	5.9	11	18.0	8	38.1
With single cavity ...	704	47.5	32	52.5	14	66.7
With two or three cavities ...	385	26.0	14	23.0	4	19.0
With multiple cavities ...	393	26.5	15	24.5	3	14.3
Activity of disease shown by Schilling count and sedimentation rate—						
Low ...	157	9.3	13	16.9	5	17.9
Moderately high ...	315	18.7	13	16.9	12	42.9
High ...	1,215	72.0	51	66.2	11	39.2

From this Table it will be seen that among the 2,021 Indian patients, only 5.3 per cent showed any evidence of marked fibrosis, while 93 per cent showed a predominantly exudative type of disease. Previously healed lesions, as denoted by calcified spots either in the lung or hilus, were seen in only

15.9 per cent. Only 19.6 per cent showed a tendency to localization, while as many as 41.6 per cent showed marked dissemination. In 71.3 per cent of the patients, both lungs were involved. As regards cavities, 73.3 per cent of the patients showed cavitation, 52.5 per cent of these showing more than one cavity; the walls of the cavities in 94.1 per cent appeared soft, and only 5.9 per cent showed evidence of even moderately hard fibrous walls. As regards resistance to the disease, judged by the duration of symptoms before the patients came to the sanatorium, 77.2 per cent of the patients belonged to the 'acute-initial' group, according to Cummins' classification, that is, with continuous symptoms of less than two years' duration, and only 22.8 per cent to the 'chronic-recrudescent' group, that is, with symptoms lasting more than two years, or with symptoms followed by intervals of good health. As many as 72.0 per cent showed high activity of disease, as judged by the blood.

The Europeans are very few in number, being only 43, but among them the type of disease approximates to what is found among Europeans in the west. In the group 39.5 per cent showed evidence of considerable fibrosis and 44.2 per cent of previously healed lesions; 55.8 per cent showed a tendency to localization of the disease.

The figures for the 94 Anglo-Indian patients indicate a type of tuberculous disease in the lung between that of the Indians and Europeans.

Another investigation into the distribution of lesions in the lung (Table V) shows that as high as between 71.2 and 73.1 per cent of the patients have lesions in the middle zone of one or both lungs, and 32.6 to 33.6 per cent have lesions in one or both bases. It is recognized that the more chronic type of the disease is found in the apical and sub-apical zones of the lungs, and that lesions in the middle and basal zones are usually of the more acute type.

The results of these investigations show that for Indian patients the disease is of a very serious type; it is acute, rapidly developing with little tendency to show a natural

resistance and healing. The allergic condition is such that there is a severe exudative reaction followed by a rapid breaking down of tuberculous tissue with a resultant cavity formation.

TABLE V
Distribution of Lesions in the lungs

	RIGHT LUNG LESIONS				LEFT LUNG LESIONS			
	Apic	Sub-apic	Mid-zone	Base	Apic	Sub-apic	Mid-zone	Base
Number	1,141	1,368	1,438	658	973	1,220	1,478	678
Percentage	56.5	67.7	71.2	32.6	48.1	60.3	73.1	33.6

Conclusions

In the earlier part of this paper a review has been made of a tuberculosis survey in a limited area and of a study of the type of disease found in Indian patients. The survey, of course, is too small and limited to be able to form from it any general conclusions for the whole of India or even for districts or areas outside that surveyed. It does, however, support the general impression that tuberculous infection is widespread even in the villages.

The study of the type of the disease found in Indian patients can perhaps be used for a general conclusion, as the patients included in the study have come from all parts of India, and little difference has been noticed in the type of the disease in patients coming from different parts of the country. It may be concluded that for Indians as a whole tuberculosis is a very serious disease, because of its tendency to show itself in an acute, rapidly developing form. This reveals a general lack of immunity among Indians as a race.

The African investigations, already referred to, show that, as long as the Africans remain undisturbed in their own natural surroundings, tuberculosis does not appear as an epidemic disease, but it spreads comparatively slowly, and there are a large number of relatively mild and chronic forms of the disease with some severe cases. But when once the conditions of life

are changed, by, for instance, migration to the mines, the situation becomes quite different, and a great many succumb to a very acute type of the disease.

In India we seem to have a similar situation. There is a widespread incidence of tuberculous infection, as far as can be judged; at the same time the immunity response is very low. Conditions of life in India are rapidly changing. The villages are being rapidly brought into contact with towns and industrial centres through improved means of communication. A liking for the amenities of civilization attracts people from the villages. There are more opportunities for infection in the increased concentration of people for education as well as for industry. The poverty of the villager makes him easily lured to the town in the hope of quickly getting rich there. Life in the city is usually associated with much increased strain both mental and physical. Not only is this true in the city, but it is equally true wherever civilization is making headway, even in the villages.

The changing conditions of life in India to-day, taken in conjunction with wide-spread infection and a low immunity, make tuberculosis an increasingly grave problem.

The Trichinopoly District Medical Association

Minutes of the General Body Meeting held at the
Government Head Quarters Hospital, Trichy,
at 5 p. m. on Saturday the
17th September 1938.

THE General Body Meeting of the above Association was held at the Government Head Quarters Hospital, Trichy, when 26 members were present.

Dr. T. N. Subramanian Iyer presided and Dr. Balammal, M.B., B.S., was At Home to the members.

After refreshments the Secretary read the minutes of the previous meeting and was adopted.

The following cases of Clinical Interest were demonstrated:

1. Fusiform Tumour. (Lympho Sarcoma) left side of the neck for differential diagnosis by Dr. Raman Menon, F.R.C.S., Trichy.
2. Pernicious Anaemia (Cured by blood transfusion) By Dr. T. V. Srinivasan, M.B., B.S.
3. Melanotic Carcinoma leg (Amputation).
4. Recurrent polypus nose.
(b) Removal of foreign body under Broncoscope.
5. Rickety Liver for differential diagnosis.

This was followed by an interesting Film Demonstration by Bayer on blood.

After the President's concluding remarks the meeting terminated with a vote of thanks to the Chair and to the District Medical Officer, Trichy.

Minutes of the General Body Meeting held at
E. R. High School, Trichy at 5 p. m. on
Saturday the 20th August.

A General Body Meeting of the above Association was held at E. R. High School, Trichy, when 26 members were present.

Dr. C. E. R. Norman, the President of the Association, presided and Dr. T. S. Balasubramanian was At Home to the members.

The Secretary read the minutes of the previous meeting. The amended resolution submitted by the Sub-Committee regarding the Honorary System was passed.

There was Clinical Demonstration on Tropical Ulcer of the foot from the Government Hospital, Trichy, by Dr. T. V. Srinivasan.

After the President's concluding remarks the meeting terminated with a vote of thanks to the Chair.

O. R. BALU,
Hony. Secretary.

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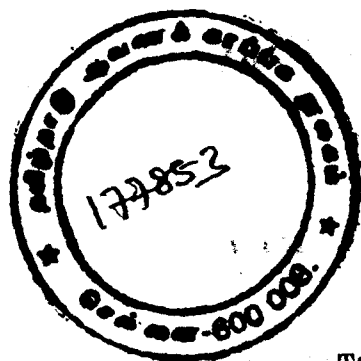
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The Trichinopoly District Medical Association
TRICHINOPOLY

Statement of Account up to the end of September 1938.

RECEIPTS			PAYMENTS		
	Rs.	A. P.		Rs.	A. P.
Cash Balance ...	64	1 3	Clerk's pay up to Sept. from 15th Aug, '38 ...	9	0 0
Bank Balance ...	210	4 2	Hire of Office for Aug. '38 ...	5	0 0
Subscription from Members ...	55	0 0	Additional Clerk in the absence of old Clerk. ...	5	0 0
Subscription from Advertisements ...	42	13 0	Stationery ...	2	0 0
			Printing ...	16	0 0
			Postage ...	12	12 0
			Baksheesh to peon for G. B. Meeting ...	1	0 0
			Sweeping Charges ...	0	4 0
			Cycle repairs ...	3	4 0
			Bank balance at the end of the month (including the deposit of the Clerk) ...	268	5 2
			Cash balance ...	49	9 3
TOTAL ...	372	2 5		372	2 5



Handwritten notes: *2m2492, N38MS, N38.5.10*

1st October 1938.

M. C. CONDILLAC,
Hon. Treasurer.

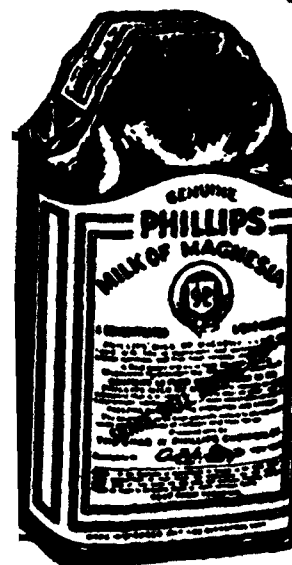
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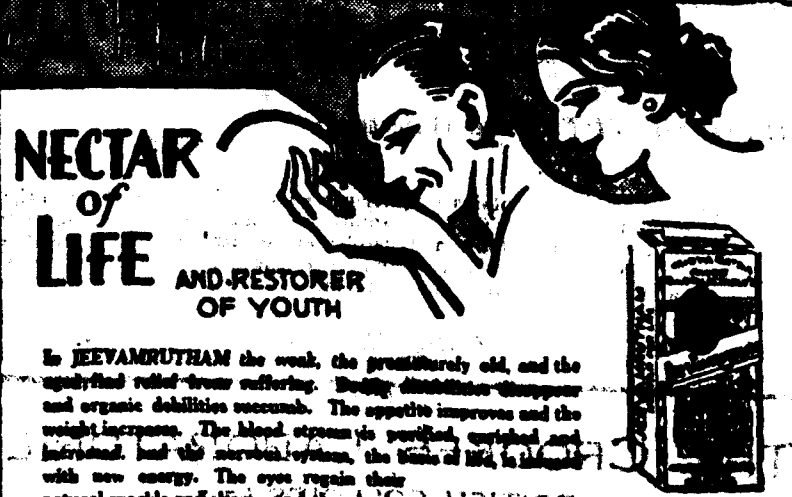
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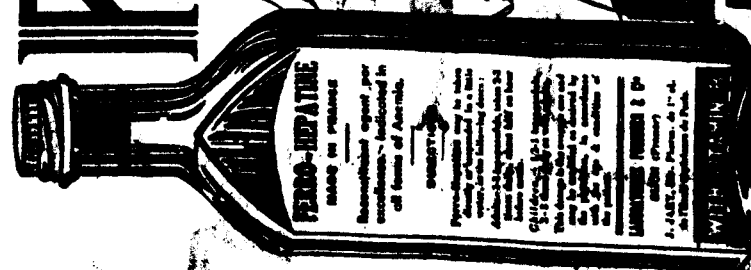
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