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The Antiseptic

A Monthly Medical Journal

Edited by

U. Rama Rau, & U. Krishna Rau, M.B., B.S.

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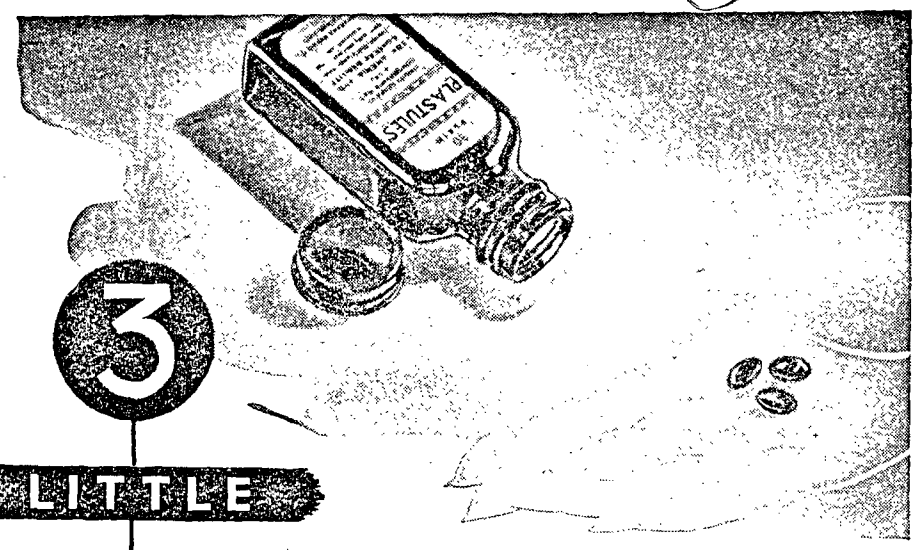

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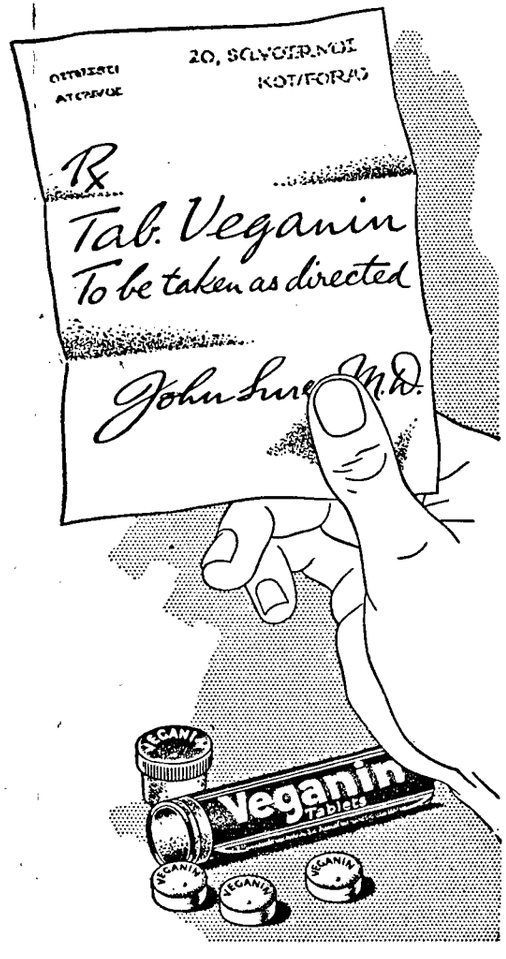

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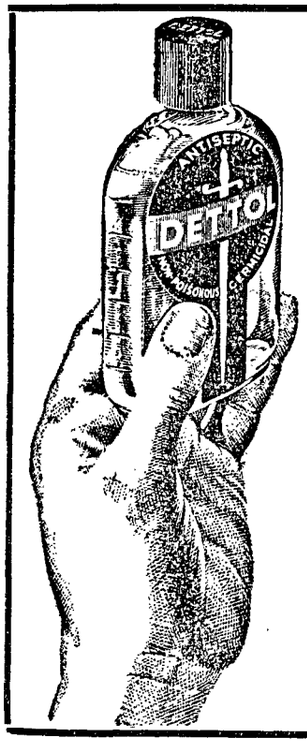

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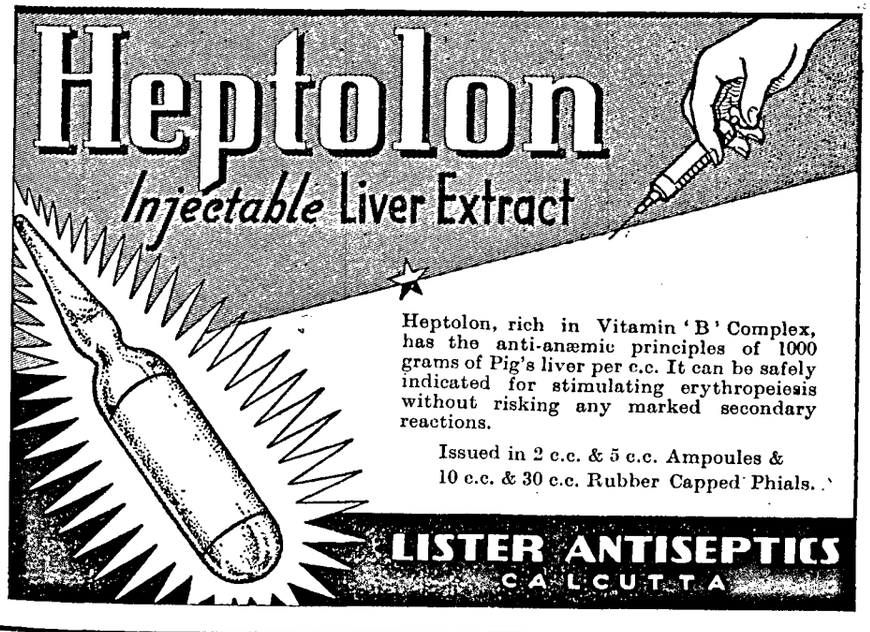

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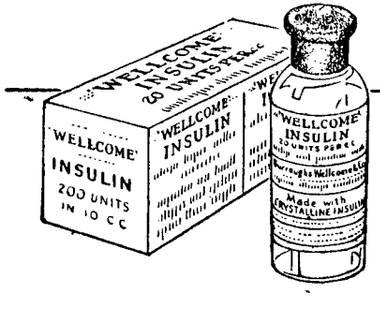

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Original Articles

The Recognition and Diagnosis of Abdominal Cavity Emergencies*

BY

F. R. W. K. ALLEN, M.A., D.M., M.A.O., (Trinity College, Dublin)., M.R.C.O.G.,

Lieut. Colonel I.M.S., lately Civil Surgeon, C.P. and Berar, and one time Superintendent, Robertson Medical School, Nagpur.

SUDDEN acute abdominal pain may be a "herald" announcing a case for all the pomp and drama of the operating theatre with its white-clad surgeons and its trim, bright-eyed sisters under the spot lights, with its scurrying menials in the dim lit passages, while outside, in some nearby shelter, anxious and trembling relatives crouch muttering consolations to each other. Or it may be a "trickster" attempting to inveigle the unsuspecting practitioner into sending his case pitching and tossing, rolling and bumping over the ill-kept, rain-swept roads to arrive, probably at night, at the hospital many miles distant, where the surgeon on being torn from his hard earned rest will find the patient dying from pneumonia or recovering after an attack of renal colic.

General Symptoms.—Abdominal cavity emergencies have only one cardinal symptom. Sudden pain in the belly. This pain may pass off or may continue. It may be severe or it may be slight. Pain in the belly does not necessarily denote an abdominal cavity emergency. It may be due to some retroperetoneal condition, it may be due to a generalised disease, it may be due to a disease within the thoracic cavity.

The pain of abdominal cavity emergencies is usually accompanied by shock and followed by collapse, but the shock may be very slight and have passed off by the time the practitioner sees the patient and the collapse may be late in appearing.

Nausea and/or vomiting is another fairly constant feature. It may be only a single small act of vomiting, concomitant with the onset of the

* Specially contributed to 'The Antiseptic'.

pain, or it may develop rapidly into the almost continuous eructation of stercoraceous material.

Constipation is usually present but in certain circumstances there may be diarrhœa.

Except in those cases of acute salpingitis which have not caused peritoneal involvement, and in cases of cholecystitis, the temperature is, usually, sub-normal soon after the onset, as a result of the shock and of the collapse, and when reaction sets in, the temperature, excluding cases of acute salpingitis or cholecystitis, will rarely rise above 102° F. A patient who suffered from a rigor and who later has a pain in his or her right lumbar region, a fever of 104° F. and a pulse rate of 140 is probably suffering from malaria, pyelitis, pneumonia or pleurisy. In pyelitis there is an increase in the pulse rate, rather greater than would be expected from the degree of fever, and when the right kidney is affected the pain and tenderness closely resemble those of a retrocæcal appendicitis.

The pulse-temperature ratio is disturbed in emergencies within the abdominal cavity so that the pulse rate is faster than would be expected for the actual temperature of the patient and this is the most reliable guide available.

Intra-abdominal emergencies often occur in previously healthy persons. They also occur in persons who have been ailing for some time, or who are chronic invalids, or like perforations of the distal portion of the ileum in enteric fever, they may supervene during the course of a protracted medical disease or even in convalescence. In passing I should like to mention that, in my opinion, perforation of the ileum in enteric fever is the result of starving and purging the patient early in the course of the disease. If the century old teaching of Graves of Dublin had been more widely followed many an untimely death from perforation would have been averted.

It is in order to avoid the disastrous consequences of sending a case of coronary thrombosis for laparotomy or the misfortune of overlooking a case of perforated typhoid ulcer until the autopsy, or of never recognising it at all, or the tragedy of allowing a young woman to bleed to death from a ruptured ectopic gestation sac, that meticulous care must be observed in taking down a history and making an examination.

If in doubt, a colleague, preferably a surgeon or gynæcologist, should be called in consultation early. Even a layman can diagnose a case of abdominal cavity emergency when the patient is reaching the stage of impending dissolution, but it will by then be too late to save either the patient's life or the practitioner's reputation. Finally, one must never forget that two or more diseases may co-exist in the same patient and require treatment simultaneously.

Case Taking.—I recommend proceeding with a case as follows:

1. *Name and caste or religious denomination and address.*—This may prove valuable. It sometimes enables fees to be collected. Europeans, Anglo-Indians and Madrasis of the middle classes appear to suffer more frequently from cholecystitis and cholelithiasis than other inhabitants of India. Acute appendicitis is rare in those castes who are vegetarians. Syphilis is common in some castes and diabetes in others.

2. *The age, sex and occupation.*—Pneumococcal peritonitis is almost confined to little girls. Intussusception is not uncommon in very young male children. Adult males suffer more from inguinal hernias and adult females from femoral hernias. Painters may suffer from lead colic. Only females of the child-bearing age can suffer from a ruptured ectopic gestation sac or a criminal perforation of the uterus. But, in this connection, it must be remembered that at a hospital in Northern India a little girl of eight years of age was admitted pregnant and delivered of a live child by cæsarian section and I myself saw a woman of fifty-five delivering herself of a husky infant.

3. *The physical and mental condition* of the patient.

4. *Particulars of the patient's digestion, defaecation, urination and menstruation.*—Male patients are tactfully asked *when* they last suffered from syphilis or gonorrhœa and what treatment, if any, they received. In the case of female patients full details should be noted about leucorrhœa, abortions, miscarriages, premature labour, still-births and live-births, with ages of children living and causes of death in those deceased with their age at the time of their demise. In both sexes a note should be made of *previous* attacks of *abdominal pain.*

5. *Exact description of the onset of the present trouble* in proper sequence of symptoms as they occurred. It is most important to know how the pain came on, whether it has remained stationary in one place, or whether it has moved, or whether it shoots and in what direction. Pain in the deltoid muscle, supraspinatus muscle or below the clavicle is due to irritation of the diaphragm, while deep pain in the scapula is caused by lesions of the gall bladder.

In peritonitis the patient lies very still and even the weight of a sheet may be unbearable on the abdomen. In colic the patient may writhe about and may find that pressure on the abdomen brings relief. Full details of any vomiting, defæcation and urination are included, and the vomitus, fæces and urine should be inspected and described. Intestinal worms are not uncommon and may be found when the vomitus or stool is inspected. They should be enquired for.

6. The *temperature*, the *pulse rate* and the *respiration rate* are charted.

7. *Inspection*:—In order that the patient may be inspected properly a good light is essential and the chest and the abdomen must be exposed and viewed as a whole. The amount and the extent of respiration, distension and visible peristalsis are important. Is there any retraction of the abdominal wall or any rigidity of the muscles or a tumour and, if so, where? Rigidity of the diaphragm is indicated by retraction of the abdomen during inspiration, this being the reverse of the normal movement. Rigidity of the psoas muscle produces flexion of the hip. The hernial orifices must never be forgotten by the eyes or by the fingers.

8. *Palpation* now follows and by this means tenderness, rigidity and palpable swellings are further elucidated. Never forget to feel for the glands in the inguinal and epitroclear regions and in the posterior triangle of the neck. They are often enlarged, discrete and rubbery in syphilis.

9. *Percussion* of the chest and abdomen demonstrates areas of dullness, resonance or hyper-resonance. Increase in the size of the liver

noted on percussion and palpation points to hepatitis or abscess, to a leaking hydatid cyst or a carcinoma. Absence or diminution of liver dullness points to free gas in the abdominal cavity or colon but it may also be due to severe hæmorrhage.

10. *Auscultate* first the *abdomen* for increased, normal or absent *peristaltic* sounds and then auscultate the chest for signs of pneumonia, pleurisy, pneumothorax, and cardiac lesions. In perforation it may happen that on auscultation of the abdomen the heart sounds may be heard with surprising clearness even in the iliac fossæ.

11. *Very important.*—Test the *upper abdominal*, and the *lower abdominal*, and in males the *cremasteric, reflexes* and look for a *scar* on the prepuce, in the sulcus, on the frenum, or on the glans penis.

12. *Urine examination.*—Before proceeding to rectal and vaginal examinations the patient should be made to pass urine or the urine should be withdrawn. About this urine the following information is required:—

Reaction, specific gravity, smell, colour, sugar, albumen, acetone and deposits after centrifuging. The laboratory where some of these tests are done may be a long way off and the diagnosis may be urgent. Every medical man can carry in his bag a small spirit lamp, red and blue litmus paper, a couple of test tubes, a tiny bottle of dilute Acetic Acid and one of Benedict's qualitative solution, some crystals of Sodium Nitroprusside, a phial of Liquor Ammoniæ Fortis, a little Ammonium Sulphate and a urinometer with its glass jar in a case. Most of the tests can thus be done at the bedside and confirmation sought from the laboratory.

13. *Rectal, and in females after marriage, vaginal examination.*—You can wash your finger afterwards if you have no finger stall but you may be unable to cleanse your reputation in some case where you neglect these examinations. Note swellings in the pelvis, tender areas, fixity of pelvic organs and balooning of the rectum. An unexpected intussusception or a new growth or a pregnancy may be found. Both examinations should be done on females, if necessary, for a rectal may supplement a vaginal examination and *vice versa*.

14. *The pupillary reflex* is to be tested for light and, if possible, accommodation.

15. Examine the *gums* for the blue line of lead. Notice in passing the condition of the tongue and the smell of the breath.

16. Examine the *reflexes* in the upper and in the lower limbs.

17. *Take a thick and a thin blood film.*—If there is time and a laboratory handy one should obtain a total white cell count, a differential white cell count and total red cell count. It is, however, possible to have a high leucocytosis without a septic focus being present though it is very uncommon.

18. *The progress* of the case especially the *pulse rate.*—A steady increase in the pulse rate with rigidity and distension within an hour or two indicates a serious visceral lesion. Steady increase in vomiting and distension points to obstruction or peritonitis. A rising pulse rate, sighing respirations and blanching of the mucous membrane are found in continued bleeding, and blood in the peritoneal cavity may produce attacks of tetany, symptoms suggestive of hysteria such as bolus in the throat and

hemianæsthesia and the most excruciating colic. It is, however, very dangerous to wait hour after hour trying to make up one's mind while the condition of the patient deteriorates and his chances of survival after operation are allowed to evaporate. Beware of apparent improvement in the general condition as shock passes off. The pulse rate is the most reliable guide, but it must be considered in conjunction with the other symptoms.

19. Have a look at the *stools* and, if possible, make a microscopic examination for ova of worms and for entamœba histolitica. I have seen entamœba histolitica infection simulate acute appendicitis and acute cholecystitis closely but there was just that want of shock, collapse, rising pulse rate and rigidity which made me advise holding off operation until the stools could be examined. Had it been impossible to have the stools examined microscopically for many hours I would naturally have performed a laparotomy rather than risk possible disaster by waiting. I have seen abdominal wounds fail to heal and fæcal fistulas persist for months after appendicectomy, because the surgeon neglected to have the patient's stools examined. A course of Emetine injections subsequently induced rapid healing. In India it is no uncommon thing for a surgeon to find a round worm in an appendix which he has just removed.

Intra-Abdominal Cavity Emergencies.—There are five vowels in the alphabet and there are five classes of intra-abdominal cavity emergencies. The word *Tophi* is a mnemonic by which may be remembered—torsions, obstructions, perforations, hæmorrhages and inflammations.

1. *Torsions* or *twists* occur more frequently in females than in males. There is only one treatment for torsions and that is immediate laparotomy. The symptoms are sudden hypogastric pain with little or no shock. Rigidity is not usually to be found at the onset and does not develop unless the case is permitted, through neglect, to develop gangrene and peritonitis. A slight rise in the pulse-rate, a touch of fever and a trace of distension are early signs. A tender, tense, rounded swelling, varying in size according to the size of the twisted organ and which may be cystic or which may be solid or which may be tympanitic and which, if not too large, is usually movable, can as a rule be felt. Diarrhœa with mucous in the stools is a common accompaniment but there may be constipation. Gangrene, peritonitis and collapse are the results of neglect or mis-diagnosis and should never be permitted to occur. The following may become twisted:—(1) ovarian cysts and tumours, (2) pedunculated subserous uterine myomata, (3) the omentum, (4) the gall bladder, (5) a Meckel's diverticulum, and (6) the cæcum or pelvic colon producing a volvulus. A volvulus usually occurs in middle-aged men. It results in absolute constipation. Though there may be fæces in the returning fluid from the first enema, there will be none from the subsequent enemata. The twisted coil becomes rapidly distended and gives rise to great distress in the lower part of the abdomen or flank. A volvulus is thus both a torsion and an obstruction.

2. *Obstructions or stoppages* may be of gradual or of sudden onset. Whatever the mode of onset, obstructions require laparotomy and they require it before the patient's condition has become desperate.

Whether the obstruction was of sudden or of gradual onset will not affect the symptoms when once the condition has become acute. There will be intense colicy central abdominal pain accompanied by varying

degrees of shock and followed by collapse and vomiting. The latter soon becomes incessant and expulsive in nature accompanied by nausea. At first the vomitus is green and bilious, while the pulse may be thin and slow and the temperature sub-normal. Constipation is absolute. The first enema may produce a result by emptying the bowel below the obstruction. Subsequent enemata will be barren. Inspection may reveal distended coils of bowel and visible peristalsis. Tenderness is unusual and so is rigidity. *Auscultation* will reveal sounds of increased peristalsis and gurgling sounds may even be heard before the stethoscope, or the ear, if no stethoscope is available, if applied to the abdominal wall. The higher up the bowel the obstruction the earlier will be the onset and the more severe will be the symptoms but the less will be the distension. (In simple constipation the pulse is very slow and the symptoms are less marked. Visible coils of bowel and visible peristalsis are not present. In simple constipation an enema should result in a good action of the bowels and bring great relief). Scybala may often be felt per rectum and may indeed be impacted there and require digging out with the handle of a teaspoon. Sometimes a foreign body in the rectum causes symptoms of obstruction and hence the paramount necessity for a rectal examination.

Do not wait for hours giving enema after enema while the patient's condition deteriorates. If the first enema produces a result and the symptoms are not very urgent wait an hour and give a second enema. If this is negative send the patient to hospital. A rapid pulse is a sign that part of the bowel is becoming gangrenous or has given way above the obstruction and immediate laparotomy alone gives a chance of saving the patient's life.

Obstructions are caused by :—(1) Strangulated external hernia which should be obvious but remember that the obvious hernia must be painful, tender, irreducible and hard, if it is the cause of the obstruction. Remember also that ill-advised taxis may have resulted in the reduction "en bloc" of a strangulated hernia without the strangulation being relieved.

(2) Internal strangulation from obturator hernia, from peritoneal fossæ, from apertures or bands, the legacy of previous inflammations or operations.

(3) Intussusception which is almost confined to babies. The patient develops attacks of screaming accompanied by pallor. Vomiting and slight distension follow. Soon there is the passage of blood and mucous from the anus and the child rapidly becomes collapsed. A banana shaped swelling may be felt in the right side or across the upper part of the abdomen. It is usually necessary to give an anæsthetic for this purpose and there must be no hesitation in doing so. In later cases the tumour may be felt in the left groin or by a finger in the rectum and the apex may even protrude from the anus where it should not be confused with a prolapse.

(4) Obstruction due to chronic peritonitis or new growths.

(5) Obstruction due to a large gall-stone or to a swallowed foreign body.

(6) Mesenteric thrombosis or embolism. (Should not be diagnosed unless some cause such as cardiac murmers, arterial disease, severe anæmia or cirrhosis of the liver is present).

(7) Volvulus which has been dealt with under torsions.

(8) Impacted fæces in or foreign bodies introduced into the rectum.

3. *Perforations or tears* can be divided into two groups. Those due to disease and those due to injuries. They require resuscitation and subsequently laparotomy at the earliest opportunity.

Perforations due to disease are characterised by the extremely sudden onset of agonizing pain in the region of the perforated viscus. Severe collapse ensues. There is marked rigidity. The patient lies absolutely still. If the diaphragm is irritated there will be shoulder tip pain or pain in the subclavicular or supra-spinatus fossa. Auscultation reveals the entire absence of peristalic sounds and even in the lower abdomen the heart sounds may be heard with a clearness that is absolutely striking. The liver dullness usually disappears as the signs of free gas and fluid in the abdominal cavity become evident. There is the history of the condition leading to the perforation. Such perforations are caused by :—(1) gastric and duodenal ulcers and duodenal diverticulosis, (2) stercoral ulcers, (3) typhoid ulcers in the third or fourth week of the disease, (4) Meckel's diverticulum, (5) diverticulitis of the pelvic colon, (6) appendicitis, (7) tuberculous ulcer, in which case the perforation is sometimes walled off by old adhesions, and (8) swallowed foreign bodies especially in lunatics and children.

In *tears* due to crush injuries and perforations due to gunshot and stab wounds and criminal abortions the symptoms and signs are variable and may constitute a dangerous trap.

In some cases there may only be a momentary feeling of sickness after the accident, the pulse may be slow, there may be no shock. The abdomen moves with respiration and there is no rigidity or tenderness. On auscultation, however, there should (except in freak cases) be absence of peristaltic sounds at least in the area of the injured segment of bowel. Other cases have transient nausea or vomiting and pain which passes off but delayed shock and collapse develop in several hours time with signs of free gas or fluid in the peritoneal cavity and pain of a colicy nature. Other cases exhibit marked shock and local signs but this is usually due to the concomitant hæmorrhage : (1) Rupture of the stomach is care, (2) rupture of the duodenum is common, (3) rupture and perforation of the small intestine is very common, (4) rupture of the colon is rare but perforation is more common, (5) rupture and perforation of the rectum is not common ; it may be the result of sexual malpraxis, (6) rupture of the urinary bladder gives rise to the signs of free fluid in the peritoneal cavity when the rent is intraperitoneal. It sometimes follows coitus in those under the influence of alcohol. The passage of a catheter usually fails to produce any urine, (7) rupture of the gall bladder is uncommon, (8) rupture and perforation of the pregnant uterus especially by unskilled abortionists. The symptoms may be slight until peritonitis sets in, (9) ruptures and perforations of the fallopian tubes and of ovarian cysts, and (10) ruptures of hydatid cysts.

Beware of buttock and thoracic wounds. They may be accompanied by concealed perforations of abdominal organs.

4. *Haemorrhages* may arise spontaneously or be the result of injury or wound perforations or ruptures of solid intra abdominal organs. After

a latent period, which may, in some cases, especially in those of ruptured spleens, last from a few hours to several days, continue. Intraperitoneal hæmorrhage produces extreme tenderness of the abdomen and restlessness and may even cause the patient to writhe about in agony on the floor like one demented. There is usually fainting and vomiting at the outset. The patient becomes pale and sweating. The pulse is rapid and running. Rigidity is absent and later the sounds of peristalsis also disappear. On percussion, if the hæmorrhage is severe, the whole of the abdomen is resonant because the distended bowel floats up on the blood. Similarly there may be dullness in the flanks which will shift if the patient is rolled on to his side. The patient may develop air hunger, tetany and symptoms suggestive of hysteria. I was completely baffled by one case of agonising, extenuating colic in the left hypochondrium with tetany and hysterical symptoms until his abdomen became distended with blood and peristaltic sounds disappeared. Some cases have pain on top of the shoulders.

(1) Ruptured spleen may result from severe injury or from an injury so slight that the patient has no recollection of it. Some authorities describe spontaneous rupture. The hæmorrhage is so free and severe that unless promptly diagnosed and treated the patient will surely die.

(2) Ruptured liver may be severe or slight.

(3) Rupture of the right kidney occurs alone or in conjunction with injury to the liver. Similarly rupture of the left kidney may occur alone or in conjunction with injury of the spleen. In addition to the signs of intraperitoneal hæmorrhage there will be hæmaturia unless all the urine is leaking into the abdominal cavity.

(4) Rupture of the pancreas and acute hæmorrhagic pancreatitis may both result in intra-abdominal hæmorrhage. The resulting shock is profound and the pain excruciating.

(5) Perforation or rupture of the aorta, vena cava, splenic or mesenteric artery or of an aneurism.

(6) Ruptured ectopic gestation sac occurs in women of the child-bearing age. There has usually been some slight irregularity about the last menstrual period and there may have been colicy lower abdominal pains for a few days. Suddenly the patient experiences hypogastric pains and, in some cases, pain on the top of the shoulders, and may vomit and faint. Some cases show all the symptoms and signs of severe hæmorrhage into the peritoneal cavity. Other cases recover temporarily though usually there is pain and tenderness in one or other iliac fossa. There may also be externally some slight uterine bleeding. Do not be deceived into believing this to be merely a rather severe menstrual upset. Perform a vaginal examination. A tender and possibly boggy swelling will be found in the posterior fornix and the patient may feel pain when the cervix is moved by the examining finger. Cullen reported the appearance in the skin of subumbilical circumscribed echymoses in some cases.

(7) Ruptured ovarian blood cysts give rise to similar symptoms.

5. *Inflammations* in theory should take several hours during which full symptoms gradually develop but, in actual practice, the onset often passes almost unnoticed by the patient until his bowels refuse to move especially if the patient is a farmer. I have seen a man walk into a

Dublin Hospital, having travelled by train from a place 130 miles distant, and when his abdomen was opened shortly after his admission it was found full of frank pus and a perforated appendix was discovered free of all adhesions.

In intra-abdominal cavity inflammations the type of pain and vomiting varies in accordance with the organ affected. There may only be a transient attack of pain and vomiting in the early morning. The patient then appears to be better or even alright for a varying number of hours. Then as *peritonitis* develops the patient feels a stabbing or an aching pain which gradually increases in intensity. Vomiting sets in, at first green in colour, later becoming darker and incessant. The pulse rate increases. The temperature rises but not much owing to collapse. The abdomen is rigid. At first locally over the site of the original lesion and later over the whole abdomen generally. Tenderness becomes acute. No peristaltic sounds can be heard, there is absolute constipation and the patient moans in distress as distension sets in and replaces rigidity.

1. *Acute appendicitis* occurs more commonly in meat-eating young people. The first symptoms may be very slight, so slight as to resemble indigestion. The patient may develop a transient central abdominal colicky pain, or may develop a dull ache at the umbilicus which passes to and settles in the right iliac fossa. He may vomit once or feel nauseated just after the onset of the pain. His bowels probably acted the previous day or, in a child, the pain may have resulted in a stool and even several stools. The tongue may be moist and clean. The temperature may be normal and as people's pulse rates are rather variable the pulse rate of 80 or so may not convey much to the unwary. Careful examination will however reveal tenderness on palpation over the appendix. Remember that the appendix may lie in several positions and that in the case of a pelvic appendix the tenderness may only be elicited by rectal examination, or the pain and tenderness may exist on the left side as well as on the right. An inflamed appendix lying behind the cæcum and running upwards and outwards may give rise to a pain which is felt to pass out in the loin. An inflamed appendix which lies over the right ureter or spermatic vessels may produce a pain radiating into the testicle or a constant desire to micturate, and even pain in the tip of the penis. An inflamed appendix hanging over the pelvic brim may produce tenesmus and mucus in the stools. Such mucus must be examined for the entamœba histolitica or ova of intestinal worms. Sometimes the pain is felt passing down into the medial side of the right thigh, due to irritation of the psoas or piriformis sheath. A sudden exacerbation of the symptoms indicates perforation.

2. *Acute cholecystitis* usually occurs in fat, flabby females of forty or fifty years of age. There is often a history of biliary colic or suggestive of gall stones. The patient develops severe lancinating pain in the region of the gall bladder. The pain shoots through to the right shoulder blade. There is bilious vomiting, a rapid pulse and a temperature up to 103° or 104° F. There is rigidity and great tenderness in the right hypochondrium. The gall bladder may sometimes be felt as a tender, rounded swelling which moves with respiration. If symptoms increase, collapse occurs, and pain, rigidity and tenderness spread all over the abdomen, while the pulse rate increases and the swollen gall bladder disappears, perforation has probably taken place. Perforation is confirmed if pain shifts from the scapula to below the clavicle or to the deltoid due to extravasated bile irritating the diaphragm.

3. *Acute salpingitis* often comes on with a rigor and fever up to 103° or 104° F. but it may come on more insidiously. There is pain in the hypogastrium and in one or more, usually both, iliac regions. The pain may shoot down the inner side of one or both thighs. Palpation may reveal such tenderness and rigidity as will prevent any useful information being obtained on bi-manual examination unless an anæsthetic be given. If an anæsthetic is given and the case is seen during a first attack of salpingitis, no swellings will be found in the fornices but the tubes may sometimes be felt like stiff cords running backwards and outwards from the uterine cornua. Masses are only felt in the fornices in second and subsequent attacks. Vomiting is rare and the pulse temperature ratio remains undisturbed unless and until the peritoneum becomes involved. There is often a vaginal discharge and pain or discomfort on micturition and defæcation. Spread to the peritoneum or abscess formation are indicated by a rising pulse rate, vomiting, sweating and general deterioration in the patient's condition. Acute salpingitis, being usually of gonococcal origin, often follows soon after marriage and coincides with a menstrual period. It is the so-called "honeymoon appendix" of western countries and is the result of inadequately treated gonorrhœa in the male. It may follow abortion or labour, the infection having remained dormant till lighted up by stress. Some cases, especially in adolescent or young adult women, are tubercular in origin. Consult a gynæcologist and not a surgeon if the former is available. The treatment is usually conservative and laparotomy is to be avoided if possible.

4. *Pelvic peritonitis* which must be differentiated from salpingitis. The patient lies on his or her back with his or her thighs flexed. A history should be obtainable of some intra-pelvic lesion, either appendicitis, salpingitis, injury to the bladder, gun-shot wounds of the buttocks, recently attempted or successful abortion, or even full term labour. Pain, tenderness and rigidity over the abdomen below the umbilicus with pyrexia, a rapid pulse and usually vomiting are present. Rectal and vaginal examinations, which may be very painful to the patient, may reveal indurated swellings in the region of the appendix or tubes or just a hot tender balooned rectum. Or, there may be a tense cystic swelling in the Pouch of Douglas. Some seemingly primary cases are tubercular in origin.

5. *Diverticulitis of the colon* resembles left sided appendicitis but occurs in corpulent, constipated, middle aged persons usually of the male sex. Rarely a diverticulum off the ascending or transverse colon becomes inflamed, resulting in somewhat perplexing symptoms, but in general resembling appendicitis.

6. *Meckels diverticulitis* is difficult to differentiate from appendicitis except at laparotomy.

7. *Acute pancreatitis* is rare and when it does occur it affects middle-aged fat men. There is a sudden onset of agonising epigastric pain with vomiting, severe shock and collapse. The pulse is small, running and very rapid. The temperature is subnormal and the abdomen distended, soft and very tender.

8. *An appendix abscess* comes on after appendicitis has been present for more than three days. There is localization of pain, tenderness and rigidity in the right iliac fossa where a rounded tender swelling, which is fixed and does not move with respiration, can be felt.

9. *Acute generalised peritonitis* almost invariably follows some other acute abdominal catastrophe. There is intense stabbing pain all over the abdomen and incessant vomiting. Rigidity is marked all over and tenderness is extreme. Later there is marked distension. Constipation is absolute and no peristalic sound can be heard on auscultation. There is a steadily rising pulse rate. The temperature may be a little raised or it may be subnormal.

10. *Pneumococcal peritonitis* occurs chiefly in small girls. It comes on suddenly without any causative lesion. The pulse-respiration ratio is altered from four to one to three or two to one. The alae nasi may be seen dilating and the chest moving at an increased rate of respiration. Otherwise symptoms are as for generalised peritonitis mentioned above.

11. *Regional ileitis* and localised phlegmonous enteritis are uncommon conditions arising in the last two feet of the ileum or other short lengths of the small intestine. There is sudden onset of acute abdominal pain and vomiting. There may be rigors and a high temperature. Rapidity of the pulse and rigidity are present.

I desire to stress the terrible danger of prescribing one of the Sulphonamide group of drugs plus rest and Poultices when dealing with cases of intra abdominal emergencies unless absolute certainty exists as to the diagnosis. One can picture for oneself what such a line of treatment will produce in a case of ruptured ectopic gestation or in a case of perforated duodenal ulcer or in a case of volvulous or a torsion of an ovarian cyst. Similarly one must be beware of doing a posterior colpotomy in a case of ruptured ectopic pregnancy under the mistaken impression that it is an abscess in the Pouch of Douglas.

Other Conditions Producing Symptoms Resembling Abdominal Cavity Emergencies.—1. *Constipation* which may resemble an obstruction very closely, can be recognised by the slow pulse and absence of visible peristalsis. On auscultation the sounds of peristalsis will not be abnormally increased. Flatus will be passed and enemata give relief.

2. *Biliary colic* resembles acute cholecystitis but the vomiting tends to be slight and retching and belching take the place of the severe vomiting of cholecystitis. The pain in the gall bladder region and in the right shoulder blade is grinding and excruciating. There is only slight rise of temperature or of pulse rate and pressure and movement relieve the pain.

3. *Renal and ureteric colic* on the right side may be mistaken for appendicular colic. The patient may even roll about in agony while pain shoots from the back or loin into the groin, testicle or thigh or in the case of a woman into the labia. There may be vomiting, sweating, shivering and frequency of micturition. Red blood corpuscles and crystals are usually to be found in the urinary deposit. A stone low down in the ureter may give rise to symptoms resembling pelvic appendicitis.

4. *Intestinal colic* which may be caused by unsuitable food or by lead or by a small fæcolith in, or kink, of the appendix, comes on suddenly with acute twisting pain around or below the umbilicus. The pain is relieved by pressure. There is no collapse but there may be vomiting. Sometimes there is diarrhœa and sometimes as in lead colic, constipation. The pulse does not exceed 100 and the temperature is normal unless the case is going to develop dysentery or cholera. In lead colic there is a slow hard pulse and a blue line on the gums. Colic may also result from chronic

Cholera Asiatica*

BY

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WE do not yet fully know why epidemics of cholera appear regularly like the hands of the clock in particular season all over our country and we are not in full possession of knowledge regarding the exact ætiology of the disease.

I am really lucky that I have got this opportunity again, after six years, to address you on the same subject. We have surely advanced a bit in the curative side with certain improved modifications during the last 6 or 7 years. As the time at our disposal is very short for such a big subject, I have to confine only to the most salient and practical aspect of the disease, keeping an eye always that I may discuss sufficiently with you the modern treatment, both prophylactic and curative as well as the general management of the disease.

May I crave some indulgence from you, so that I would venture to present a few new ideas which I have actually come across while dealing with several thousand cholera cases under my charge during the last 10 years. It has now become my honest conviction that while taking up a cholera case, if you watch and observe keenly and do the right thing in right time, you would perhaps never lose a case.

The following humble advice should be our guiding principles while taking up a case.

1. Treat the life entrusted to you as your own kith and kin.
2. Try to inculcate confidence in your patient, encourage and convince him about his sure recovery.
3. Text-book description of the disease cannot apply to many cases; each case is an individual problem and requires treatment accordingly; no charted routine treatment can be followed.
4. Do not interfere in a case of cholera unless such interference is absolutely necessary.
5. If you can save the patient from the acute moribund collapsed condition, do not allow him to die in the later stages from post-choleric complications.
6. Never lose hope while there is life.
7. Do not stop active treatment abruptly because, late fatal complications are directly due to haphazard and imperfect treatment in the early acute stages.

Definition of the Disease:

I. **Short historical account of cholera.**—Sanskrit writers of about 400 B.C. and Hippocrates gave descriptions 1817—virulent attacks in lower Bengal. Since 1817 seven pandemics spread through three distinct routes of travel and commerce. (1) Afganisthan—Persia—Central-Asia—Eastern Russia—Caspian Sea—interior of Russia along the Volga. (2) Persian Gulf to Turkish Arabia, Persia—Turkey in Asia—Black Sea—Constantinople and the Danube. (3) Indian Ocean—Red Sea—Aden—Mecca—Egypt and the countries bordering the Mediterranean.

* Specially contributed to 'The Antiseptic'.

II. **Epidemiology.**—Meteorological relationship, seasonal incidence, periodicity, pilgrimage, fairs, festivals—endemicity and spread of the disease to non-endemic places, endemic centres in India and outside India, relation to surface and subsoil water,—why epidemics usually start in the hot summer months.

III. **Ætiology.**—(1) Cholera vibrio is only a contributory factor plus other factors, known or surmised. Most of the vibrios are killed in the acid contents of the stomach. (2) PETTENKOFFER's X, Y, Z theory.—X=seed, Y=soil or host, Z=environments, all the factors must be in suitable combination to produce disease. (3) Most people are *potentially infected* during the suitable season and any distrubance in the local intestinal condition (allergic manifestation ?) would precipitate an acute attack.

IV. (1) *Bacteriology*—morphology, agglutination—Ogwa, Inaba. (2) *Toxins*—endo, exo, amines, lysin fraction. (3) *Bacteriophage*—production in the convalescents. (4) *Post-mortem* findings.

V. **Blood-changes.**—R.B.C., W. B. C., *specific gravity* of blood,—method of taking and indication obtained,—*loss of fluid*—relation of serum and corpuscles (45% corpuscles, 55% serum-normal,—mild cases—loss of 35% of fluid from serum,—moderately severe cases–53%, most severe and fatal cases 64% or almost *2/3 of the blood), loss of chlorides,*—stools contain about 1% of NaCl or for every 100 grammes of stools there is a loss of about 1 ounce—*reduction of alkalinity* of the blood.

VI. **The Carrier Problem.**—(1) *Incubatory,* (2) *convalescent*—36% of patients show organisms in their stools before discharge from hospital (Greig),—(3) *healthy*—disputed by many, and (4) *contact*–about 2% after exposure.

VII. **Methods of Transmission.**—Water, milk, food, fly, contact.

VIII. **Clinical Picture of the Disease** incubation period.

Campbell Hospital grouping—(1) *Mild cases*—10% of admissions—only one or no I. V. injection—very important from public health reasons. (2) *Severe cases*—50%—3-4 I.V. injections. (3) *Very severe cases*—30%—6-10 I. V. injections. (4) *Fatal cases*—10% usually terminate in fatality inspite of repeated I. V. injections.

Initial stage of *premonitary diarrhoea*—stool matter, yellow colour, *algid stage* or stage of *evacuations*—vomiting, watery motions, mucus flakes, absence of bile, *rice water, stage of collapse*—complete suppression of urine, very feeble or no pulse at the wrists—*'living death'*—due to *extreme dehydration,* heart does not receive enough blood—exact *picture of secondary shock*—primary *weakness* of *cardiac musculature* or combination of both factors of great therapeutic significance—*stage of reaction,*—return of the pulse at the wrists, rise in B. P., rigor, pyrexia, hyper-pyrexia—of grave concern, may lead to comatose state—never to return to consciousness—how to minimise serious reactionary complications ? secretion of urine—*optimum quantity* 40 ounces in 24 hours—*re-adjustment of vascular equilibrium—stage of convalescence—post-choleric manifestations.*

IX. **Differential Diagnosis.**—(1) Acute bacillary dysentery, (2) algid malaria, (3) food-poisoning, (4) arsenic poisoning, and (5) any other moribund condition with collapse-remember *combination of multiple diseases* in the same patient.

diverticulitis. I saw a case due to eating too much "Kellogs all bran" which came very near to obstruction and which was difficult to differentiate from it until repeated high enemata produced masses of bran.

5. *Pancreatic colic* gives rise to severe paroxysmal central abdominal pain. It may be due to a calculus but I imagine that pain in diabetic colic may really be of pancreatic origin.

6. *Heat cramps* may affect the abdominal muscles of workers in stokeholds, miners or soldiers on the march, especially after drinking large quantities of plain water to alleviate thirst. The urine will be found almost free of chlorides.

7. *Visceral neuralgiae* or muscle pains may be due to syphilis, herpes zostor, migraine, spondylitis, angina pectoris or fibrositis. Look for signs of heart disease or nervous disease. In tabes dorsalis of the upper thoracic roots the knee jerks will be unaffected, so one must be beware of this trap but here should be slight but obvious discrete rubbery enlargement of the superficial lymph glands and the W. R. in the C. S. F. is usually positive. There may be an old scar on the penis.

8. *Atheroma* of the abdominal aorta (angina abdominalis) may cause colicky pain, nausea and distension resembling a mild degree of obstruction.

9. *Coronary thorombosis* comes on at night or while the elderly patient is resting. There is sudden severe epigastric pain accompanied by shock, restlessness and collapse. The blood pressure is often on the low side and the temperature slightly raised. The heart sounds are very weak and the patient is slightly cyanosed or flushed. Pericardial friction can often be heard.

10. *Diabetes* is a rare cause of central abdominal pain. I have only seen one case and it was a mild one. Cases have been reported with intense abdominal colic (but made worse by pressure), tenderness, rigidity, spasm of the inter-costal muscles, rapid pulse and respirations and high leucocytosis but with subnormal temperature and loss of reflexes in the lower limbs.

11. *Pyelitis* is common in women and may appear during the first or second month of pregnancy. It is usually right sided. There is pain and tenderness in the loin which may radiate round to the hypogastrium. There may even be vomiting and rigidity. The temperature rises to 103° F. and the pulse rate is rapid. The urine has a peculiar fishy smell and may become opalescent. Albumen and pus cells are usually to be found but one must be beware of intermittent excretion.

12. *Uraemia* often gives rise to intense vomiting, abdominal distension, sub-normal temperature and collapse. It may closely resemble jejunal obstruction.

13. *Henoch's purpura* may resemble intussusception but the blood passed per rectum is bright red in Henoch's purpura and purpuric spots, which may be mistaken for old flea bites, are usually present.

14. *Abdominal influenza* often resembles mild appendicitis except that the tenderness is more diffuse over the abdomen.

15. *Enteric fever* at the commencement of the disease may cause pain and tenderness in the right iliac fossa. The slow pulse rate and the atropine test should prevent a mistaken laparotomy.

16. *Early pneumonia and diaphragmatic pleurisy* especially in children may cause pain, tenderness and rigidity of the abdomen. When the pleural covering of the diaphragm is irritated pain at the tip of the shoulder or in the sub-clavicular or supra-spinatus fossæ is produced.

17. Spontaneous *pneumothorax* gives rise to sudden severe epigastric pain and collapse which closely imitates a perforated gastric ulcer.

18. *Dietl's crisis* due to kinking of the ureter in a movable kidney produces pain, rigidity, vomiting, rapid pulse and collapse. The kidney is usually palpably enlarged, tender and mobile. It may be possible to manipulate it back into place.

19. *Mesenteric adenitis.*—I have opened the abdomen of several patients who complained of symptoms resembling mild early appendicitis. After removal of a normal appendix and a search for another abnormality I have failed to find anything but discrete rubbery glands, the size of a French bean, throughout the mesentery. My pathologist could only report signs of chronic inflammation present in the gland specimens removed.

20. *Malaria* can mimic appendicitis closely, so one must not neglect to take a blood film and examine it. One must not forget that a patient might have both appendicitis and malaria simultaneously.

21. *Acute adrenalitis* produces symptoms very similar to acute pancreatitis. There may in addition be convulsions and coma. Addison's disease sometimes gives rise to attacks of abdominal colic.

22. *Catarrhal enteritis* produces vomiting, pain, tenderness, fever and diarrhœa. I saw such a case in consultation and later performed the autopsy. The resemblance to high jejunal obstruction or peritonitis was only superficial but might have misled the uninitiated.

23. *Sudden displacement* of the *gravid uterus* early in pregnancy such as might result in jumping from a train or during violent exercise produces acute pain and collapse. Vaginal examination should help to elucidate the problem.

24. *Splenic embolism* gives rise to acute pain and rigidity over the region of that organ. It should not be diagnosed without a cause being present. Friction might be heard by the stethoscope over the spleen.

25. *Pott's disease* in children is mentioned by some authorities. It is easy to turn a child on its side and to examine the spine.

26. *Hysteria* can mimic an acute intra-abdominal emergency in the same way as it can mimic most lesions.

27. *Amœbic typhlitis* and *amœbic hepatitis* may result in acute pain and rigidity resembling acute appendicitis or cholecystitis. The tenderness is however more diffuse, the pulse-temperature ratio is not disturbed and there is absence of shock or collapse. The appendix is often chronically inflamed and should be removed after a course of treatment with Emetine and Carbarsone and not before treatment unless acute appendicitis supervenes.

28. *Pericarditis* may give rise to epigastric pain, giddiness and vomiting combined with fever and a rapid pulse. There may be pain under the left collar bone.

29. Intestinal *worms*, especially round worms, give rise to symptoms remarkably like appendicitis and the lump felt is due to a mass of worms in the cæcum. There is often a worm lying in and irritating the appendix. The patient often vomits a worm and ova are passed in the fæces.

X. **Prognosis in Cholera.**—Always pronounce a guarded opinion,—you can keep the life going for some time by your treatment. Nature must be benign to re-establish vascular equilibrium, otherwise cure is not possible. *Infants, children* with associated round-worm infection, *old people* over 50,—granular kidneys—a natural sequence of long-living unusually higher B. P. is necessary for secretion of urine—greater chance of uræmia later—*cases of long duration* with continued suppression of urine before coming under treatment,—*Vaso-motor-paretic cases,—persistent anuria, pregnant women,* association with *complications.*

XI. **Treatment of Cholera.**—*Prophylactic, Curative.*—Drugs, Salines, bacteriophage, *special treatments* : symptomatic, treatment for post-choleric complications.

Prophylactic—early diagnosis, notification, isolation-hospital or home-screened room with trained attendants, *education and propaganda*—rouse the sanitary consciousness of the people—a sacred duty of all medical men, *immunisation*—herd immunity, individual protection cannot be guaranteed. Kolle's vaccine,—now used in dead cultures, smooth colonies (A.G.) 24 hours growth—of high antigenic power, expert control, .4-.8 Carbolic. 1 c.c.=8000 mills. organisms. SHIGA (1918) *sensitised vaccine,*—Vibrios treated with specific anti-serum—immunity quick, lasts short, not yet practised in this country. Bilivaccine, worth trial where inoculations are not possible, believed to confer immunity for a year. Dr. J. W. Tomb's *anti-cholera mixture*—one drachm in ½ oz. of water once or twice daily have been advocated.

Water supply.—Chlorination, permanganation, boiling, reserve tanks and wells, protection of foods and drinks against flies, *concurrent and terminal* disinfection.

Curative treatment : *Drugs orally.*—Oral administration of any drugs during the acute collapse stage seems to be useless as nothing can be absorbed from the stomach or intestines. Often such drugs are immediately vomited out. Calomel in fractional doses, Pot. Permanganate, Glucose, Alkaline, stimulant and carminative mixtures, Coramine, Cardiozol, Adrenalin, Bismuth, Castor-oil, Chloretone, Kaolin, Tinct. Iodine.

Drugs parenterally : *Atropine in therapeutic dose.*—Pituitrin, Pitressin, Caffeine et Sodi-benzoas, Adrenalin, Camphor-in-ether, Eserine Sulph., Strychnine, Emetine, Coramine, Glucose, Cardiozol, Anti-cholera Serum.

Special drugs.—Bacteriophage, Malachite Green, Acriflavin S. G., S. X. D., Septanillam, M & B 693, Diseptal-B. etc.

Treatment by Salines. I. V., subcut., oral, rectal, intra-peritoneal.

Intravenous use of Salines was *first introduced* in the treatment of cholera by LATTA and MACKINTOSH in Edinburgh during the first English pandemic of 1831-1832, the mortality in 166 operations was 84%. A. J. WALL (1893) used 0.4% NaCl and 0.2% Sodium Carbonate dissolved in sterile water. In severe cases as much as 5–6 pints were given and repeated as often as necessary. WALL lost a little over 70% in 193 transfusions. KENNETH MCLOYD (1907) used 60 gr. NaCl and 30 gr. of Sodium Bicarbonate in one litre or 35 ounces of distilled water. The mortality remained at about 60% for natives at Calcutta and 80% for Europeans up to 1907. Then came L. ROGERS (1907) to relieve the suffering humanity,

whose scientific line of treatment is being scrupulously followed by the present medical world.

The rationale in the treatment of cholera in the early collapse stage is to counteract and replenish the evil effects of the blood changes following rapid dehydration by repeated use of intra-venous Salines, in order to dilute and increase the blood volume. This requires a good deal of discretion and judgment on the part of the attending physician.

In the cholera ward of the Campbell Hospital, Calcutta, Sodium Bicarbonate in regulated doses is given intra-venously earlier. This practice reduces the number of I.V. Salines to minimum, incidence of fatal post-choleric uræmia has also been considerably reduced. The relative inanition resulting finally in ketosis and depletion of alkalies from the blood are the main contributory causes of uræmia. In the Campbell Hospital, CHATTERJEE in collaboration with CHOPRA, MALLYA and NAPIER has introduced some changes in the composition of Saline infusions and thereby modifying Roger's and Ganguly's Salines. Clinically it is giving better results and the incidence of uræmic cases has been appreciably reduced. The results, though sub-judice, has been given in the appendix roughly.

Campbell Hospital technique :—Duration of disease *within 24 hours—Hypertonic Saline* in adequate amount,—*over 24 hours but within 48 hours—Normal Saline with Soda,—over 48 hours—Hypotonic Saline et Soda,*—later repeat Hypotonic Saline over and over again, or 4% Soda solution, till patient's condition fairly improves.

Indications for I.V. Salines—guiding principles,—suppression of urine, shrivelling, cyanosis, painful cramps, rectal temperature, specific gravity of blood, any lung lesions,—active treatment to be rigidly continued till at least 40 ounces of urine passed in 24 hours.

How much quantity.—Specific gravity—extent of dehydration—remember children, old people, delicate women. Average specific gravity of a moderately severe case ranges from 1062–1066 (normal being 1054),—3-3½ pints at one sitting,—never exceed,—repeat after 4 hours, and as often as necessary, bigger amount—risk of œdema of lungs and precordial distress —supplement by 1 pint of Normal Saline subcutaneously on the outer side of the thigh, never in the axillæ,—*exact amount directly depends on the patient's individual condition,*—before I.V. injection, Atropine for cardio-vascular condition and as a preventive against reactionary troubles,—*never inject* Atropine in a patient with *high rectal temperature* and *tympanitis,*—Pitressin would be excellent if available,—hesitate to inject Pitressin intra-venously,—why ?

Varieties of Saline :—Hypertonic is the thing of choice in the first instance, succeeding ones should consist of salines with gradually increased doses of Soda Bicarb. *Rate of flow.*—usually 4 ounces a minute, in very low cases decrease the rate. Every time ascertain if blood has to be diluted and Soda has to be pushed in further, then pick up Saline,—Hypotonic or 4% Soda. The dose of 4% Soda must not exceed 8-12 ounces at a time,—be careful while infusing soda solutions,—danger of infiltrating into the subcutaneous tissues,—Glucose 25% (200-300 c.c.) with each I. V. injection, administer Carbohydrate diet (soft rice, Lactogen etc.) at the earliest opportunity to eliminate the vicious circle of ketosis.

Post-choleric complications.—(1) *Uraemia*, (2) pneumonia, *œdema of lungs*, bronchitis, (3) exposure keratitis, corneal ulcerations, (4) *hiccough*, (5) persistent vomiting, bilious vomiting, (6) septic parotitis, (7) *tympanitis*, (8) cholera-typhoid, (9) allergic manifestations *e.g.* urticaria, vaso-motor disturbances, (10) bed-sores, (11) gangrene of toes, penis, vulva, (12) progressive asthenia with wasting, (13) hypochlorhydria, (14) toxæmia and convulsions in children, (15) abortion, miscarriage, still-birth, (16) cellulitis, suppuration and other inflammatory troubles, (17) continued pyrexia due to some other associated condition, and (18) sudden death.

Post-choleric uraemia.—If you can keep a strict eye on your patient this fatal complication would be unnecessary, it is the outcome of indiscreet and imperfect treatment in the early acute stage,—*danger signals* of impending or *threatened uraemia* or pre-uræmic stage of uræmia,—you can smell in the early threatened stage,—*treat*—the patient may escape death,—once uræmia sets in, in right earnest, cure is not possible,—I. V. Alkalies, Castor oil, Atropine, Coramine, diuretics etc.

Differential diagnosis of uræmia.—Combination of multiple diseases in the same patient, cholera with M.T. infection, diabetic coma, cerebral hæmorrhage, uræmia due to other pre-existing conditions, epilepsy, meningitis.

APPENDIX

A.—*Mortality figures* in the Cholera Ward of the Campbell Hospital.

YEAR	ADMISSION	DEATH	MORTALITY
1926	1559	369	23.73%
1927	2156	522	24.15%
1928	1916	515	26.88%
1929	2083	439	21.07%
1930	1646	298	18.11%
1931	1564	309	19.75%
1932	1279	262	20.48%
1933	1233	212	17.19%
1934	1312	227	17.30%
1935	2105	322	15.29%
1936	2023	304	15.02%
1937	740	99	13.40%
1938	1676	216	12.89%
1939	2678	225	8.40%
1940	1867	155	8.30%
1941*	4622	532	11.40%

B.—List of *notifiable diseases in Bengal*:—Anthrax, chicken-pox, dysentery—bacillary and amœbic, measles, whooping cough, relapsing fever, tuberculosis of all forms, typhus fever, yellow fever, influenzal pneumonia, epidemic dropsy, small-pox, meningitis, diphtheria, cholera, plague, enteric fever, leprosy.

C.—*Composition of Saline solutions*, used in the cholera ward of the Campbell Hospital, Calcutta.—

* This year saw the biggest epidemic in Calcutta and therefore a higher mortality figure. Out of 532 deaths, 115 came to the hospital in a hopeless condition, only to die within a few hours. If we take out this figure, the *corrected mortality would be 9.20%*.

Dr. Ganguly's Salines (Old).

1. Hypertonic Saline.

Sodium Chloride	... 120	gr.
Calcium Chloride	... 4	gr.
Water	... 1	pint.

2. Normal Saline et Soda.

Sodium Chloride	... 90	gr.
Sodium Bicarbonate	... 60	gr.
Water	... 1	pint.

3. Hypotonic Saline et Soda.

Sodium Chloride	... 60	gr.
Sodium Bicarbonate	... 160	gr.
Water	... 1	pint.

4. 4% Soda solution.

Sodium Bicarbonate	... 340	gr.
Water	... 1	pint.

Dr. Chatterjee's Salines (New)—being used since February 1940.

1. Hypertonic Saline.

No. 1. Sodium Chloride	... 140	gr.
Calcium Chloride	... 4	gr.
Water	... 1	pint.
No. 2. Sodium Chloride	... 140	gr.
Water	... 1	pint.

2. Normal Saline et Soda.

Sodium Chloride	... 90	gr.
Sodium Bicarbonate	... 90	gr.
Water	... 1	pint.

3. Hypotonic Saline et Soda.

Sodium Chloride	... 60	gr.
Sodium Bicarbonate	... 180	gr.
Water	... 1	pint.

4. 5% Soda solution.

Sodium Bicarbonate	... 440	gr.
Water	... 1	pint.

5. Normal Saline.

Sodium Chloride	... 90	gr.
Water	... 1	pint.

D.—*Comparative results* of cases treated with *old and new Salines* in the Cholera Ward of the Campbell Hospital, Calcutta.

Series	Number of cases treated	Death	Mortality	Number of hopeless cases who die within a few hours after admission	Corrected Mortality
New Saline ...	859	58	6.7%	24	4.07%
Old Saline ...	861	67	7.7%	16	6.03%
Total ...	1720	125	7.3%	40	5 06%

E.—*Results of treatment of cholera by different methods.*

Treatment	Number of patients treated	Deaths	Mortality
Calomel ...	75	9	12.0%
Potash Permanganate ...	37	4	10.8%
Essential oils ...	46	4	8.7%
Choleraphage ...	43	1	2.3%
M & B 693 ...	43	4	9.3%
Total ...	244	22	9.0%

N. B.—There was appreciably no difference in the mortality in the cases treated with Calomel, Pot. Permanganate, essential oils, M & B 693. The patients treated with Pot. Permanganate took longer to recover and there was tendency for the vomiting to persist longer, convalescence was delayed. Recovery was slow in the patients treated with essential oils. The patients treated with Calomel and M & B 693 recovered rapidly and convalescence was un-eventful. The results of choleraphage therapy are striking and are sufficiently encouraging to justify the adoption of choleraphage as a routine measure in the treatment of cholera.—Pasricha, Chatterjee 1939.

F.—*Diseptal-B* (Para Amino Benzyl Sulphonyl-Para Amino Benzene Methyl Sulphonamide).

Treatment	Number of patients treated	Deaths	Mortality
Diseptal-B ...	329	24	7.29%
Control ...	460	58	12.69%

G.—*Sulfaguanidine Sqibb* (Sulfanilyl Guanidine Monohydrate).

S. G. ...	70 0-28, I-17, N. A. G. 1, Neg-24	0	0.0%
Control ...	69 0-27 (2 deaths) 1- 1 (1 death) N.A.G. 6 (No ") Neg-18 (1 death)	4	5.8%

Seven of the control series developed uræmic symptoms; during this stage they received S. G. and were cured. All of them improved and passed urine within 24 hours. The S. G. series had on the average 3.2 pints of I. V. Saline per head. The Control series had on an average 4.8 pints.

Sulfaguanidine is a Sulphonamide derivative, distinguished from other such derivatives by reason of low absorbability. This causes it to remain in the intestinal tract and exert its anti-bacterial influence therein. Like other Sulphonamides S. G. has anti-bacterial action. Unlike them and inspite of its relative solubility in water, it diffuses to a much less extent through the intestinal wall. It is therefore possible to obtain a relatively high effective concentration of the drug in the intestine itself (200 mgm. per cent) with little penetration into the circulation and consequent systemic effects (1-4 mgm. per cent concentration in the blood). The average weight of an Indian admitted in the cholera ward is roughly 50 kgm. 5 grms. of S. G. was given statum on admission and 2.5 grms. every 4 hours till 20 grms. in all were given.

Common Warts and their Treatment*

BY

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WARTS are a minor malady, and important after-effects rarely occur. The general health is seldom harmed if one neglects them. Although warts do not give rise to cancer, sometimes cancer of skin is mistaken for warts, and valuable time may be lost due to lack of diagnosis. The scientific name of warts is "verruca."

Ninety per cent of all warts fall under the classification, the common warts. They were believed to be due to some infective organisms previously, but recent work has shown that they are infective in origin and the infection is due to some filter passing virus, as WILE has proved to be. Warts are found on cattle, dogs and rabbits. Viruses have been recovered from the warty tissue of all of these animals and new warts have been produced in others of the same species by injection of the viruses. This has also been done on human beings. However, the virus which causes warts in one species has no effect on another species. Warts cannot be transmitted from animals to human beings. Not only one infects oneself but one can infect others. For infection, the wart must have a broken, oozing surface, and at the same time there must be a fresh break in the skin of the uninfected person before infection can take place. It has been proved that warts can be transmitted by rubbing the freshly cut surface of a wart on newly scratched skin. Although warts can occur in any part of the skin, they are most common on the hands, feet, knee, scalp and neck. These areas are those where cuts and scratches are most likely to occur. Their distribution supports the statement that they are an infection acquired through a break in the skin surface.

The pathology of warts shows that they are benign epithelial tumours, characterised by an overgrowth of the prickle-cell layer, with or without hyperkeratosis and produced by an infection, which appears to be a filter passing virus.

The age group of 16 to 20 years is the one in which warts are generally common, but they may develop at any age. They are as frequently encountered in females as in males.

The course of warts is varied. Sometimes warts disappear even without treatment, the average duration of these untreated warts being 3 years. They may remain unchanged for many years but flatten and disappear within a few days leaving no scar. Occasionally some of the warts will disappear but the rest will remain. Sometimes treatment of a few warts is followed by the disappearance of untreated warts. I have come across a case, where the warts on the hands were treated but the warts on the knees disappeared. There has been no satisfactory explanation, for disappearance of untreated warts. Cases are on record where warts lasted for even 28 years.

By studying the follow-up cases of warts, it has been found that about one half of the persons who recover from an attack of warts, have another attack later in life. The period of freedom from warts averages about twelve years. This shows that, if immunity at all

* Specially contributed to 'The Antiseptic'.

follows their disappearance, it is limited, and hence this is not a life time protection.

The diagnosis is a very important item in the treatment of warts. Sometimes a tiny splinter embedded in the skin causes a persistent lump which resembles a wart. Often the older people develop rough, thickened brown spots on the skin, which resemble warts but are actually not. Some kinds of moles closely simulated an ordinary wart. True warts are not always easily identified. The small flat wart, *e.g.*, verrucca juvenilis, may sometimes suggest lichen planus but it is smaller than the papule of that lesion. It does not give rise to itching, and has not the dark colour as lichen planus. There is no tendency for the growth to run together with rough, scaly, infiltrated patches. The venereal warts in the retro-glandular sulcus of penis very often simulates epithelioma. An epithelioma has a characteristic hard base, infiltrates underlying tissue and bleeds easily, while the venereal wart springs from apparently healthy skin, does not infiltrate, is soft and on careful examination consists of a number of confluent vegetating excrescences.

Folklores regarding the treatment of warts goes back hundreds of years. Some of them are quite fascinating. The most popular form of treatment was based on the idea that the wart would be cured by touching each of them with a pebble and putting the pebbles in an old purse, and dropping the purse at the cross roads where some disliked person would pass. If that person picks up the purse, and touches the pebbles, the warts would disappear from the patient and appear on the picker of the purse. Similar treatment in certain diseases like small pox is still carried out even in the modern days of advanced medicine.

A long list of common applications is also offered—milk, tobacco-juice, morning dew, lemon juice, and vinegar. Raw meats have been buried in the warts and the warts disappeared, as they say, when the raw meat rots. Another common method is tying of knots in a string, one knot for each wart.

Some doctors are convinced that warts can be influenced by psychotherapy and report a respectable percentage of cured cases by auto-suggestions to the patient that his warts will disappear.

Surgical methods including electric needles are satisfactory, but they leave a raw surface which must be protected from infection. They generally leave a scar.

Another method is the use of strong acids but it is dangerous. This causes sores which heal slowly and later produce scarring. Other methods involve injection into or around the warts of various solutions. They are used to block off the blood supply, or through pressure cause the death of abnormal wart cells.

Radium and X-ray are used for the treatment, but no uniform success has been achieved. In large clinics for skin diseases, either X-ray or some form of electro-surgery is chosen for the treatment of most local warts at the present time. After describing the warts and their treatment in general, I will deal with the varieties of warts and their individual treatment.

There are several varieties of warts, different in appearance from the common wart. They are: I. Verruca Vulgaris. II. Verruca Plana or Juvenilis. III. Filiform Warts. IV. Venereal Warts (Condyloma Acuminatum). V. Verruca Senilis (senile warts). VI. Post-mortem Warts.

I. **Verruca Vulgaris.**—It is a benign neoplasm consisting of hypertrophy of the stratum corneum and the downward growth of the interpapillary areas. This is the so-called 'common wart' which has a low degree of infectivity. It is usually multiple, consisting of a small mass of tissue, projecting in a varying degree above the surface of the skin. The size is at first pin point and smooth on surface, but it rapidly increases in size. The surface becomes somewhat rough and horny, and its colour changes from that of normal skin to greyish or brownish red. These warts may be senile or pedunculated and are situated on the dorsum of fingers and hands, the palm and the face, the scalp where they tend to become filiform and the soles where they assume some special character consisting of flat horny tissue but level with the adjacent skin and surrounded by a tight ring of horn cells which shuts them in. On dividing the ring the wart is freed. These warts generally occur in children. They persist for an indefinite time, tend to multiply in number but may disappear spontaneously.

The treatment has been of various kinds. General measures consist of giving a wine-glassful of prepared lime water (fresh), twice or thrice daily. This may cause the warts to disappear in 2 to 3 weeks. Magnesium Sulphate taken in doses as will cause two to three liquid motions a day has been found to cause the disappearance of the warts in a week or two.

Local methods of treatment are varied. Various caustics have been used such as Silver Nitrate pencil (thrice a week), Trichlor Acetic acid, 1% solution of Picric acid, Nitric acid or Mercuric Nitrate once a week. They are very powerful and should be used cautiously. A satisfactory application is Glacial Acetic acid, applied daily with a glass rod or a piece of match wood. The following recipe is useful.

Resorcin	...	gr. 60
Salicylic acid	...	gr. 60
Methylated Spirit ad	...	℥ 1

Sig. to be applied to each wart twice daily.

The medicine should be applied with a wisp of cotton wool wound round a match stick, or by a soft brush. A paint of Salicylic acid dissolved in Collodion is a remedy which has stood the test of time.

In some cases, curetting with a sharp spoon, under a local anæsthetic, gives most rapid results. The raw surface should be touched lightly with Silver Nitrate pencil and then dressed with Salicylic acid ointment or 1-4000 Biniodide of Mercury.

Ionization with Magnesium ions from a 10% solution of Magnesium Sulphate has been recommended. The positive pole should be attached to Magnesium pad and the current should be allowed to pass for 20 to 30 mts. It is better to abrade the cuticle over the warts before the treatment.

A pencil of CO_2 Snow applied with firm pressure for 30 to 40 seconds, over each wart, will often cure when other means fail. The cosmetic results are excellent. Actual cautery may be useful in some cases. It has been found that in cases of multiple warts, Magnesium ionisation and X-rays are satisfactory. I have treated a few cases with CO_2 Snow and this method gave a very satisfactory result, with a few failures, of course.

II. **Verruca Plana.**—This is the common flat wart met with in children or young adults. It occurs on the hands, wrist, or the face. It may also appear in the centre of the ball of the foot and has the appearance of a corn.

These warts are small, round, flat-topped, smooth excrescences. They arise from the normal skin without signs of inflammation. Usually they are darker than normal skin and are not hard to touch. The size varies from a lentil to a pea.

The adjacent warts may become confluent to form a kind of warty plateau. They are indolent, persistent, with a strong tendency to multiply. They frequently disappear spontaneously, as mentioned in the general description of wart. I have seen a case being cured by only some intestinal antiseptics and some general tonic in the form of Fowler's solution and without any local application. The treatment of these warts is the same as that of verruca vulgaris, with the difference of spontaneous disappearance in some of these cases.

III. **Filiform Warts.**—They are irregular in cantour, because of undue overgrowth of one or more of the papillæ. They are softer than the flat warts and often pedunculated. They are frequently met with on scalp in individuals suffering from seborrhœa, and for this reason, sometimes referred as the "seberrhœic warts." They might exhibit a number of fine spicules on its free edge. They can be cured by rubbing in Salicylic acid ointment, or one of Sulphur and Salicylic acid. Any individually large wart can afterwards separately be touched with a stronger acid or other methods such as electrolysis. Frequent soap and water scrubbings are also used. An ointment may be made of two parts of Calcium Carbonate or Phosphate to three parts of Hydrous Wool fat. Warts on the scalp may be removed by a curette. The bleeding base should be touched with Silver Nitrate. The pedunculated warts may be snipped off at the base by a pair of scissors, and the spots touched with caustic, or the wart may be strangled by tying a piece of fine silk firmly round the base. The growth will separate in the course of few days, when the spot should be touched with caustic.

IV. **Venereal Warts (Verruca Acuminata).**—These are a special fungating variety of warts. It is not yet found out that this type of wart is, as others, due to a filter-passing virus. Some believe that this is due to a spirillum, which is constantly found in these warts. This occurs in both the sexes. In the case of males, these are found on the foreskin, glans or sheath of the penis; in the females on the vulva, vagin or Os uteri and occasionally between the toes or in the flexures of the limbs; and they are found round the anus and inner side of thigh in both the sexes. They occur both in the skin and mucus membranes. They are purplish in colour, resemble a mulberry, and are accompained by a characteristic nauseating odour. The incubation period is about four months, and they occur when the florid gonococcal discharge has altered to a thin irritating gleet. They begin singly but multiply rapidly. Primary lesion is a tiny red macule on which a papule develops. The papule grows rapidly and undergoes a partial division at its free edge, and ultimately becomes lobulated and pedunculated tumour, a cawliflower-like excrescence. Adjacent warts become confluent and large fungating masses are found. The surface tends to become eroded and the warts discharge a fetid dirty sero-pus. If prepuce is tight they may actually

penetrate through the whole thickness to the surface and fungate through the orifice thus produced or they may project through the preputial opening. These warts were for long believed to be gonorrhœal in origin. CATHCART of Edinburgh was one of the first to dispute this belief. More recently it has been suggested that the spironema refrigens is the causative agent and are found upon them, but it has not yet been definitely proved. These warts are occasionally associated with trichomones vaginitis. The etiological factor is a filter passing virus, according to some, and the predisposing causes are: the irritation of excessive moisture, hyperæmia and the temperature of the parts.

Scrupulous disinfection of the parts with antiseptic lotions such as Mercuric Perchloride, or Biniodide or with Eusol followed by the free application of a drying dusting powder such as Xeroform, or Salicylic acid and Talc powder in proportion of 1:3. When small they can be made to shrivel by the above treatment. The treatment should be repeated several times a day. If it fails and the warts are more marked, they can be touched, after drying, with a pencil of Silver Nitrate, and immediately afterwards brushed over with a crystal of Chromic acid—fused on the end of a probe. Chromate of Silver is produced. This treatment may be repeated at an interval of few days till the warts disappear. After that the parts should be kept thoroughly clean and dusted daily with a drying powder. The caustics such as Acid Nitrate of Mercury and Glacial Acetic acid may be used.

Fulguration with high frequency spark, under a general anæsthetic, may be employed. The warts may be touched with a galvanometer needle. Surgical measures which may be required are curetting or snipping off, specially in a case of large wart. Excision with a knife, thermocautery or a diathermy point, and careful treatment of denuded area with pure carbolic generally succeeds in preventing recurrence. Hæmorrhage is free but can easily be controlled. Raw base may also be touched with Silver Nitrate, Chromic Acid or both.

Venereal warts have a most obstinate tendency to recur. This tendency may be controlled by scrupulous cleanliness, and free use of dusting powder to keep the parts dry. If a pregnant woman is treated for venereal warts during gestation, they are almost certain to recur before pregnancy terminates. The excessive secretion from vagina and the abnormal blood supply of the parts are the factors responsible for this.

V. **Verruca Senilis.**—It is a variety of wart met with in old people, specially on the face and trunk, and more particularly on the back. It is soft in touch and has a slight warty surface. The senile warts consist of flat excrescences, grey, brownish or black in colour. They are irregular in outline. Their surface as mentioned above is slightly uneven. By scraping it can be easily removed, as small masses of horny debris. They occur in people who have suffered from seborrhœa, and hence sometimes called 'seborrhœic warts.' As a result of chronic irritation, they may become malignant, hence they should be removed early. This may be done with a sharp spoon, the bleeding base being afterwards touched with styptic or mild caustic. Washing with soap and water, followed by the application of 10% Acid Salicylic ointment will often remove them. Failing this, painting with Trichlor Acetic acid, freezing with CO_2 Snow or a pastille dose of X-rays should be employed.

VI. **Postmortem Warts.**—They are met with chiefly on the knuckles, in the interdigital folds, or on the back part of the hands in those who

have to handle dead bodies, whether of human beings by mortuary attendants or of the lower animals by the butchers and slaughterers. It is a form of tuberculosis caused by infection with living bacilli from dead tissues. The treatment is followed on the lines of tuberculosis of the skin.

Before I conclude, I want to mention few methods of treatment of the common warts which have been tried by myself and others recently. Arsenic internally has been recommended, given in moderate doses of ¼ drop or more of FOULER'S Solution to children, and 2 to 5 drops to adults, three times a day, after food. I have found it useful in cases of common flat warts. Full doses of Nitro-hydrochloric acid have been of service, in some cases, so also has Thyroid extract. I have used the latter in one or two cases with beneficial results. Mercury such as a pill of green iodide gr. 1/8 to 1/4 has been stated to cure.

Among local treatments, more importance has been given to the electrical methods, and some to chemical methods. Applications of saturated solution of Salicylic acid in Alcohol has been found useful in hard warts. The solution of Salicylic acid in Collodion (10 to 20%) or in plaster form has been used by many. A stronger application can be made by dissolving 30% Salicylic acid in Acetone Collodion. Frequently painting the part with equal parts of Liquor Carbonis, Detergens and Spirit, as advised by SIBLEY, is another method. Formalin, Chromic acid, Caustic Potash, and Zinc Chloride, in addition to the chemicals mentioned before, have been tried.

Fairly large warts can be effectively destroyed by the negative electrolysis needle, a current of 1 to 4 or 5 milli-amperes being allowed to pass for some 30 seconds, the needle having almost wholly or completely transfixed the growth. Some observers have described satisfactory results by the application of high frequency currents by means of Carbon or Glass-point eloctrode.

Isolated warts may be effectively cured by full pastille doses of X-rays; often 2 to 3 pastilles are necessary. I have myself found beneficial results in some of my patients. Two usually have been given in the first sitting. Individual warts are best treated by CO_2 Snow, as mentioned, by firm pressure for 20 seconds to 2 mts. according to the size and site of the wart. There is some discomfort felt during the freezing process, and often sharp pain for a few seconds afterwards, but this rapidly subsides, and in a few hours a bleb of serum appears under the base of the wart, the whole tumour becomes raised up, and after a few days fall off, leaving a pale, thin scar in its place, which gradually fades in course of time. Trichlor-Acetic acid has been recommended as a substitute for the Carbondioxide Snow, as being less painful, but I have not tried it. A few crystals of this substance should be placed in a watch glass,with just enough water, say one or two drops, to dissolve and applied to the wart on a glass rod with fairly firm pressure. The surrounding parts, as in the case of CO_2 Snow treatment, should be protected with Wax or Vaseline before the acid is applied.

The warts on the face is really a problem for treatment as we have to be careful about the cosmetic side of it. A prescription consisting of 5 drachms of Sulphur, and Glycerine and Glacial Acetic acid 1½ oz. each has been found to be a good application. An useful paste consisting of one ounce of Glycerine with enough Salicylic acid to make a thick cream, and then mixing in a drachm of pure Carbolic acid, is found beneficial in cases of common flat warts.

Pruritus Ani in Adults*

BY

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IT is common to come across cases of chronic pruritus ani with peculiar restlessness and worry resulting from insomnia and discomfort. The mental symptom is characteristic in these patients.

When cases of chronic pruritus ani come to the out-patient department of the Hospital, excluding Condyloma, they are given some ointment. The patient returns very weak and worries the doctor and returns every time with increased mental symptom. He is sometimes given an injection of Proctocain round about the region and the patient is not seen for two weeks at least but he comes back again with a mental condition which has been much worsened through the repeated suffering and insomnia and with all faith in the Allopathic system of medicine at the point of disappearing, ready to fall in the hands of any quack.

Observation.—These patients come with excoriation over the anal region, buttocks, thighs, perineal region and with a neurosis peculiar to these patients. None of my patients were found free from this mental condition.

The present investigation is based on observation in 47 cases during a period of four years in the Venereal and Skin Department of the Patna Medical College Hospital. All the cases were adult males and condylomata growth, cancer anum, fistula-in-ano and such other troubles being excluded.

The following examinations were done in each of these 47 cases :— (1) Rectal examination, both digital and proctoscopic for internal piles, (2) stool examination for worms, and (3) smear examination for gonorrhœal proctitis from the discharge present in the anal region.

The treatment given for these cases differed. Pruritus ani due to internal piles were injected with a sclerosing fluid through a proctoscope and advanced cases were operated on. Pruritus ani due to rectal gonorrhœa had dilute condy's douching twice daily for a period of six weeks and introduction per anum daily a suppository of some Silver preparation. The patients were given routine oral Sulphapyridine therapy, having one tablet 6 times daily for 6 days and repeated three times at intervals of ten days. Some had Vaccine injections twice weekly and some cases had different treatment also. Those cases diagnosed as caused by oxyuris vermicularis were treated two days in a week with Santonin and Calomel followed by a Saline purge and sometimes with enema. In all cases the pruritus ani was cured but relapse occurred after 6 months only in two cases of gonococcal proctitis and only one case of gonococcal proctitis developed sphincter trouble for sometime. In some cases pruritus ani with the mental condition disappeared surprisingly with the internal treatment and no relapse was observed in follow up cases for about one year. The result was very encouraging in all cases of pruritus ani properly treated and investigated. In 6 cases of infection with worms and pruritus ani, after cure left some pigmentation over the affected area and recurrence of the condition was observed over the pigmented area.

* Specially contributed to 'The Antiseptic.'

TABLE No. I.

RESULTS OF INVESTIGATION AND TREATMENT OF 47 CASES OF PRURITUS ANI

Cases.	Rectal Examination, digital and proctoscopic.	Stools Examination. Routine Microscopic.	Smear Examination.	Result of Treatment.	Time of disappearance of signs and symptoms starting after treatment.
Gonococcal proctitis.	—	—	Nisserian infection present in 7 cases.	Cured.	2 to 5 weeks.
Internal Piles.	Present in 13 cases.	—	—	Cured.	2 to 8 weeks.
Oxyuris vermicularis infection of bowels.	—	Present in 27 cases.	—	Cured.	1 to 2 weeks.

TABLE No. II.

Total number of cases treated.	Relapses.	Pigmentation of skin in anal, thigh and perineal region.	Temporary sphincter trouble.	Age of patients.	Improvement in mental condition.
47	2	6	1	23 to 48	All.

Conclusion.—HUNT (1936) studied 300 cases of pruritus vulvæ et ani and found lichen planus to be responsible for one-third of such cases. ELSON (1937) observed that pruritis vulvæ must not be put in the same category as pruritus ani. Causes of pruritus ani in adults need proper investigation and proper treatment of the different causes underlying the condition. Oxyuris vermicularis infection in adults is apt to be lost sight of but it has been found in a surprisingly large number of cases. In 27 cases this was present out of 47 cases investigated in the present series. SCHROPL (1926) reported 4 cases of prurigomitis in adults. All had history of long standing infection with oxyuris vermicularies. The skin involvement began with itching, followed by isolated or grouped papules, frequently follicular, later pigmentation. The rash in all cases was situated on the lower abdomen, buttocks and thighs. SAVILL (1936) observed various factors in the causation of pruritus ani such as the infection by streptococcus, leakage of liquid paraffin or leakage of mucus resulting from hæmorrhoids and threadworms. FELDMAN, et al (1942) treated 20 senile vulvovaginitis, leukoplakia and kranrosis vulvæ and their accompanying pruritus with Estrogen and Androgen. In 12 cases there were good results and in 4 had a favourable response.

Acknowledgement.—I am thankful to Captain R. P. Ghose, the Superintendent and Dr. H. P. Lall, the Surgeon, for their kind permission to publish the case reports, I am indebted to Captain N. Pal, Professor of Surgery and Dr. U. P. Sinha, Lecturer in Surgery of the Patna Medical College Hospital, for help and encouragement.

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Cases and Comments

A Complicated Case of Enteric Fever

BY

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H., a girl aged 6 years, was placed under my care for fever said to be continuous and of 5 days duration, last August. The usual signs and symptoms of enteric fever were evident and the case appeared to be running an uneventful course. The child was dull, listless and apathetic from about the 8th to the 11th day of the illness as is usual in the second week in all cases. Suddenly from the evening of the 11th day she began to be irritable, restless, sleepless, screaming at intervals and resenting all interference. The next day (12th day of illness) she developed parotitis on both sides, vulvovaginitis and Br. pneumonia. Up to now the child was having a plain mixture of Sod. Bicarb, Pot. Citras, Liq. Am. Acet., Spts. Am. Aro. & Aqua Cinnomomai, the mixture I usually rely on as being the best I have used during the last 28 years. Symptomatic treatment like tepid sponging for a high temperature and Bromides and Calcium for the irritable signs and symptoms were used as necessary. When complications of streptococcal and pneumococcal origin appeared, M & B 693 was at once started and locally Antiphlogistine and hot fomentations were used for the parotitis and Br. pneumonia. On the 13th day there was cellulitis of the neck, the neck became intensely swollen and by the next day the patient was unable to swallow. The child had a fixed staring look, the neck was rigid and discharge of pus began to appear from the right ear. The child was unable to take anything internally and she had to be maintained with Glucose injections. From the 14th to the 17th day the child's condition was considered hopeless, but the M & B 693 was religiously continued with other symptomatic measures. On the 17th day of the illness there was fluctuation in both parotids and the abscesses were opened. There was discharge of pus and blood from both ears in addition. The patient continued drowsy or irritable that day and on the next day (18th day) the patient looked a little lively in the morning but appeared dazed, presenting a vacant look later and began to exhibit typhoid phenomena such as clutching at imaginary objects and pulling out dressings. At 6 p.m., the child began to have a fixed staring look, toss her head from side to side, keep the teeth tightly clenched or grinding and refuse all nourishment and medicine. I had to see the child at 10-30 p.m., in this condition and gave her an injection of Hyoscine Hydrobromide and Collosol Calcium as a last resort. The child continued in the same state the next day and began to appear lively on the 20th day and swallow a little fluid but still had the vacant look and picking at bed clothes. From the 21st day onwards she began to steadily improve and her temperature was normal morning and evening by the 28th day of her illness. There was another abscess on the scalp which was also opened. All the abscesses and the discharging ears were simply mopped out with sterilized swabs and dressed with Sulphanilamide powder while M & B 693 was continued internally until all signs of meningitis, parotitis, Br. pneumonia and vulvovaginitis disappeared. She later developed during convalescence a paresis of the larynx and a nasal twang of her voice which cleared up with Iron and Strychnine. The child is hale and healthy now and is

perfectly free with her voice. This is a case which owes its life to M & B 693 and the multiple complications which appeared could not have been overcome but for its persistent use.

A Case of Mania

BY
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IN the following pages I am going to describe a case of mania in a patient after an attack of M. T. malaria in Behala, Calcutta, and his treatment by intramuscular injections of Atebrin Musonate. Atebrin Dimethane Sulphonate 0.1 grm. was dissolved in 3 c.c. of sterile water (3 mils) and was injected intramuscularly. When the 2nd injection was given in the evening this dose was doubled and 0.2 grm. was injected. Insanity started when 3 such injections were given to the patient (statement of the father). The patient, a H. M., 25, had the following symptoms when he was under my observation :

Physical Signs.—He was looking ill and anæmic, tongue was furred, bowels constipated, the pulse was frequent, 100 p.m. with the axillary temperature of 97°8 F.; blood pressure systolic was 120 m.m. of Hg.

Mental Symptoms.—He was laughing or crying for no reason, he was very talkative, his talk was irrelevant, was destructive to clothes, his modesty was lost, *e.g.*, he would remain naked before strangers, suffered from insomnia, number of hours of sleep was variable, sleeping only about 3 or 4 hours in the earlier part of the night, ate very little food on persuasion, was noisy, would scream, shout and sing frequently.

Treatment.—Patient was given a course of prolonged baths (temp. of the bath was 98°F.) from half an hour on the first day to two hours on the fourth day.

He was put to bed and an attendant was provided to watch over him.

To overcome the constipation of this patient, S. S. Mag. Sulph. 1 oz. was administered and it was frequently necessary to resort to enemata of soap and water.

For the treatment of insomnia I gave at the beginning injection of Hyoscine Hydrobrom gr. 1/75 and for the next 3 nights—

℞ Paraldehyde ... ℥ 2
Aqua Menth pip ad ... ℥ 2 bed time

I got better results with Phanodorm (Cyclohexenyl-ethyl-malonyl Urea), 1 tablet B. D. dissolved in water followed by a cup of warm tea.

A course of iron tonic (Fersolate Tablets of Glaxo) and

℞ Quinine (Arsenic trioxide) ... gr. 1/24
Quinine Murias ... gr. 2
Pil Rhei Co. ... gr. 1½ B. D. P. C.

Abundant nourishment was given in the form of milk 1¼ seers, loaf, biscuits, rice with butter and fish soup, a couple of half-boiled eggs, tea and fruits.

The patient made an uneventful recovery. He had a second attack after 9 months of the one described by me but was quickly controlled by baths, enema of soap and water and Phanodorm.

M & B 693 in Dysentery

BY
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MAINLY in this part of the country we are seeing cases of dysentery either amœbic or bacillary, though rarely malarial dysentery cases are also met with but kala azar and bilharza dysentery cases are not seen.

In muffasal practice where facilities for microscopical examination are not available, the doctors have to depend mainly on clinical diagnosis. The practitioners in this area generally treat dysentery cases with Emetine injections, Saline and Castor Oil emulsion as a routine until the case happens to be a typical, very acute bacillary case.

My attention in dysentery cases, after reading an article written by Captain HASSETT, I.M.S., the Agency Surgeon, MIRAN SHAH, South Waziristan, under whom I had the privilege to work with for sometime, was directed to examine the stools of every case very carefully and I must confess that all the acute and subacute cases of dysentery that came under my observation were of bacillary type. In his report Captain HASSETT has stated that nearly all cases of dysentery in North Waziristan are bacillary and he has ordered his subordinates not to use Emetine at random in dysentery cases.

A few words about the treatment. For the last one year, I have been treating dysentery cases with M & B 693 and have been getting miraculous good results. During all this year I have never stood in need of Saline, Castor Oil emulsion, Emetine or Stovarsal etc., for dysentery cases.

Below I mention a few important cases of dysentery :—1. J., aged 35, Subedar, having 35 to 40 motions a day, much prostrated, acute tenesmus, tenderness all over the abdomen, temperature 100°F., pulse 120 per minute, respiration 24 p.m. (had one Emetine injection and Saline by a doctor), stools alkaline in reaction, odourless, contained blood and mucus. He was kept on Glucose water and M & B 693 (.5 gm.) 2 tablets T. D. S. The second day he was quite cheerful, passed only one stool at night. He was given for further few days M & B 693 one tablet T. D. S.

2. M., aged 24, a motor driver, having 25 to 30 stools a day, reaction of stools alkaline, general condition not bad, was given M & B 693 2 tablets T. D. S. The second day he was O.K. and was kept on one tablet T. D. S. for 4 days more.

3. B., aged 45, a Patwari, was having 20 to 30 motions a day, was much weak and before coming to me had 3 injections of Emetine and Castor Oil emulsion with no effect.

Stools were examined. At first the patient refused to show his stools but when he was told that no treatment would be given, he agreed to show the stools. The stools contained blood and mucus, odourless, alkaline in reaction. He was given M & B 693 2 tablets T. D. S. The next day he was cheerful, no tenesmus. Motion reduced to one or two a day. M & B 693 was continued for few days one T. D. S.

4. S's., wife, aged 24, had diarrhœa and dysentery for 4 or 5 months, much emaciated and practically reduced to skeleton ; temp. 100°F. in the morning and 101° F. in the evening, pulse 26 p.m., could not move from bed, was getting night sweats, stools odourless, alkaline in reaction. As the patient was weak, she was given M & B 693 one tablet T. D. S. The second day frequency of stools was 2 to 3 and the patient was much comfortable. The treatment was continued for a week. Now the patient is O.K. and is taking normal diet, meat etc.

I have been giving Sulphonamide tablets 2 T. D. S. to poorer class of patients who could not afford M & B 693. The result is not promising as with 693 but is encouraging enough, the progress is slow and gradual. In all these cases I had to depend on clinical diagnosis as facilities for microscopical examination were not available.

Conclusions.—1. M & B 693 is the treatment for bacillary dysentery.

2. Bulk of dysentery cases in sub acute and chronic stage, requires thorough investigation and it is useless, rather harmful,to prescribe Emetine or Stovarsal at random. Emetine which is a valuable drug for amœbic dysentery should not be wasted.

3. In this are amajority of dysentery cases are bacillary in origin.

Anaphylactic Shock After Aolan Injection

BY

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Selection Grade Sub-Asst. Surgeon, Markapur.

V., H. F., 30, was suffering from pain below the right hypochondrium, dullness, discomfort in the abdomen, passing of 4 or 5 stools per day and whites for a number of years. Had undergone treatment for a long time and was disgusted. On enquiry she had dysentery repeatedly, has been the mother of 5 children, anæmic, right lobe of the liver enlarged and tender to about 3 fingers below costal margin. There was dull pain over the abdomen at its lower part and a history of gonorrhœa was denied. The case was taken to be amœbiasis and a course of Emetine injections was given followed by Carborsone orally. Next a course of Sulphanilamide was given for the leucorrhœa as the enlarged liver had receded and there were no signs and symptoms of dysentery. The leucorrhoea was better but was persistent even after a course of Sulphanilamide. A course of non-specific Protein therapy with Aolan injections was advised. As Aolan had to be got from outside, sterilized milk was given twice or thrice in doses of 1, 2 and 3 c.c. intramuscularly with no untoward results. Aolan was next got and injections were started. Three injections each of 5 c. c. were given in the gluteals at intervals of 3 or 4 days and no untoward results were noticed. When the 4th injection was given, the patient fell down after a shriek with a thud on the floor in about 5 minutes after the injection and was covered with profuse sweat and the face became pale, pulse feeble and she complained of pains in the region of the heart and dragging sensation of lower limbs and impending fear of death. She was extremely restless and excited. As the signs and symptoms pointed to anaphylactic shock, an injection of Adrenalin, Ammonia inhalations, hot coffee and Glucose by mouth and an injection of Atropine and Strychnine were given one after another and the patient rallied round and became normal in about half an hour. What puzzled me was that there were no similar phenomena in the patient either with milk or with the same brand of Aolan on previous occasions, nor have I seen similar signs and symptoms in any other patient. Since Milk injections came, I have used them now and then for the past 12 years in various conditions but never noticed any anaphylactic phenomena.

Ocular Involvement in Ichthyosis With Case Reports

BY

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IN this short communication I desire to record my observation of a few typical cases of ichthyosis with various forms of ocular involvement. Involvement of the ocular structures in ichthyosis is very rarely met with in ophthalmic practice. Hence the justification for my presentation of a few cases of ocular ichthyosis together with a brief review of the available literature.

Ichthyosis of the skin is a chronic disease, mostly of congenital origin, involving all but the flexor surfaces, and in which the skin shows a marked dryness, harshness, scaling or horny formation[1] (GARDINER). This condition may be present at birth or it may develop shortly afterwards; in a certain group of cases its manifestation might be delayed until the adolescent period. The subject of ocular manifestation of certain skin diseases, such as ichthyosis, has been investigated by several notable observers amongst whom may be mentioned the names of BULLER,[2] KOMOTO,[3] KRAUPA,[4] SONDERMANN,[5] CORDES & HOGAN,[6] DERRICK VAIL,[7] VERRYP,[8] ISCHREYT,[9] KINGERY,[10] ELSCHNIG[11] and others.

In the course of my practice, I have come across a few typical cases of ocular involvement in ichthyosis. The ocular symptoms in these cases depended mainly on the degree of the ocular involvement as well as the extent of the ocular lesion. The symptoms are mild and often inappreciable in cases of ocular manifestation of a moderate degree, whereas with severe lesions involving the cornea and the conjunctiva, the symptoms complained of by the patient are extreme photophobia, blepharospasm, and epiphora followed by diminution in visual acuity.

Report of cases with brief clinical notes:—CASE I. A Hindu boy, aged about 10, came to my clinic for the treatment of a chronic form of conjunctivitis (as they called it) which was resistant to all forms of treatment which the parents of the boy availed of. The boy's parents reported that the boy had congenital ichthyosis which was gradually developing and that the boy had developed the eye symptoms for a period of about 3 years. The complaints were a marked presence of redness, irritation and watering from the eyes. Both the eyes presented symptoms of marked photophobia, blepharospasm and epiphora.

Examination of the eyes:—Lids—fine scaling on the skin of the lids; bases of cilia covered with greyish-looking firmly adherent scales; most of the lashes absent, their places being occupied with nodulous areas. Palpebral conjunctiva—signs of a chronic inflammation, marked conjunctival injection and hypertrophy and ruggedness of the conjunctival surface.

Bulbar conjunctiva presented marked injection.

Cornea—unaffected in both the eyes.

General systemic examination of the boy:—Ichthyosis all over the body, unhealthy looking, stunted growth.

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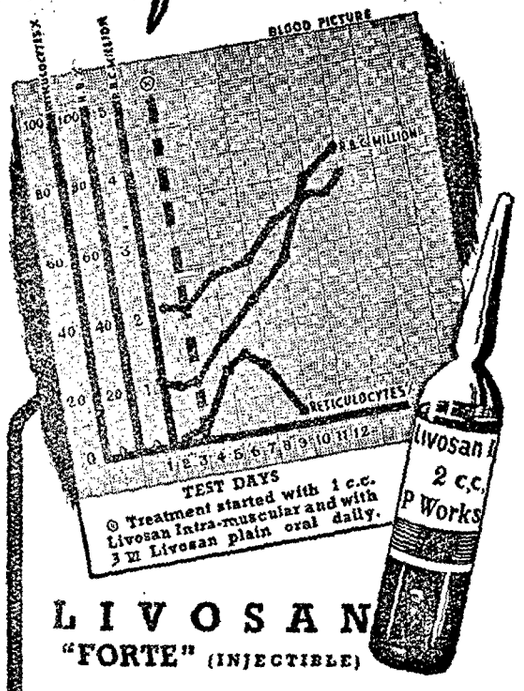

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CASE II.—A Hindu young adult about 25 years, emaciated and unhealthy, came to the clinic for the treatment of diminution of his eyesight, more felt in the right eye than in the left. On general examination, the patient presented a generalised ichthyosis which he reported to have been developing for the past 10 years. Examination of the lids—thickening of the eyelids, cilia almost absent. The conjunctivæ showed areas of thickening with marked injection. The right cornea presented a marked pannus formation, while the left was slightly vascularised.

The therapeutic measures adopted for these ocular conditions consisted in prescribing sedative and antiseptic eye lotions and ointments. Peritomy is advocated for relieving the pannus formation. Treatment of such ocular conditions is however unsatisfactory, being generally limited to palliative symptomatic measures.

Review of the literature.—The subject relating to the association of ocular and cutaneous diseases has been the theme of investigation by numerous observers. On a perusal of the available literature, we find that as early as 1887 BULLER [2] described a rare form of ophthalmia granulosa associated with ichthyosis. In the case of BULLER's patients, the palpebral conjunctiva of the lower lids presented a swollen and glazed appearance with numerous longitudinal ridges, while the conjunctiva of the upper lids presented a marked glazed and glossy appearance. In 1909, the next authority to observe the ocular manifestation of ichthyosis was KOMOTO [3], in whose cases both cunjunctival and corneal involvement were noted. In 1909, again ISCHREYT [9] reported a case of ocular inflammation resulting from ichthyosis. KRAUPA [4] (1920, 1923, 1924, 1928) has made an extensive investigation into this subject. SONDERMANN [5] (1923) reported a case of ocular ichthyosis which presented severe involvement of the lids and the facial skin with marked ectropion. In 1928 VERRYP [8] reported a case of ichthyosis with corneal involvement. In 1939 CORDES and HOGAN [6] reported a case of ocular ichthyosis in which there were bilateral involvement of the conjunctiva and involvement of the right cornea. In 1940 VAIL [7] reported a case of a 9 year old boy with congenital ichthyosis presenting multiple corneal nodules.

Summary.—Two cases of ocular ichthyosis are presented. In one case there was bilateral involvement of the conjunctivæ, the corneæ being free; while in the other case, both the conjunctiva and cornea were involved. Therapy of ocular ichthyosis is only palliative, being limited to the adoption of symptomatic measures.

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War and Skin Disease

SKIN disease has always figured prominently in war time. It has added greatly to the discomfort of the soldier in the field, and its commonest manifestations have been parasitism and the skin complications of malnutrition. As the skin is a surface organ and therefore, more than any other, one which is influenced by environment, it is not surprising that the altered living conditions and occupations of war-time might profoundly influence the incidence of certain of its diseases. The present war has not so far greatly affected the proportionate incidence of skin disease, but it has, by necessitating an evacuation, brought home to the authorities and population alike that skin parasitism, and infection with pyogenic organisms are common in the civil population, so common as to be apparently uncontrolled. Statistics have shown that in all people—and Military people are no exception— a few skin diseases which may differ only slightly according to the locality constitute more than 80 per cent. of dermatology.

Among these Scabies is the most troublesome. For this Sulphur is the time-honoured remedy. In addition alternative methods have become available and have been useful either for their elegance or in cases which have exhibited some intolerance to Sulphur. The demand now has been for a drug which is quicker, cleaner, more potent and less liable to produce Dermatitis than Sulphur ointment. Upto the present time, however, there seems to be no drug which will cure all cases of Scabies in such a short time. The reputation of the newer remedies depends on the results in the intitial series of selected cases in which every detail of treatment is carefully supervised. Benzyl Benzoate is painted on the skin and the benefit of inunction is absent. Quick treatments are successful in a population which is slightly infected because it is in the habit of taking regular baths. But in cases where bathing and changes of underwear and sheets are not practicable as often as one would desire, a different type of Scabies will result, and Benzyl Benzoate may be a failure. Long-standing cases require prolonged contact with parasiticide to kill the infection and closeness of contact can be achieved most efficiently by ointment application. Sulphur satisfies these conditions best. It is true that Sulphur Dermatitis gives trouble in a few cases. This is almost exclusively due either to the intermittent use of a sulphur ointment or to the use of

a strong preparation. It must be remembered that incomplete treatment with its resultant recrudescence of the disease must be guarded against, for these incompletely cured cases reinfect others. In this way, the disease may persist for long periods, causing serious economic loss and throw an unnecessary strain on the energy and patience of those who are called upon to treat this disease. It must also be remembered that the effectiveness depends on the care with which it is applied and the best results are obtained when expert supervision of the actual therapeutic measure is possible. In severe cases confinement to bed and bandaging are necessary.

Another important problem which presents more difficulties than actual prescribing of treatment for a case of Scabies is the disinfection of clothing and bedding and the detection and treatment of infected contacts. Steam sterilisation of bedding is necessary though unfortunately this may have a deleterious effect on the material sterilised. The staining of underwear can be removed by boiling. From the point of view of Public Health problem, special Scabies treatment centres may be essential if the disease is to be controlled properly among the civilian population. To be efficient such Scabies-Centres require an adequate number of baths, dressing rooms, treatment rooms and competent nurses to direct assistants in the supervision of treatment. Such a centre may also require a sterilisation plant on the premises to deal with clothing and bedding. Sources of recrudescence and reinfection can be detected by such a Centre and steps can be taken to rectify the defects.

Pediculosis.—This also is a very common disease. The Pediculus in order to cause widespread human infestation requires a low standard of cleanliness amongst the population particularly as regards change of clothing. The parasites, owing to their great mobility, can quickly attack large numbers of individuals, provided circumstances are suitable, and the spread is more rapid. Apart from itch, the louse is responsible for epidemics of Boils and Impetigo on covered areas and in this way can produce widespread temporary incapacity. The treatment and the final eradication of the nits may be a protracted operation. The complicating Impetigo and Septic Dermatitis may require weeks or even months of treatment. Shaving the head is the ideal procedure, and is absolutely necessary in the presence septic complications. The treatment should be persistent and should be complete.

Epidermophytosis is also very important Ringworm of the Scalp and also Ringworm infection of the body are common. The same cannot be said of Ringworm infection of the flexures, a condition which has many local names but which is generally referred to as Epidermophytosis. This condition spreads rapidly when infection is introduced to a population living under communal conditions and it seems to be acquired from infected inanimate objects and seldom from direct contact. Its spread is influenced by climatic conditions. The interdigital areas of the feet are perhaps the commonest areas to be affected and once established there, the infection defies treatment, although the lesions may cause no discomfort. The groins and adjacent thighs are the next most frequently attacked areas and here troublesome itch is almost invariable but the disease is amenable to treatment. Reinfection in individual cases occurs from clothing, and case to case spread occurs through the medium of fungus-contaminated floors and lavatory seats. The fungus is difficult to

destroy and may remain in an avirulent state for long periods so that associated with the same surroundings epidemics may appear at intervals over long periods in spite of disinfection measures.

Coccal Infections are also troublesome. While the incidence of streptococcal and staphylococcal infection of the skin is greatly affected by the prevalence of parasitism, the diseases caused by superficial infection with these organisms, namely Impetigo, Streptococcal Dermatitis, and Folliculitis, both superficial and deep, may occur spontaneously in epidemic form. Overcrowding, malnutrition, lack of opportunities for personal cleansing and absence of laundry facilities predispose to such periodic increases. Furunculosis can be definitely associated with malnutrition and dietary insufficiency. Some temporary constitutional defect in the skin must be responsible for the development of Epidermophytosis lesions and once they are firmly established even prolonged hospitalisation and exhibition of all likely therapeutic measures are not successful in checking these diseases. Points in the treatment of these exudative and purulent superficial infections are the shaving of affected areas, the liberal use of antiseptics of the aniline type to reduce surface contamination and the covering of active lesions in order to avoid spread of infection by scratching and by friction of the clothing.

Occupational Dermatitis must also be considered as important. Alterations in industrial processes necessitated by war-time requirements will expose large number of individuals to contact with potentially irritant chemicals so that idiosyncrasies will be revealed with a probable increase in certain localities of acute idiosyncratic chemical Dermatitis. Apart from idiosyncrasy, many more individuals will be exposed to the direct pharmacological action of caustics in low dilution and to contact with substances of gritty consistence and some skins will be unable to withstand these or will fail to develop a protective mechanism against infective Dermatitis on and around the injured areas. Occupational Dermatitis will undoubtedly become more frequent as a result of increased employment and altered occupations, and it is well to remember these points.

Vesicant Gases.—Many of the foregoing remarks as to the effect of war on skin disease have been speculative because they have dealt with disorders already prevalent about which accurate statistics are not available, but there is no doubt about the certainty of the occurrence of necrotic skin lesions in the event of vesicant gas being used as an instrument of war. Following cutaneous contact with such gases there is a latent period of some hours before the inflammatory reaction sets in. If the irritant is not removed from the skin or neutralised within five minutes of its application, a sequence of tissue reactions is bound to unfold itself and there is no known method of preventing this. Low concentrations cause a simple persistent Erythema followed by pigmentation which causes no incapacity and requires only a simple powder. More intense reactions are essentially exudative in character. A sub-epidermal bulla commences to develop and is complete in about twelve hours from the start of the reaction. Removal of the roof of this bulla reveals an ulcer, the pallid base of which is formed by the dermis, and this lesion takes four to twelve weeks to heal, depending on its size. Prior to the complete development of the bulla, 1 per cent. aqueous solution of gentian violet should be pain-

ted on and around the affected area. As soon as bulla formation is complete the roof should be removed and wet dressings of Eusol applied to the base of the ulcer for a few days, the surrounding skin being covered with a 1 per cent. Ichthammol paste. Thereafter this paste should be applied twice daily to the ulcerated area, but if the base of the ulcer again develops a thick purulent exudate the Eusol soaks should be resumed for a few days. DR. G. H. PERCIVAL, M.D., PH.D., F.R.C.P. (Ed)., D.P.H., Physician for Diseases of the Skin, Royal Infirmary, Edinburgh, who has written an excellent article on the subject of 'War and Skin Disease' in the Edinburgh Post-graduate lectures in Medicine published in a book form by OLIVER and BOYD, and from which we have taken material for this article, has given this as the simplest and the most effective treatment. He however hopes that some new drug may be discovered which will be useful and which will counteract the aplastic state which the gas produces in the tissues in addition to the initial tissue necrosis.

Therapeutic Economy.—Turning lastly to the effect of war on supplies of therapeutic sustances it becomes apparent that dermatological therapy may suffer in many directions and substitutes may have to be employed. Considerable economy will have to be achieved in the use of fats and oils. the preparations most commonly prescribed for skin disease. In Dermatitis wet dressings of astringent lotions may yield results which are almost as satisfactory as those obtained with ointments and pastes, and Anilinedye paints can be sustituted with effect in infective conditions. Tar paints in the form of crude tar, a pharmacopœial tar preparation, or a diluted solution of either of these, are excellent remedies in certain stages and types of Dermatitis, in Psoriasis, and Lichen Planus. Pastes are more efficient than ointments and are more generally suitable for application to non-hairy surfaces, but they require some type of oil for their removal, in addition to the use of soap and water. It is hoped that a cheap fatty base of this type will soon be evolved in the near future, as considerable economy in available supplies of fats would thus be effected.

The common drugs, Mercury, Boric Acid and Ichthammol, may be difficult to obtain and their use should be restricted to cases which are unresponsive to alternatives. Starch in the form of the starch poultice is one of the most useful skin applications, provided the jelly is properly made. Unfortunately its preparation is a tricky procedure, one which almost requires a special knack and one which is usually left to the patient to carry out on the scantiest instructions. Starch jelly so prepared is often bad, and is liable to do harm rather than good. While it is preferable to carry out dressings twice daily, it is not absolutely necessary in all cases and, wherever possible, consumption of material can be reduced to a minimum by renewing treatment only once daily.

We have in this article attempted to review the position of skin diseases in relation to the present war. Statistics are not yet available to form a comprehensive or a complete survey of the effects that this war may have both on the military and civil population with regard to skin diseases. But, it is worth-while remembering that conditions of cleanliness and of proper and efficient medical treatment to a few of the commonest diseases will eradicate most of the skin diseases in men and women.

Gleanings From Medical Press

Medicine and Therapeutics

Cerebrospinal Fever.— From January 1940 through February 1942, 500 patients with cerebrospinal fever were admitted to the Cardiff City Isolation Hospital. They were treated by chemotherapy, Harries says, without anti-meningococcus serum intrathecally. The ages of the patients ranged from an infant of 6 weeks who recovered completely to a person of 70 who died. All patients, even those who were moribund and died within a few minutes of admission, were included in the group of 500. The total number of deaths was forty-three. Sulfapyridine was employed in the treatment of 471 and sulfathiazole for the others. Sulfathiazole was as effective in promoting recovery and was less prone to cause nausea and vomiting. The drug was given by mouth in 2 Gm. doses on admission and repeated in four hours' time; then 1 Gm. every four hours for the next seventy-two hours; then 0.5 Gm. was given for a further three days. After the first 250 patients were treated the dose was increased to 2 Gm. every four hours for four doses and then 1 Gm. every four hours for ninety-six hours, followed by 0.5 Gm. every six hours for a further three days. The increased dosage had a slight effect in diminishing recurrences and complications, such as arthritis. Children less than 12 were given half the adult dosage, and infants less than 1 received one fourth of the adult dose. In all, 1,935 lumbar punctures were performed without any untoward effect. No general anæsthetic was administered. Apart from relieving headache, the reduced intracranial pressure was considered less damaging to the nervous tissue. The cerebrospinal fluid furnished a satisfactory guide to the progress of the disease. No patient was regarded as out of danger if the sugar had not returned to normal. Only six ventricular and five cisternal punctures were necessary. If the patient was comatose the tablets were crushed and given intranasally. If vomiting occurred after ingestion of the drug or the patient was delirious and nasal feeding was difficult, the sodium salt of sulfapyridine was given by intramuscular injection; but as sloughing often ensued in spite of care, it was discontinued and the sodium salt in equivalent doses was injected intravenously with three times its volume of isotonic solution of sodium chloride. Severely ill or greatly dehydrated patients were given the sodium salt of sulfapyridine intravenously in about 500 to 1,000 c.c. or more of isotonic solution of sodium chloride in 5 per cent. dextrose solution by the vaco-liter drip method. The ingestion of fluid was encouraged. The patients who had such complications as arthritis or iridocyclitis during convalescence were given a second course of chemotherapy. If bromides were given as sedatives the sodium salt rather than the potassium salt was administered. No person in attendance contracted the disease Morphologic meningococci were found in 465 cases, or 93 per cent. Material for cultures was obtained from 214; 93 per cent. belonged to group 1, 3.7 per cent. to group 2 and 3.3 per cent. were inagglutinable. Clinically, the various strains seemed to be of equal virulence.—*J. A. M. A.*

Recognition and Management of Cardiac Neurosis.—Joseph B. Wolffe, M.D., Philadelphia, Penna.

Cardiac neurosis may be defined as an unwarranted haunting fear of invalidism or premature death as a result of heart disease.

It is characterized by a tendency to dramatic exaggeration of symptoms, pain unrelated to effort most often occurring at night which lasts from half an hour to several hours, heaving, sighing, dizziness and faintness.

It is well known that psychic insults may make the heart a sounding board of emotion. Conversely an occasional extrasystole, forceful heart beat, dropped beat or other conscious disturbances of the heart may be relayed through the diencephalon and cause physchic disorders.

While there is no distinct line of demarcation between the various forms of cardiac neurosis a number of well-recognized syndromes are commonly seen. These seem to respond to different forms of treatment and management.

Neurocirculatory Asthenia: Characterized by reduced cardiovascular capacity for effort, heart consciousness, giddiness, sweating, palpitation, dyspnea, faintness, cold perspired extremities and undue fatigability. It is due to an abnormal response of the central nervous system to effort. Strain of war and military training often precipitate this syndrome. Early recognition of this malady is most important.

Treatment:—1. Advise against sudden physical and mental strain, persuasion, re-education, rehabilitation.

2. Suprarenal cortex (Eschatin), 2 c.c. daily with high salt diet.

Vegetative Reactions: Vegetative stigmatization of the cardiovascular system is responsible for several types of cardiac neurosis. The symptoms are due to a morbid reflex arc which gains expression through the cardio-sympathetic and cardio-parasympathetic components of the autonomic nervous system.

(A) *Sympathetic Hyperirritability*: Seen mostly in women and characterized by tachycardia of gradual onset and termination, fear of invalidism and death. Heart rate varies in lying and sitting position

(80 to 100 per minute). Abnormal blood pressure fluctuations. Forceful heart beats. Normal B.M.R. Commonest precipitating factor is emotional shock.

Treatment: Outdoor activity, avoiding excessive sunlight. Alkalies, alkaline-ash diet. Tr. valerian, potassium bromide, arom. sps. of ammonia and in severe cases desympatone, an epinephrine neutralizing fraction obtained from the pancreas, 1 c.c. -2 c.c. intramuscularly every other day and in enteric coated tablets by mouth. Smoking in moderation is beneficial.

(B) *Parasympathetic Irritability*: Seen mostly in men accompanied by variations in cardiac rate, force, and rhythm. Parasympathetic stimulation may even cause tachycardia by suppressing the normal sino-auricular node and precipitating ectopic foci.

The most common manifestations are: Precordial pain, heartburn, œrophagia, dizziness, gastrointestinal and urinary irritability, peripheral vasomotor disturbances, faintness, sensations of heat, sweating, allergic phenomena.

Treatment: High calcium acid-ash diet, sunshine or quartz-lamp exposures, graduated exercises; avoid tobacco, eserine, digitalis, cholinergic substances. Proper eye refraction, barbiturates with belladonna, cod-liver oil, calcium orally and intravenously, ephedrine or benzedrine whenever indicated.

Nothnagel's Syndrome: Due to deranged vasomotor mechanism or thermal allergy. Palpitation, coldness of the extremities, giddiness, pain or uneasiness over the precordium are some of the leading symptoms.

Treatment:—Histaminase, two tablets t. i. d. before meals. Histamin desensitization.

Hypogonadism: Seen in women as well as men of various ages. Characterized by vasomotor instability, palpitation, profuse sweating, precordial uneasiness, rapid gain in weight.

Treatment: Testosterone propionate orally and parenterally, estrogenic hormone in adequate doses every other day following the menstrual cycle.

A few general principles apply to all forms of cardiac neurosis.

Advice should only be given after a careful history and physical examination have been completed.

Laboratory, x-ray, and electrocardiographic studies should be done for the sake of thoroughness, but it should be explained to the patient that these are routine procedures and that they are not done because heart disease is suspected.

The physician and the family must have an attitude of understanding and sympathy in order to make the treatment successful.—Jour. Med. Soc. N. J., 39:266 (May) 1942.—*Medical World*.

Pneumonitis.—Quite recently a form of pulmonary inflammation has been described which is said to differ from any other recognized form of pneumonia. It has been termed pneumonitis. NAPIER and others have given a good account of this affection. They describe it as a low-grade inflammatory change of a benign nature. The symptoms include cough, low pyrexia, and lassitude. Physical examination does not yield any evidence of pneumonia. Weak breath sounds and a few rales are perhaps the only ausculatory signs. The respiration rate is not increased and there is no toxæmia. On X-ray examination there is some opacity, suggestive of a localized inflammatory process in the lung. The disease runs a benign course and usually clears up rapidly. Some have regarded the condition as a mild or abortive pneumonia of acute specific type. This has, however, been disputed. The condition may be due to a virus infection, and so it has also been called 'virus pneumonia.' Some workers have reported epidemic outbreaks. More severe forms of the disease occasionally prove fatal, and a few autopsies have been performed. The lesions found were quite distinct from those of pneumonia.

An atypical form of bronchopneumonia of virus origin is described by MARKHAM under the nomenclature of acute pneumonitis. It was frequently diagnosed as 'influenza.' This type of pulmonary infection is characterized by fever, cough, and malaise and is often diagnosed as influenza. It is becoming increasingly frequent. Other names given to it are 'atypical pneumonia,' 'bronchopneumonia of unknown ætiology,' 'virus pneumonia,' 'acute pneumonitis;' but the clinical description and laboratory findings show no significant differences There is no well-defined clinical syndrome to characterize this disease. There are three groups of cases: (1) Patient does not feel ill, but has rales in the chest. (2) Most patients feel 'just miserable' with headache, malaise, and a dry, hacking cough. (3) A small number are acutely ill, slightly cyanosed with high temperature, occasional rigors and a moderate amount of dyspnœa. Malaise is by far the commonest symptom. Headache and general muscular pains are also common. Cough with or without expectoration is always present. Pleural pain is not frequent. The chief physical signs are suppressed breath sounds with a few fine crackling rales. Bronchial breathing is rarely present. Dyspnœa is extremely uncommon. Vomiting, if present, is only associated with severe headache. Herpes is seldom observed. There may be some tachycardia. These cases do not respond to chemotherapy. More frequent use of radiographic films in cases of vague respiratory illnesses is essential for diagnosis. It is a communicable disease.
—*Prescriber*.

Irritable Colon.—The term "IRRITABLE COLON" is one which, according to TURNER, is applied to a condition which gives rise to symptoms of colonic dysfunction for which no basis of organic disease of the colon can be discovered. It is, however, a very vague term. It emphasizes, however, the fact that colonic symptoms can and indeed frequently do arise on a purely functional basis and without any underlying organic cause. Other terms are also used, such as 'the spastic colon,' but this is a somewhat narrow expression as it is only applicable to a certain group of cases. This writer emphasizes the fact that there is absence of organic disease in a large number of patients who suffer from bowel symptoms, and he decries the common use of the term 'colitis' in cases which present no actual inflammatory disease of the bowel. Functional disorders of the colon can be classified under two major headings. The first of these includes those cases in which the disturbance is primarily motor. As this may occur as either contraction or relaxation, it may be manifested either by spasm or by atony. The motor disturbance that occurs in association with spasm may result in either diarrhœa or constipation. Atony can only cause constipation. The second variety is secretory, and here we have the discharge of excessive amounts of mucus. Many patients, however, may have both motor and secretory dysfunction. Patients with colonic irritability present variable symptoms. Generally, however, these consist of constipation or diarrhœa, discharge of large amounts of mucus, and abdominal pain. Other common symptoms are abdominal distension, the vague digestive discomforts known as 'dyspepsia,' case of fatigue and nervous and emotional instability. The constipation complained of is characterized by the passage of motions which are narrow and ribbon-like or broken up, often consisting of very small fragments of pellet-like particles. The common use of cathartics in such cases only adds greatly to the irritability of the colon. If there is diarrhœa it will tend to be worse during periods of fatigue or emotional strain. Mucus may be passed whether there is constipation or diarrhœa. The pain in cases of irritable colon varies greatly. It is commonly cramp-like and in such cases it occurs in violent paroxysms or it may consist of a dull, constant ache. It may be felt in any area of the abdomen, and may be diagnosed as being due to appendicitis or disease of the gall-bladder. As regards treatment, it is of the utmost importance to break down the excessive bowel consciousness that so many of these patients have. If there is constipation, all strong laxatives, irrigations, and enemata must be immediately stopped. Regular bowel habits must be established. Care must be taken to avoid the use of preparations of substances containing laxatives such as cascara, as such combinations defeat the purpose of the physician. Diarrhœa is to be treated by rest, avoidance of roughage, regularity of meals, reduction of nervous strain, and the use of sedatives and antispasmodics. For severe attacks of pain strict rest in bed should be ordered. Atropine and sedatives of the barbital group should be used freely. Heat applied to the abdomen is also beneficial.

Ryle deals with colonic neuroses. He states that the term 'spastic colon' is one given to a condition which continues to pass undiagnosed or to be misdiagnosed and to be treated erroneously in consequence. No other single condition has led to so much unwise local treatment and to so many needless abdominal operations. Acute attacks of colonic spasm may simulate a stone in the ureter or the bile-duct. Of erroneous diagnoses given to such cases, chronic appendicitis and colitis are the commonest. Futile surgery, of course, causes disappointment and adds greatly to the patient's mental and physical misery.
—*Prescriber*.

Urticaria and its Treatment.—By AUSTIN FURNISS, L.R.C.P., L.R.C.S., L.D.S., D.P.H.

Urticaria comes on suddenly, the eruption being accompanied by intense itching and burning. Scratching gives some momentary relief, but is followed by the development of large numbers of fresh wheals. The wheal, as a rule, is due to the action of a poison which dilates the vessels and leads to exudation of serum into the lymphatic spaces. The itching is due to irritation of the nerve-endings. The poison may gain access from without: the wheals produced by the sting of nettles, mosquitoes, gnats, fleas, jelly-fish etc., are familiar examples. In these cases the affection is purely local. The poison may, however, be present in the circulating blood, being derived from systemic disturbance, such as caused by shell-fish; while certain medicinal drugs may set up the affection. In these cases general symptoms such as high fever, headache, backache, furred tongue, anorexia, nausea, vomiting, and diarrhœa may be present.

In the common form, *urticaria fugax*, the individual wheals last only a few hours at most, and disappear, leaving no trace of their presence. Fresh crops, however, may continue to appear, and the attack may last for several days. In some cases the eruption has been known to come out in successive crops day after day, for weeks or months, or even longer. This is a very chronic form and is usually called *urticaria perstans*. Urticaria sometimes invades the mucus membranes of the eyelids, lips, mouth, tongue, pharynx, vulva, and possibly of other parts.

The wheals of urticaria have no definite arrangement and are never symmetrical. There may be only a few on some particular part of the body, or they may cover nearly the whole of its surface. A striking feature of urticaria when it has obtained a hold on the person is that the slightest contact with the clothing or the least scratch will at once bring out a crop of wheals on any part of the skin.

A number of varieties of urticaria have been described according to the size, configuration, and structural peculiarities of the characteristic lesions. Thus the wheals may be small and on their subsidence leave papules. Hence the name *urticaria papulosa*.

This type of urticaria is chiefly met with in children and is a stubborn and chronic affection. The wheals are, as a rule, no bigger than lentil, and on the top of each is a tiny red spot or inflammatory papule, which is usually covered with a darkish scab, the result of scratching. The eruption affects all parts of the body, but shows a preference for the trunk. It is sometimes markedly vesicular in character, closely simulating chicken-pox. Fresh crops of lesions come out at night, and cause such intense itching that sleep is impossible. This disease may last for several years, becoming milder or practically disappearing in winter, and returning with the warmer weather. When simple urticaria attacks parts which are very lax, such as the eyelids, scrotum, etc., the swelling or œdema which comes on quite suddenly is quite alarming to the patient. It seldom lasts longer than twenty-four hours. *Urticaria pigmentosa* is not a true urticarial affection. It consists of moderately large flat nodules or macules, which become urticarial when slightly irritated. These become pigmented and are of a buff or brown colour. It is a very chronic eruption beginning in early infancy, and continuing on and off until puberty, when the eruption often tends to disappear. The little nodules or tumours are composed of masses of mast cells, which are chiefly to be seen around the blood-vessels.

Ætiology.—It has been suggested that the urticarial condition may be explained by hypersusceptibility or anaphylaxis to foreign albuminoid bodies. We may classify the causes as predisposing, internal, and external. Among predisposing causes are sex—females being much more liable to the affection than males; age—infants, owing to their skin being very irritable, are very prone to nettlerash; the neurotic temperament, indigestion, gout, functional and organic disease of other organs, notably of the nervous system. Violent mental emotion may be sufficient of itself to bring on an attack. Among internal causes are certain articles of food which irritate the alimentary tract and reflexly the skin. Every variety of idiosyncrasy is displayed by patients in this respect; but to selfish, especially mussels, lobsters, and crabs, must be assigned the chief place among dietetic irritants. Other substances which may cause urticaria, in certain individuals are pork, oatmeal, strawberries, parsley, and mushrooms. The phenomenon is probably anaphylactic—the food itself, at some stage in the process of digestion or of decomposition, acting as antigen. The affection may also be set up by digestive disturbance, quite independently of errors of diet. Certain medicinal drugs, antitoxins among them, also give rise to urticaria.

Diagnosis.—This presents no difficulty as a rule, the sudden onset, the presence of wheals, and the short-lived nature of the eruption being the characteristics of the affection. The history and course of the eruption, and the almost invariable presence of typical lesions, reveal the nature of the affection. Urticaria papulosa is frequently confounded with scabies, but the distribution of the lesions on the trunk and the absence of the characteristic burrows are sufficient to exclude that disease. When the wheals are surrounded by vesicles or bullæ, urticaria may for a time simulate pemphigus, and if the constitutional symptoms are well marked, the rash may at first be mistaken for that of scarlet fever or even erysipelas. The prognosis is always favourable, although the affection may run a more or less prolonged course. If the cause be an acute toxæmia from the ingestion of unsuitable food, the symptoms may quickly disappear; if, however, the cause be a chronic toxæmia, the affection may be very persistent.

Treatment.—The first thing to do is to exclude any article of diet, external irritation, or focal infection which may be the cause. Desensitization for articles of diet difficult to exclude should be carried out. If the attack is distinctly traceable to indigestion, or to poisoning by food, etc., an emetic should be given if the symptoms are very severe; in milder cases a small dose of calomel followed by a saline such as magnesium sulphate effervescent will cleanse the intestinal canal of the toxins which are the cause of the trouble. In the more chronic cases treat any dyspepsia on ordinary lines. Many doctors temporarily withhold nitrogenous food. Salol (phenyl salicylate) is often used for its local antiseptic action in the intestine. Salicin or the salicylates, especially of quinine, are also very useful. Aspirin is not without value. Calcium in some form should always be prescribed. Some use calcium lactate in full doses, but it is better to use a double salt-calcium sodium lactate. Kalzana, which is a calcium sodium lactate, is a well-known remedy. Thyroid gland in small doses sometimes benefits the more obstinate cases. Local treatment is required for the itching. Alkaline baths and dilute carbolic lotion (1 in 100) are useful. A dusting powder of talc or zinc oxide may be used, whilst calamine and lead lotion is very soothing. Brocq advises that the patient's body linen be impregnated with starch powder, and that he sleep in fine sheets sprinkled with the same material. It is most important to prevent chill. For this reason it is well, whenever the patient will submit to such a course, to keep him in bed. Where restlessness is very great it may be necessary to give sedatives. In very acute cases it may be necessary to use ephedrine or adrenalin chloride hypodermically. Special treatments are sometimes used such as auto-hæmotherapy and ultra-violet irradiation. In the case of the latter remedy mild applications of the rays are given. They usually suffice to relieve the intense itching and to clear up the condition.

For local treatment all kinds of preparations are available such as Mitigal, a liquid organic sulphur compound; Anæsthesin; Borol-Chloretone; Anæsthone Cream; Emollientine; Witch Hazel Distilled Extract; and Calmitol Lotion or Ointment.—*Prescriber.*

Surgery

Some Thoughts on Ingrowing Toe-nails.—It is a clinical fact that there are two distinct varieties of ingrowing toe-nail. There is the flat nail, which usually has a sharp corner growing forwards into the nail fold, which is pressed on to it by the body weight and the shoe. This soon ulcerates, and, when seen, is usually infected and suppurating, or is more chronic and covered by a mass of granulations. This variety is unilateral typically, and may be on either side of the toe. The method of treatment will depend on the presence and degree of infection. The second variety is a very curved nail, which presses inward along the whole extent of its lateral margin and usually of its medial margin too, and is rarely infected.

Treatment in the first variety may be confined to the affected side. Treatment in the second variety should be directed to the whole nail. In the first case there appears to be a local maladjustment, and it is this variety which responds best to non-operative treatment, if seen early; in the curved nail, on the other hand, there seems to be some intrinsic factor at work causing the ingrowing in spite of any prophylaxis.

All methods of treatment must keep two problems in mind, the likelihood of recurrence and the amount of disability. Neither has been satisfactorily solved yet.

A commonly-performed operation which has a short disability-period but a high recurrence-rate is simple removal of a part or the whole of the nail. Success with this method may be achieved in flat toe-nails if the patient is watched and educatad afterwards, but such favourable circumstances rarely occur. The best method in general use is that used at the London Hospital, namely the excision of a wedge comprising the outer or inner one-third of the nail, the nail fold, and—most important—the nail bed. In a properlv performed operation this part of the nail never grows again, while the remaining two-thirds of the nail continues to grow normally. Few of these cases recur, but the post-operative disability is prolonged; for the wound granulates very slowly, and healing is delayed by the facts that the patient is ambulant and that the wound is often infected from the original lesion. In an attempt to hasten healing one may suture the wound wedge, but in no case has primary healing been observed: the sutures have either cut out or become infected, and no time has been saved.

Another method tried in cases which were not infected, and were of the flat-nail type, was to cut out a wedge of soft tissues on the side of the toe affected and to suture the wound. This pulls the nail fold away from the nail and allows the offending portion of nail to grow without being buried in the soft tissues; the scarring in the wound should hold the fold down permanently and prevent recurrence. The technical difficulty here is that, to ensure that the nail fold is pulled well away, an unexpectedly large wedge of soft tissue must be removed. Suturing this requires tension, which brings in its wake the usual penalties: the stitches cut out, or infection occurs. The only satisfactory results have been where a small wedge was cut, and here the period of disability was much shortened, but the late results and possibility of recurrence are not known.

In bilateral or recurrent cases the necessity for a radical operation presents itself, and the basis of all such operations must be total removal of the nail bed. Special care must be taken in the two proximal corners of the nail bed not to leave anything which may become the origin of those very annoying small growths of nail which are occasionally seen. Simple removal of the nail bed is unsatisfactory. The wound takes fully six weeks to granulate and epithelialize, and leaves a weak, tender scar, adherent to the phalanx, which needs a long time before it can stand up to hard work. To avoid this three methods have been tried. The most radical is a partial amputation of the toe through the distal phalanx, with a plantar flap which is sewn to the skin at the base of the nail bed. The cosmetic result is poor; the healing time is usually short, but the disability time seems to be prolonged, and it is usually many weeks before these patients walk comfortably in boots. Cases have been seen, as much as a year later, of men unable to march and wearing shoes only.

A less radical method was to cover the raw surface with a Thiersch graft. These cases healed quickly, the grafts taking very well; but they were left with a thin skin-covering in a vulnerable area; and were not much different from those which had been allowed to heal spontaneously. The next step was to try a free full-thickness graft. This does produce a better cosmetic result, with good thick skin covering the area. Unfortunately the number of grafts taking fully has not been as large as with the Thiersch grafts, and consequently there has not been any shortening in the disability period. The final result, however, seems to merit efforts to improve the technique.

In brief, the most successful method in use remains the well-tried wedge excision to nail, nail fold and nail bed; but the magnitude of the problem and the surprisingly long disability after operation, call for a trial of other methods in the search for one which satisfies the two criteria of low recurrence rate and short disability period.—By S. GLASER F.R C.S., (From *The London Hospital Gazette*, July 1942).—*G. P.*

Immersion Foot.—Webster and his associates have observed 142 cases of "immersion foot," a condition produced by long immersion of the feet in cold water. As the condition may occur in feet exposed for long

periods in subtropical waters, it cannot be classed as true frostbite. Almost all of the cases were the result of enemy action in the North Atlantic. The feet when the patients were removed from the open lifeboats or rafts on which they had been for varying periods were cold, swollen and waxy white, with scattered cyanotic areas. The patients complained that their feet felt heavy, "woody" and numb. The feet were anæsthetic to pain, touch and temperature. Soon after the patients were removed from their craft the swelling increased rapidly, the feet became red, hyperemic and hot without sweating, and the pulse in the vessels of the feet was full and bounding. The initial anæsthesia and hypersthesia were replaced by intense paresthesia on the eighth to the tenth day after removal from the traumatizing agent. A trial of treating the feet by dry refrigeration was made at Camp Hill Hospital, Halifax, N. S. With the feet elevated, dry cooling and refrigeration were achieved by the application of ice bags (changed every four hours), dry cooling by exposure to a fan and dry cooling at room temperature. A few hours after the ice bags were applied the patients were completely comfortable, the edema subsided and blebs filled with straw-colored fluid and those filled with extravasated blood were resorbed without breaking. The blebs refilled if cooling was discontinued prematurely. The 127 patients with minimal, mild and moderate involvement, with 1 exception, recovered completely after superficial desquamation over the entire foot and re-education necessitated by an abnormal gait. Their average hospital stay was thirty and four-tenths days. Of the 15 patients with severe involment 7 have been discharged after the loss of small areas of superficial tissue, which healed rapidly and did not require grafting. Of the 8 still confined to the hospital, 5 have gross tissue defects across the mid-dorsum of both feet, in 2 the superficial skin over the distal aspect of both feet has become mummified but is being shed and replaced by healthy tissue with epithelial islands throughout and in 1, to whose feet ice bags were applied for four weeks, the tissues of the feet had a healthy pink color, but in eight hours at room temperature a large quantity of blood was extravasated into the subcutaneous tissues. The feet became greenish gray, and a sharp line of demarcation between healthy and damaged tissue encircled the midtarsal region of both feet, and tissue breakdown occurred. This will probably progress ultimately to extensive tissue loss over the distal aspect of both feet. The rationale of the treatment rested on the presumption that if the metabolic demands of the part could be reduced until the edema subsided, the extravasated blood resorbed and the vasomotor tone re-established the tissue damage would be greatly ameliorated. Strict asepsis is essential because if infection develops in the damaged tissue the process spreads rapidly through all layers of the feet.—*J.A.M.A.*

The Scalenus Anticus Syndrome with and without Cervical Rib.—Joseph Donald and Benjamin F. Morton. *Annals of Surgery*, CXI, 709, May 1940.

The authors present an analysis of twenty-one cases of scalenus anticus syndrome observed by them in the past two years. Sixteen of these twenty-one patients have been operated on by scaleniotomy, of whom fourteen were completely relieved and two partially; the other five are awaiting operation.

The age of these patients ranged from fifteen to fifty-four with an average of thirty-seven years. Females predominated over males. There were nine left-sided cases, eight right-sided, and three bilateral.

Histories revealed that excessive or unusual use of the involved extremity preceding the onset of symptoms occurred in eight cases; five cases were servants who used the arm for sweeping or washing. One case developed immediately after a direct trauma, and two after general anæsthesias during which the shoulder posture was faulty.

The symptoms varied in duration from six weeks to eleven years, half of them existing for less than six months. The outstanding symptoms and physical findings were pain, numbness, tenderness over the scalenus anticus, muscle weakness, and occasionally atrophy. Many cases showed changes in tendon reflexes and sensation. Vascular findings of decreased blood pressure, bruits, and, in severe cases, gangrene were frequently present. Only four had cervical ribs, but the symptoms were more extreme in these cases.

The authors conclude that scaleniotomy is the treatment of choice in scalenus anticus syndrome when conservative treatment is inadequate to give relief; the symptoms are produced by inherent anatomic variations in the shoulder girdle, such as low origin of brachial plexus, etc.; and the precipitating conditions are trauma, occupational strain, or improper posture.—*Frank Kugler, M.D., Iowa City, Iowa.—J.B.J.S.*

Improved Methods in Extremity Amputations for Diabetic Gangrene.—F. W. Bancroft, A. G. Fuller and W. F. Ruggiero (*Annals of Surgery*, 115: 621, April 1942) describe two recently adopted methods employed for thigh amputations in patients with diabetic gangreno at the City Hospital, New York. The patients submitted to this operation at the Hospital are usually poor surgical risks, elderly and under-nourished. Mortality from midthigh operations in these patients has been high, varying from 54.4 per cent. in 1937 to 62 per cent. in 1938 to 1941 In 1941, Fuller's method of sleeve operation for amputations above the knee was adopted; this is a modification of the Callender operation, with special emphasis on "preserving the collateral superficial blood supply above the knee," and on producing a well-padded stump for an artifical leg. With this operation, the mortality in 13 midthigh operations was reduced to 33.4 per cent. Subsequently

the use of this operation was combined with "refrigeration anæsthesia." For this procedure a rubber tourniquet is placed on the thigh six or more inches above the line of the skin incision; two turns of the tourniquet are employed, one above the other. The extremity is then packed in ice, finely cracked and kept in place with a rubber sheet; the ice packing extends about two inches above the tourniquet; about 50 pounds of ice are required to secure adequate refrigeration for a low thigh operation. The ice packing is not removed until the patient is placed on the operating table; the tourniquet is not removed until after the amputation is done and the large vessels ligated. After operation the stump is "gradually de-refrigerated" with the use of icebags. With this technique, there is little, if any, post-operative pain and the stump heals well. In 13 cases of thigh amputations in which this method of anæsthesia combined with the sleeve operation was employed, there were about 2 deaths, reducing the mortality to 15.4 per cent., although the condition of the patients in this series was no more favorable than in previous series operated at the City Hospital.—*Medical Times.*

Proceedings of Associations

Medical Licentiates in Conference

Dr. U. B. Narayana Rao's Presidential Address

Presiding over the 32nd Annual Conference of the All India Medical Licentitates' Association, Delhi, Dr. U. B. Narayana Rao in the course of his address said:

"The past glory of the Licentiate—whether as his earliest predecessor the Black Doctor of Mahim or as H. A. or S. A. S.—has been sung by hundreds of lips on thousands of platforms. Any one who counted in the country and who came in contact with him showered encomiums of praise on his unflinching devotion to duty. No doubt a Col. Turner might have 'damned' our Association: a Dr. Dubash might have 'villified the Civil Hospital Assts. and Military Asst. Surgeons.' But these were negligible and treated with the contempt they deserved. In a nutshell, as long as he undrudgingly worked he was patted and promised—but all the same exploited. But when he pleaded for justice and fair play, regarding his pay and prospects, facilities for higher education, and for proper recognition as a medical man, he was left in the lurch, he was badly let down, nay neglected. The improvements and changes made were more from the outlook of a grocer. The last post-war period brought in a series of fresh disabilities and disappointments. The report of the Medical Services Re-organisation Committee, appointed after that war could be best described by what the 'Hindu' of Madras then succinctly wrote about it: 'the recommendations of the Lovett Committee furnish a striking illustration of the art of contriving a method of reform which will leave matters exactly where they are.' The retrenchment axe fell more powerfully on the Licentiate cadre; the war time vague promises resulted in a curtailment of the percentage of promotions in the S. M. S. cadre wherein the licentiates were also slowly being replaced by graduates. On the top of all, the Indian Medical Council Act was passed—giving the Licentiates the unique recognition of being inefficient at home and unfit for honor abroad. Yet the Government with the support of vested interests persisted in perpetuating the class; finding it impossible to obtain justice from such a powerful combine, the Association decided that the class should be scrapped forthwith, and that there should be an uniform standard of education for the whole country.

"It was at such a time—when the relations between the Government and the Licentiates were severely strained, due to the narrow-visioned and short-sighted policy of the former that the present deadly war commenced. The bitter experience of the past war has proved that the number of medical men in the Government Services—both military and civil—was hopelessly inadequate for the needs of a growing army. Advertisements were flashed in medical and lay papers for recruiting medical men—but even here the terms offered were ungenerous, undignified and therefore rejected as unacceptable by the Association. To be honest, with the Licentiates, it was a sense of grievance, of wrongs unrectified, of humiliations unjustified, and fear of further exploitations that kept them back from joining the war services.

"Where there was a need of drastic revision of policy the little improvements made at the various consultations, committees and conferences did not touch the fringe of the problem. In short, they were 'too little and too late' to use the Churchillian phrase, and offered without grace. The reply of the Licentiates was the inevitable Ahmedabad Conference Resolution No. 4 of Dec. 1941, which unequivocally demanded King's Commission and nothing less. Parleys, arguments and counter arguments, followed in its wake, the Souttar Medical Mission travelled throughout the country, and the Govt. at long last, after a further 15 months of deliberation found the necessity of acceding to our demands. We got justice in the shape of the formation of an Indian Army Medical Corps, the formation of which was announced early this month".

He then pointed out some of the defects in the system. What they wanted was not a "Made in Japan" brand of recognition, but a declaration by Government of its future policy. He pleaded for the removal forthwith of the invidious distinction that

had been sought to be perpetuated among the existing men in the I.M.D. He appealed for equal pay and status among Civil Medical Practitioners employed in Military stations. He urged that their Association should be taken into confidence by the Government in all their future dealings with the problems of the Licentiates. Referring to the gradually deteriorating political situation, he pointed out that the great majority of the class were engaged in private practice and therefore had an independent outlook on life and nationalistic tendencies. It would be a difficult task to induce them to join War service unless the political issue was satisfactorily settled.

Kazmi's amendment and the attitude taken by the Government in the matter next engaged his attention. They should not be discouraged, he said, by the fate that overtook Kazmi's Bill, but should continue their efforts unabated and urge their supporters in the Legislative Assembly to carry on their efforts. Referring to medical education, he pointed out that two factors stood out prominently in the educational policy of the Government. First and fore most was that the Licentiate class was and is kept up with the sole purpose of catering to the needs of their services. Secondly, wherever improvements were made in either the pre-medical or the medical courses, a distinction was assiduously kept up as to debar a Licentiate from rising higher. This Association, in utter disgust, decided to end such a system. The Government have shown sympathy in their aspirations by granting them emergency Commissions. They should, he urged, lose no time in translating their sympathetic assertions into definite action.

The Medical Schools should no longer be allowed to continue, he said. In the words of the Prime Minister, facilities for advanced education must be evened out and multiplied. The sooner the Government abolished the Medical Schools—unwanted by them—the better it would be for all concerned.

Their future destiny was in their own hands. They should increase their strength and influence. Every Licentiate should join the Association and give it added strength.

Concluding he said, "It is a matter of common knowledge that it was the Licentiates of Bombay who, ten years ago, took a leading part in arranging a common venue for the conferences of the two associations with a view to establish closer contact and subsequent amalgamation of the two bodies; further negotiations between them resulted in a joint committee meeting held at Delhi under the presidentship of the late lamented Col. Bholanauth. The seemingly good results of these negotiations were torpedoed on the rock of Journal management. Be that as it may, ever since, one felt that the I. M. A. was not serious enough in handling the problems affecting the licentiates, whether in the matter of amendment of the Indian Medical Council act or in standardization of medical education, whether in the fight for Emergency Commissions, or in the abolition of medical schools. I am sorry to say that the I. M. A. did not put up a show expected of it. On the contrary, instances were seen where some of the chief executives of the Association openly supported the perpetuation of the medical school education. What is more, the I. M. A. is meeting in its conference to-day at Patna, and would not change the dates to suit its licentiate members in spite of their knowing our prearrangements. It is not my desire to apportion any blame on the I. M. A. for such a state of affairs, but I am pointing out to them the necessity of a change in their policy. I would put forward a few suggestions, which I believe would be practicable and pave the way for better understanding and mutual co-operation which is a pre-requisite to amalgamation. The Working Committee meeting of the I. M. A. should be held in consultation with ours (if the latter is formed) in the same place each time. Questions which affect the profession as a whole, should be thoroughly discussed and plans formulated for concerted action to gain our ends. Especially subjects like abolition of medical schools and standardisation of medical education, amendment of the Indian Medical Council Act, emergency and war services and A. R. P. should be the few subjects to be tackled during the year. I am confident that with a spirit of mutual good will and co-operation the two Associations can work miracles and make it easy for their future merging."

The Kistna District Medical Association, Masulipatam.—The monthly meeting of the Kistna District Medical Association, Masulipatam, was held on Sunday, the 18th April, 1943, at the Government Hospital, Bezwada. 15 Doctors attended.

After tea, the business meeting began at 6-40 P M. Dr. Seshacharyulu, Vice-President, occupied the chair. The minutes of the last meeting were approved.

Read letters No. C. 112 to 115 dated 20-3-43 from the Honorary General Secretary of I M.A , Calcutta :

Resolved that the amendment to rule 15-II, page 24 of the rules of I.M.A., as proposed by the Secretary of the Andhra Provincial Branch, Masulipatam, be accepted.

It was resolved that there should be no monthly meeting in May '43, owing to hot summer.

It was resolved to urge the Special Officer, Dt. Board, Kistna, (1) to regrant a contingency allowance of Rs. 5/- per mensem to every rural dispensary, in view of the increased cost of postage, stationary etc.; and (2) to appoint one ward-boy for each rural dispensary in place of the retrenched compounders.

The Secretary was authorised to communicate the above resolutions to the Special Officer, Dt. Board, Kistna, through the District Medical Officer, Kistna.

Correspondence

M & B Tablets in Pneumonia

To
The Editor, THE ANTISEPTIC,

Sir,

With reference to Dr. Deb Sarma's letter in your journal of December 1942, I beg to cite the following few cases which came under my observation.

I. My compounder's son aged about 10 months, was taken ill with pneumonia. On the first two days he was put on expectorant mixture. He was also given two injections of S.U.P. 36, one on each day. As he did not show any improvement I decided to try M&B 693 tablets on the third day. He was given ¼ (one fourth) tablet every four hours with Glucose water. The next day the same treatment was continued. On the fifth day of the illness there was distinct improvement in the child's condition. The treatment with M & B tablets was continued for two days more and the child recovered completely. In all he was given six tablets of ·50 gm. each, and yet no anæmia developed in this case.

II. A child, aged one year, son of a farmer, had an attack on lobar pneumonia. The child was brought to this hospital in a serious condition. His pulse was rapid and feeble and it appeared that the child would die at any moment. He was given Coramine injection. The pulse began to improve. He was administered M&B 693 tablets with Glucose water. From the next day onwards his condition improved and he was all right within a week. This child was given in all five tablets, but except vomiting he did not show any ill effects due to the administration of Sulphapyridine.

III. A boy, aged two years, had an attack of broncho-pneumonia. I was called to see the case on the third day of the illness. I found him in a very serious state. After initial injection to improve his heart he was given M&B tablet. He was given ½ (half) tablet to start with. After this initial dose he was given ¼ tablet every four hours. Next day his condition remained the same, but on the third day the child began to show improvement. In all, this child was given eight tablets of Sulphapyridine. This boy also did not show any anæmia even though he was given such an amount of the drug.

IV. A son of a tailor, aged about ten months, was laid up with pneumonia. He was seen by me on the third day of the illness. I found him in a serious condition. His pulse was very rapid and could be felt with great difficulty. After Cardiac stimulants were given I gave him ¼ tablet of M&B. He was given this amount of tablet every four hours. His condition began to improve, and after three days the child was alright. This child was given four tablets in all.

About a month afterwards the same child got an attack of malaria. He was given Quinine mixture. While under this treatment the child's father, without informing me, gave ½ tablet of M&B. He was tempted to do so, as he had observed that on the previous occasion when the child was seriously ill he recovered due to the administration of this tablet. It was unfortunate that he had in stock a few tablets of this drug, which had remained with him from the container of 25 tablets purchased by him. On the next two days I could not see the child but his father used to inform me that the temperature was gradually coming down. On the fourth day the child had no rise of temperature. His father innocently believing that this good effect was due to the M&B. tablet continued this drug. About four days later I was once again called to see the child and I was surprised to find the child pale. His skin was yellowish and there were purplish spots in the skin due to the extravasation of blood under the skin. I asked his father whether he was given M&B. tablets and he informed me that the child had already six tablets of this drug. I advised him to stop this drug immediately. He was also, told to bring Liver Extract for injection, but before he could bring it from some city the child grew worse and the boy died on the fourth day of my last visit to his house. From all these four cases I come to the following conclusions :—

(1) As seen in the first three cases, if Sulphapyridine is given in usual dosage, it has very little tendency to give rise to anæmia. I have used this drug frequently in elders and children, but I have seen none of them developing anæmia.

(2) I believe the anæmia in the fourth case cited above was due to the simultaneous administration of Quinine and Sulphapyridine. The very fact that the child did not develop anæmia on the previous occasion, when no Quinine was given, shows that the anæmia on the second occasion was due only to the administration of Quinine.

(3) It appears therefore that Quinine in some way affects the R.B.C.s of the blood and makes them an easy prey to the action of Sulphapyridine. Sulphapyridine in such cases causes extensive hæmolysis of the R.B.C.s.

(4) I have used this drug in large quantity in cases of gonorrhœa in young people and have never noticed development of anæmia in a single case.

(5) While not denying the fact that Sulphapyridine in large doses may cause anæmia; previous medication with Quinine has the tendency to produce anæmia even when small amount of Sulphapyridine is given simultaneously with this drug.

Yours sincerely,

Raj-Gadh, *20-12-'42* — DR. D. J. CHANHAN, M.B., B.S., *H. H. Dilher-Kunverba Hosptl., Raj-Gadh, (Rewa-Kantha.)*

Further Consideration Needed

To
The Editor, THE ANTISEPTIC,

Dear Sir,

I refer to the article in the ANTISEPTIC of January 1943 (p. 16) on Sulphonamide preparations by Dr. Ch. KRISHNAMURTY and the correspondence in the February 1943 issue (p. 132) by Dr. K. D. GHOSH. The question raised by Dr. GHOSH is no doubt interesting

as it has been fairly frequently observed that although Sulphapyridine provokes a crisis, in a large number of cases the pneumonic consolidation does not resolve quickly. The reason for this delayed resolution has been scarcely dealt with in the majority of publications on the subject. The following few, however, may serve to throw some light as to the possibility of the unwanted manifestation.

Aldo Cionine (Abstract—The Year Book of General Therapeutics, 1941, p. 80) refers his observations on 236 patients with pneumonia treated with Sulphapyridine. The writer mentions that in most of the patients the temperature returned to normal in 12 to 48 hours and remained so; in others, there was a secondary rise for a few hours or days. The resolution of the pulmonary infiltration also varied. It was extremely rapid in about 25 per cent. of the patients and much slower in the others. These differences in behaviour did not depend on the gravity of the disease or on the day treatment was instituted. Slow resolution was observed in patients in whom treatment was started on the second or third day of the disease, and rapid resolution was seen in those in whom it was started at an advanced stage.

ANDERSON and CAIRNS (The Lancet, Oct. 12, 1940, p. 449) while reviewing their experiences on the treatment of pneumonia with Sulphapyridine and Serum mention that the combined treatment was adopted for various reasons: despite the beneficial effects of Sulphapyridine in type II pneumococcus pneumonia there was still an appreciable fatality rate; Sulphapyridine frequently gave rise to severe gastric discomfort with nausea and vomiting which made it necessary to stop treatment; moreover the process of resolution often seemed to be slowed down suggesting that some stimulus to resolution had been inhibited.

This view of Anderson and Cairns has been amply clarified by De and Konar in their paper entitled "Observations on some unusual toxic effects of Sulphanilamide therapy" (Ind. Med. Gazette, July, 1940, p. 385). It is stated by the writers that in a case of acute lobar pneumonia, no sooner is M & B 693 exhibited in adequate doses, than the patient begins to perspire profusely and the temperature drops down to normal or even subnormal. This condition usually develops 24 to 48 hours after the treatment has been started. In some cases, the sweating is so severe that the patients' clothes have to be changed several times in the day and night. In such a condition, the skin feels cold and clammy, urine diminishes considerably, the patient looks weak and exhausted and the whole picture resembles that of collapse. The writers further add, that such a dangerous depression of the vasomotor system not only leads to a marked concentration of the circulating toxins but also lowers the temperature of the body and maintains it at a low level. This prevents the development of a healthy reaction of the tissues to the invading micro-organisms and their toxin and delays the mobilization of an adequate amount of antibodies. Thus actual resolution is often hampered and convalescence chequered by complications with irregular pyrexia.

I should once again emphasize that Dr. GHOSH'S pointer is very significant and in view of the importance underlying the question, it appears that the problem needs still further consideration.

Yours sincerely,

Calcutta, 22-2-'43.

A. C. DEY, L.M.F.,
Formerly, Senior Resident Medical Officer, Ashtanga Ayurveda Hospital, Calcutta,

Discoverer of M & B 693 made an F.R.S.

The honour of the Fellowship of the Royal Society has just been conferred on Dr. ARTHUR JAMES EWINS, Director of Research of the May and Baker Laboratories at Degenham, England. This honour, which is the highest scientific distinction attainable in Great Britain, has been conferred on him in recognition of his outstanding achievements as leader of the May & Baker research team who were responsible for the discovery of M & B 693; which they followed up shortly afterwards with the very similar compound, Sulphathiazole. Since then a new remarkably interesting series of totally distinct compounds have been elaborated by Dr. Ewins and termed the 'Amidines' (in the same way that M & B 693, PROSEPTASINE, Sulphathiazole, Sulphanilamide, etc. are called "Sulphonamides"). With the introduction of the first member of this new series (which is already available commercially) M & B 744 or Stilbamidine "a very great advance has been caused in the treatment of kala-azar." (*I. M. G.*, June 1942). Other members of this series (M & B 800 or Pentamidine, M & B 736 or Phenamidine, etc.) are at present undergoing extensive clinical trial with a view to making them available commercially in due course.

Announcement

The Three Months' Course of Instruction for the Licentiates in 'Tropical Medicine' will begin from the 15th July, 1943. Applications for admission should be submitted as early as possible to the Director, School of Tropical Medicine, Calcutta.

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Special Number on "Deficiency Diseases"—Part I

Regd. No. 9 M. 429. JUNE 1948. Vol. XL. No. 6.

The Antiseptic

A Monthly Medical Journal

Edited by

U. Rama Rau, & U. Krishna Rau, M.B., B.S.

CONTENTS PAGE

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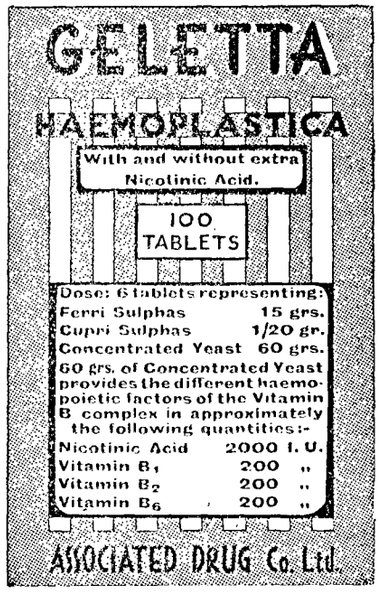

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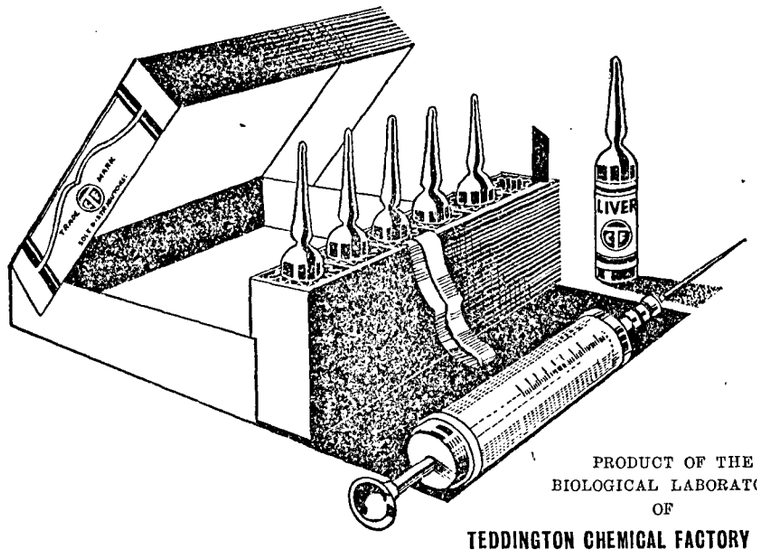

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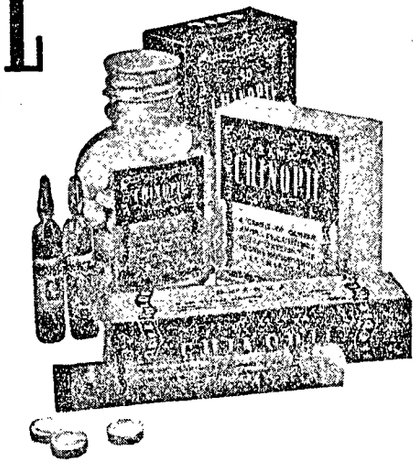

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Vitamins—Their Deficiencies and Their Diseases

BY

A. S. MANNADY NAYAR, M.B., B S., PH.D.,
Professor of Biochemistry, Medical College, Madras.

VITAMINS are organic compounds present in foods, which are essential, in minute quantities, for the growth and repair of the tissues and for the proper functioning of the various organs in the body. The lack of vitamins in the food may vary from a slight defect to severe deficiency. Prolonged minor defect of vitamins in the diet may produce vague symptoms which are rather difficult to diagnose clinically and which may be termed "sub-clinical" nutritional states. Until simple chemical methods of estimating the various vitamins in the blood and urine are elaborated, it is not possible to assess definitely the real cause of these sub-clinical nutritional states; but, if correctly diagnosed from clinical symptoms, a supply of the deficient vitamins will produce alleviation of the symptoms. It may be stated, vitamin deficiency of a single vitamin is rare. Often the deficiencies are multiple and that must be remembered in vitamin therapy.

Deficiency of vitamins may arise from one or more of the three causes, namely: (1) lack of supply in the food, (2) lack of absorption from the intestines, and (3) lack of utilization by the tissues. Long continued deficiency from these causes, when severe, produce definite clinical, well-defined conditions like rickets, pellagra, beri-beri and others, and when a supply and utilization of the deficient vitamins are made possible, a cure of these deficiency conditions is effected.

Vitamins may be broadly divided into two classes: I. Fat soluble vitamins. II. Water soluble vitamins.

Fat soluble vitamins are:—(1) Vitamin A, (2) Vitamin D, (3) Vitamin E, and (4) Vitamin K.

Water soluble vitamins are:—(1) Vitamin B. complexes: (*a*) Vitamin B_1 (Thiamine), (*b*) Vitamin B_2 (Riboflavine), (*c*) Nicotinic acid, and (*d*) Other B. complexes; (2) Vitamin C, and (3) Vitamin P.

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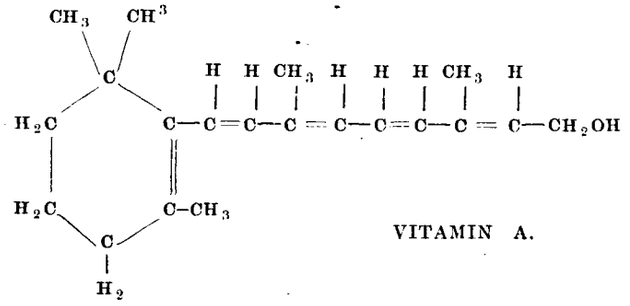
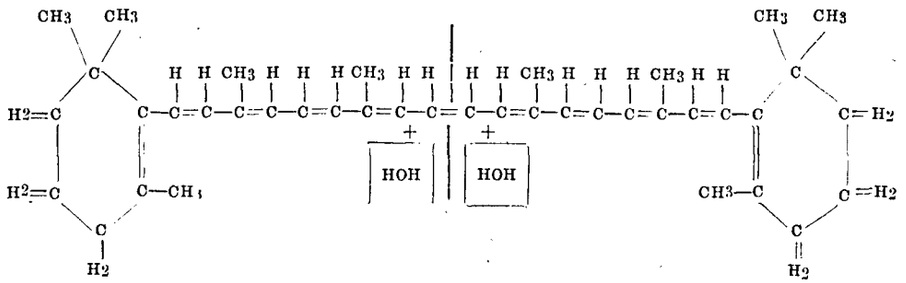
I. **Fat soluble vitamins.**—*Vitamin A* :—The physiological actions of vitamin A are not definitely understood. However, from our knowledge of experimental animals it appears to be essential for (1) normal growth, (2) normal function of the eyes, and (3) normal function and structure of the epithelial tissues. Vitamin A is a fat soluble unsaturated alcohol. It is readily destroyed by oxidation, *i.e.*, when heated in the presence of air. But it is not destroyed when heated in the absence of air nor by saponification of fats in which it occurs. It is very closely related to carotenoids. The chemical structure of 30 of these carotenoids is known but only four of these give rise to vitamin A, namely, *alpha*, *beta*, and *gamma* carotenes and crypto-xanthine ; of these one molecule of *beta* carotene gives rise to two molecules of vitamin A while one molecule of others gives rise only to one molecule of vitamin A. The structure of vitamin A and *beta* carotene are:



VITAMIN A.



Beta CAROTENE [The dotted lines show how it can be split into two and converted into 2 molecules of vitamin A.]

The animal body cannot synthesize vitamin A but can convert the carotenoids into vitamin A. The carotenoids are synthesized by the plants. Both carotenoids and vitamin A are easily absorbed. Carotenoids are converted into vitamin A in the liver where it is stored. Vitamin A gives a brilliant blue colour with Antimony Trichloride and this reaction is utilised for the detection and estimation of vitamin A. The best sources of vitamin A and carotenoids are butter, cream, egg-yolk, fish-liver oils—Cod-liver oil, Halibut-liver oil and Shark-liver oils—and green leafy vegebles—spinach and parsley.

Requirements :—The requirements are mentioned in international units (I. U.). One international unit of vitamin A is equivalent to the growth promoting activity of 0.0006 mgm. of standard *beta* carotene which is used as the international vitamin A standard. The Commission for the Study of Nutrition of the League of Nations has recommended a daily intake of 2,000–4,000 I. U. for adults, 6,000–8,000 I. U. for children, and pregnant and nursing women are recommended to take a daily intake of 8,700 I. U. Newborn infants require a large intake of vitamin A as their liver reserve is very much less, compared to the adults per unit weight.

There are certain factors which affect the utilization of vitamin A The fat content of the food influences the absorption of both vitamin A and carotene. Paucity of fat in the food lowers the rate of absorption of both. Bile is another factor which is necessary for the absorption of both, especially of carotene. Mineral oils, when administered in excess, interfere with the absorption of carotene but not of vitamin A. This should be remembered when mineral oils like liquid paraffin are administered therapeutically. In hypo-thyroidism and diabetes mellitus, liver appears to be impaired in its ability to convert carotene into vitamin A. Similarly when liver parenchyma is damaged by disease both the storage of vitamin A and conversion of carotene into vitamin A are impaired. In pathological conditions like fever, general infection and hyperthyroidism when general metabolism is increased, vitamin A intake has to be increased.

General effects of vitamin A deficiency in man.—Hemeralopia, nyctalopia or night blindness is most often the earliest manifestation in older children and adults. This is often overlooked in infants and small children. Vitamin A is believed to combine in the dark with a protein, in the presence of phosphoric acid, to form the pigment called rhodopsin or visual purple, which is present in the rods of the retina. When light falls on the retina it decomposes rhodopsin into retinene or visual yellow and protein. Visual yellow decomposes to visual white on further exposure to light. Visual yellow can, in the dark, combine with protein and reform visual purple. But this synthesis of visual purple takes place only in the presence of retinal epithelium and it appears to be an enzyme action and seems to depend not only on the presence of vitamin A but also on that of riboflavine, ascorbic acid and probably of some other substance. The phenomenon of night blindness is the impairment of the capacity to see objects in dim light, or the efficiency to adapt from bright light to darkness is impaired. Night blindness in motor drivers is of serious consequence and administration of vitamin A can both prevent and cure night blindness. Based on this phenomenon are the various adaptometers devised to measure vitamin A deficiency in man.

As the deficiency progresses, gross changes in the eyes appear. Keratinizing metaplasia of the epithelium of the cornea, conjunctiva, lachrymal glands and ducts take place and as a result areas of thickened epithelium with patchy dryness and loss of lustre of the sclera and wrinkling of conjunctiva appear. This stage of the disease is called xerophthalmia. On account of insufficiency of tears to wipe off the bacteria, they invade the unhealthy epithelium of the cornea and produce ulceration of the cornea. This is the last stage of the disease and blindness results therefrom. Substitution therapy with vitamin A will effect a cure only when the treatment is started before ulceration starts.

Vitamin A is very essential for the health of epithelial structures and in the absence of vitamin A, atrophy of epithelial structures takes place. Proliferation of the basal cell layer follows the atrophy of epithelium and they differentiate into stratified squamous keratinized epithelium. This keratinizing metaplasia is identical in appearance in all locations, whether it is in the eye, in the skin, the mucosa of the stomach and intestine, renal tubules or genital system. Keratinizing metaplasia in the conjunctiva, nose, accessory sinuses, trachea, bronchii, renal pelvis, ureters, salivary glands, uterus and periurethral glands have been noticed in infants suffering from vitamin A deficiency. This accounts for the frequency and severity of colds and pneumonia in deficient children and adults.

Skin lesions are early indications of vitamin A deficiency. On account of the atrophy of the sweat and sebaceous glands with keratinizing metaplasia of the ducts, a dry shrivelled skin, often with increased melanin pigment, is produced, which is seen usually on the lateral aspects of the thighs, forearms, extensor surfaces of the legs, shoulders, abdomen, back, buttocks and neck in that order. The dry rough skin is followed by a papular eruption. A biopsy of the skin makes the diagnosis of vitamin A deficiency certain.

Vitamin A deficiency in childhood appears to be one of the causes of absence or defective enamel and dentine formation which in later life accounts for dental caries. Vitamin A deficiency has been reported to be the cause of various central nervous system lesions in experimental animals, but clinical reports have not been brought forward to show this special effect. Clinical data are lacking also to show the effect of vitamin A deficiency on gastro-intestinal and genito-urinary systems. Despite the fact that vitamin A deficiency is associated with the formation of stones in the renal system in experimental animals, clinical proof is still not sufficient to warrant such an inference in man. Vitamin A deficiency has been reported to produce atrophy of the testes in man. Administration of vitamin A to children and women has shown, in various clinical researches, to be beneficial in preventing the frequency and severity of colds and other respiratory diseases. But vitamin A has no anti-infective property and does not effect general immunity.

Therapy of vitamin A deficiency.—For therapeutic purposes fish-liver oils, like cod-liver oils, halibut-liver oils, or shark-liver oils or their concentrates can be utilized. They are well absorbed when administered by mouth, unless there are gross pathological lesions interfering with absorption. Highly concentrated solutions of carotene are also available for therapatic uses. Both vitamin A and carotene are also well absorbed through the skin and this route may be utilized in cases where intestinal absorption is defective.

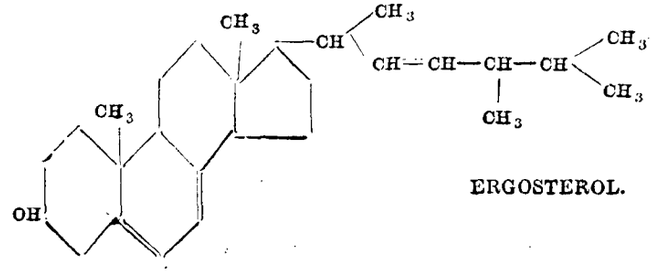
Xerophthalmia and keratomalacia are the severest forms of vitamin A deficiency. If the condition has not progressed to corneal ulceration, excellent results are obtained by daily administration of 50,000—100,000 I. Units. Treatment of night blindness with vitamin A produces excellent results except when it is due to other causes. In defective adaptation to dim light, 10,000–25,000 I. U. daily is enough to effect a cure in moderate and mild deficiencies. It is advantageous to administer 3–5 mgms. of riboflavine and 100–200 mgms. of ascorbic acid besides vitamin A therapy, in the treatment of defective adaptation of vision as this condition appears to be a multiple deficiency.

Vitamin A is of value in the treatment of epithelial ulcerations of various kinds, particularly those caused by tuberculosis. It seems to have a bacteriacidal effect as well as epithelium stimulating action. Therefore vitamin A has been incorporated into salves and ointments. They contain about 5–25% of halibut or cod-liver oil. The beneficial effect of administration of vitamin A in hyperthyroidism has not been widely confirmed.

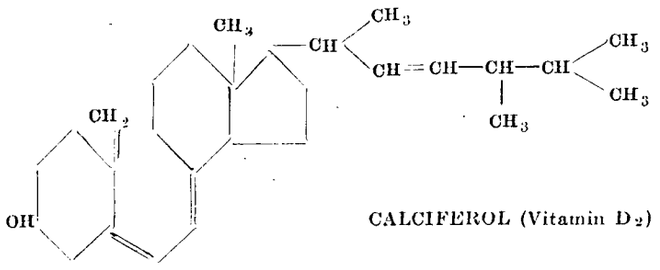
Vitamin D.—This is the anti-rachitic vitamin which is often found associated with vitamin A in natural foods. Its use for rickets was first reported in 1824 by SCHUETTE, but it was only a century later that the anti-rachitic power of vitamin D was demonstrated. Now about eleven chemical compounds are known to possess anti-rachitic potency but of these only two are of practical importance—namely Calciferol called vitamin D_2 and Dehydrocholesterol—called vitamin D_3. Both these compounds have a corresponding inactive precursor. Calciferol is one of the products formed by irradiating Ergosterol with ultra-violet light. It has powerful anti-rachitic potency. Dehydrocholesterol, on the other hand, is a normal constituent of the natural oil of the skin and this, when activated by ultra-violet irradiation, is converted to vitamin D_3 which has their powerful anti-rachitic potency. It is activated Dehydrocholesterol or vitamin D_3 which is present in fish-liver oils like cod-liver oil and halibut-liver oil, and in the chief anti-rachitic vitamin concerned in human nutrition. Calciferol, on the other hand, is a compound artificially produced for therapeutic purposes by irradiating ergosterol.

The physiological functions of vitamin D still remain obscure. However, it is definitely known that vitamin D increases the absorption of calcium and phosphorus or decreases their re-excretion by the gut. Bile appears to be essential for the absorption of vitamin D, as is probably the case with all fat soluble vitamins. Vitamin D appears to be essential for normal growth, especially for the skeletal growth which is impaired by vitamin D deficiency. Vitamin D somehow controls the process of calcification at the epiphyses of growing bones. The enzyme phosphatase plays some part in this process; but we have not got complete knowledge of the mechanism of this process.

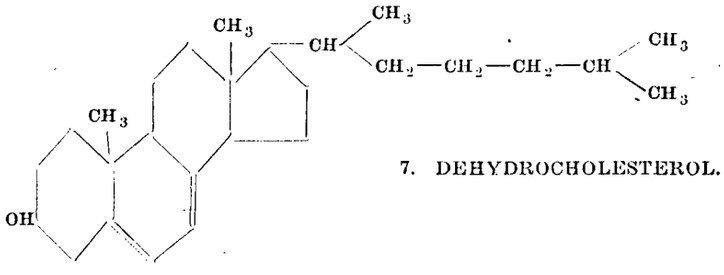
Vitamin D compounds belong to the group of sterols. They are soluble in alcohol, acetone and ether. They resist oxidation more strongly than vitamin A. In neutral medium they can withstand direct steaming process. In acid medium high temperatures gradually destroy them but they are not affected by alkalies even at high temperatures. Ergosterol when irradiated gives rise to a series of compounds of which Calciferol is the one with anti-rachitic potency. It has the following formula and may be compared with Ergosterol.



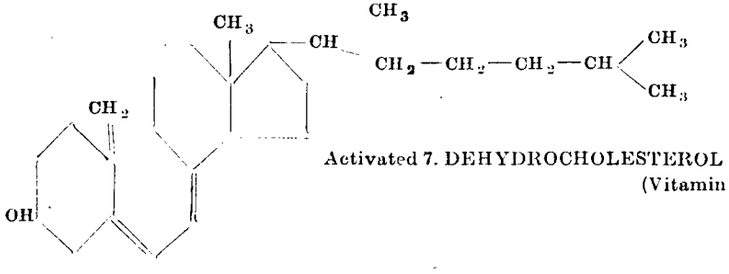
ERGOSTEROL.



CALCIFEROL (Vitamin D_2)



7. DEHYDROCHOLESTEROL.



Activated 7. DEHYDROCHOLESTEROL (Vitamin D_3)

Vitamin D_3 is the anti-rachitic factor present in natural foods and irradiated animal foods. Vitamin D is predominantly found in animal foods. Fish-liver oils like cod-liver oils and halibut-liver oils are rich in vitamin D. Shark-liver oil appears to be deficient in vitamin D. Oily fishes like sardines, salmon and herring are rich in vitamin D. There is a fair amount of vitamin D in butter, liver of different animals and egg-yolk. Supply of vitamin D in milk has to be reinforced by irradiating milk or feeding cows with vitamin D rich food.

Regarding vitamin D requirement the food and drug administration has specified a daily requirement of 600 I.U. for all persons irrespective of age. Adults and children running about in daylight obtain the greater part of their supply by the irradiation of the skin. Infants must be provided with 600 I.U. daily. Pregnant and lactating women and growing children may, however, be provided with 800–1200 I.U. daily. Vitamin D is stored in the liver and the capacity to store is limited.

The effects of vitamin D deficiency.—Vitamin D deficiency affects the growth of long bones at the junction of the epiphysis or head, with the diaphysis or shaft. Calcification of the cartilage and that of the

preosseous tissue does not occur and preosseous tissue is produced in abnormal amounts. There is enlargement of the growing areas of the long bones with resulting deformities. The flaring of the epiphysis is apparent in the wrist, knees and ankles. Normally the line of calcification is smooth and regular. In rickets the line of calcification at the end of diaphysis is rough and irregular but under proper and intensive treatment the line of calcification becomes regular and smooth. Bony changes in the ribs at the costochondral junction cause the formation of beading called "rickety rosary" and Harrison's groove. Rachitic thinning of the skull is also noticed. Characteristic bio-chemical findings in rickets are:—(1) Serum Calcium falls from the normal range of 9–11 mgs. per cent. to even 5–6 mgs. per cent. in severe cases. (2) Inorganic phosphate of blood falls from normal 4·5–5 mgs. per cent. to 2·5–3·0 mgs. per cent. (3) Serum phosphatase is regularly elevated in rickets from normal 5–15 Bodansky units in children to 20–60 units according to the severity of rickets.

Normally vitamin D regulates the metabolism of calcium and phosphorus and brings about the maximum utilization of calcium and phosphorus by reducing excretion and increasing absorption. In rickets there is diminished retention of calcium and phosphorus, but with administration of vitamin D or from the action of light on the skin, the retention of these minerals returns to normal.

Vitamin D deficiency appears to demand compensatory production of parathyroid hormone which is concerned with the metabolism of these minerals.

Vitamin D appears to be concerned with energy metabolism. Basal metabolic rate may be considerably below normal in rickety children and it may be raised by vitamin D therapy.

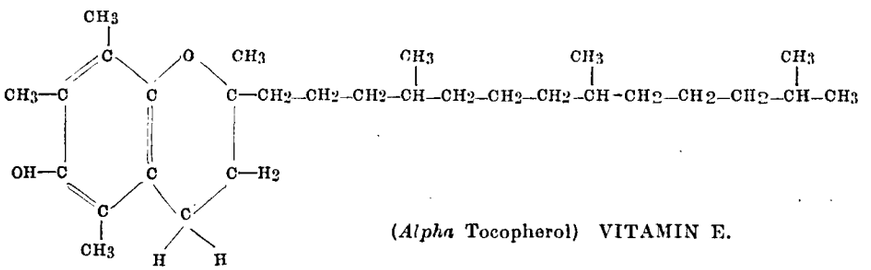
Vitamin D Therapy:—Cod-liver oil is available and vitamin D potency can be ascertained. Ordinarily each gram of cod-liver oil contains 100 I.U. and a tea-spoon of cod-liver oil contains about 4 gm. and therefore about 400 I.U. Viosterol (irradiated product, Calciferol) contains 10,000 I.U. per gm. Halibut-liver oil is richer than cod-liver oil. The potency will be stated on the bottle. In the treatment of rickets 1,200 units—60,000 units have been administered. Ordinarily a daily dose of 10,000–20,000 units is effective. A few cases of refractory rickets have been reported, which has required 1,000,000 I.U. Such cases should be carefully examined and differential diagnosis from renal rickets, endogenous rickets and obscure forms of deranged metabolism of calcium and phosphorus, must be made.

A word may be said about toxicity of vitamin D. The earlier reports were due to toxic sterols present in vitamin D preparations. Toxicity of pure preparations of vitamin D may be considered almost negligible. Toxic dose is nearly 1,500,000 units daily for an average adult of 70 kgs. wt. Toxic symptoms are elevation of serum calcium and appearance of metastatic calcifications in tissues like kidneys and aorta.

Osteomalacia is another disease with deficiency of vitamin D. Treatment is by supplying vitamin D 8,000–10,000 I.U. daily. Beneficial effects have been reported by administration of 300,000–400,000 I.U. daily of vitamin D in arthritis, although it is not a deficiency disease. In

hypo-parathyroidism administration of vitamin D is beneficial in raising Serum calcium. But Dehydrotachysterol which has the power of raising Serum calcium, and has no anti-rachitic power has taken the place of vitamin D. Although vitamin D therapy in scores of other diseases has been reported, the studies of these reports have not been convincing.

Vitamin E :—Wheat-germ oil is the best source of vitamin E. Its structural formula has been determined and it has been synthesized. It is *alpha*-tocopherol and has the following formula :



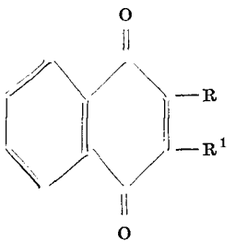
(*Alpha* Tocopherol) VITAMIN E.

It is fat soluble and its characteristic chemical property is its strong reducing power on which probably its biological action depends. Vitamin E is present in greatest concentration in green leafy vegetables and in vegetable oils. Wheat-germ oil is the basis of all commercial preparations. The physiological action of vitamin E is not definitely known but from experiments on rats it is known that vitamin E deficiency impairs fertility by interference with placental function in the female and spermatogenesis in the male and that it is indispensable for normal growth of rats. Rats on vitamin E deficient diets also develop a curious type of paralysis in the hind legs, the nature of which is rather obscure. Vitamin E deficiency appears to effect the endocrine glands of experimental animals. Hypoplasia of thyroid and adrenal glands have been noted. Anterior hypophyses of rats also appear to be affected. Vitamin E deficiency produces in rats a progressive degeneration of the nervous system; posterior nerve roots, anterior horn cells, anterior roots and pyramidal tracts are affected in that order. Muscular atrophy and degeneration accompany the degeneration of the nervous system. The lesions in these deficient rats resemble those of tabes doreatis, progressive spinal muscular atrophy and combined degeneration of pernicious anæmia. In contrast to these myelopathic lesions in rats, myophathic lesions are noted in rabbits and guinaepigs as a result of vitamin E deficient diet.

Vitamin E Therapy:—Based on these experimental findings *alpha*-tocopherol has been used in both myelopathic and myopathic conditions in man. *Alpha*-tocopherol has been administered in amyotropic lateral sclerosis, progressive muscular atrophy and tabes dorsalis. Excellent results have been reported from its use in myasthenia gravis, pseudo-hypertropic muscular dystrophy and cord degeneration in pernicious anæmia. These studies are still in an experimental stage. Again based on experimental study of rats vitamin E therapy has been applied in the treatment of sterility, threatened abortion and inadequate lactation, but there is not yet sufficient evidence to show that vitamin E plays a definite role in

human reproduction. Our knowlege of vitamin E regarding human requirements, its physiological functions, and biological assay and chemical estimation are very incomplete and there is no method of standardising *alpha*-tocopherol at present.

Vitamin K:—Vitamin K is the anti-hæmorrhagic vitamin,the deficiency of which causes delay in the clotting of blood due to deficiency in prothrombin content. Administration of vitamin K raises the pro-thrombin content of the blood and the clotting takes place normally. Vitamin K compounds have the structural formula given on the left side. They are substituted naphthoquinones. 2-methyl-1, 4-naphthoquinone is a most active anti-hæmorrhagic substance isolated from human tubercle bacillus. The chief sources of vitamin K are the leafy portions of many young, growing plants. Alfalfa, wheat, oats and grass have been found to be rich in vitamin K. Putrefaction of fish meal makes it rich in vitamin K, which it originally lacked. Probably intestinal putrefaction in human beings supplies them with vitamin K. It is now established that these naphthoquinone compounds are necessary for the production of prothrombin both in man and animals. We are yet ignorant of the human requirement of vitamin K nor has it been possible to determine the vitamin K contents of various foods ; no satisfactory standardization of vitamin K unit has been possible. Prothrombin deficiency in man has been correlated with vitamin K. But prothrombin deficiency may be due to (1) inadequate intake of vitamin K ; (2) absence of bile in the intestinal tract—as it is a fat soluble vitamin-presence of bile appears essential for the absorption of vitamin K ; and (3) defective absorption of vitamin K from the intestine due to pathological conditions of the intestine interfering with absorption. Further, if liver is grossly damaged prothrombin cannot be produced in adequate amounts as the liver appears to be the seat of production of prothrombin.



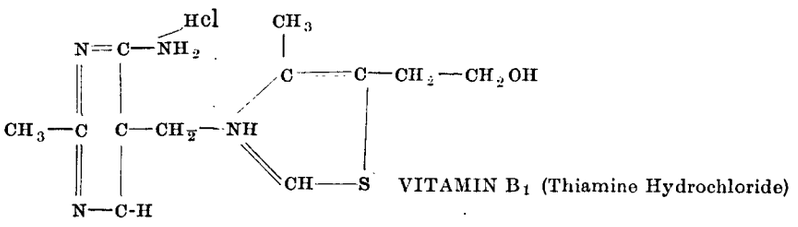
VITAMIN K

Vitamin K Therapy :—Early clinical work with vitamin K was carried out with putrified fish meal and extracts of alfalfa. Then a commercial preparation called " Cerophyl," a mixture of dried powdered young cereal grains of oats and wheat was put on the market. An extract of alfalfa called " Klotogen " was prepared. Now pure synthetic naphthoquinones have been prepared and rendered available for clinical purposes. Vitamin K preparations are administered by mouth or by parenteral routes. When given by mouth bile salts are also given to ensure adequate absorption. " Cerophyl " is given 10–15 gm. daily in divided doses with milk or fruit juice along with 15 gr. of 'oxbile'. " Klotogen " is given 1–3 gm. daily along with bile salts.

The synthetic product 2-methyl-1, 4 Naphthoquinone is given in doses of 1–2 mgs. daily intravenously. Bile salts are unnecessary when vitamin K is given intravenously. The clinical conditions in which vitamim K therapy is employed are : (1) to eliminate hæmorrhage during or following operations on jaundiced patients with disease of the liver or biliary tract, and (2) to prevent or stop bleeding in infants during the first few days of life. In both types an abnormal fall in prothrombin content

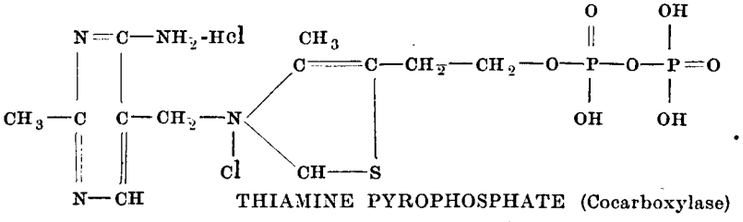
of the blood is noticed and this is raised by administration of vitamin K and bile salts by mouth or vitamin K intravenously. The exact role of vitamin K is not known, but it appears to be essential for the formation of prothrombin by the liver.

II. **Water Soluble Vitamins.**—Vitamin B_1 or Thiamine Hydrochloride. This vitamin is called "Aneurin" in the continent of Europe, the name given by JANSON of the Netherlands. WILLIAMS proposed the name Thiamine from the structure of vitamin B_1. The structure of Thiamine Hydrochloride has been determined and is given below:



VITAMIN B_1 (Thiamine Hydrochloride)

It functions in the body as 'cocarboxylase' in the form of Thiamine Pyrophosphate.



THIAMINE PYROPHOSPHATE (Cocarboxylase)

It acts as a coenzyme to facilitate decarboxilation of Pyruvic acid which is an intermediate compound in carbohydrate metabolism.

$$CH_3\ CO\text{–}COOH \xrightarrow{\text{Cocarboxylase}} CH_3\ CHO + CO_2.$$

In the absence of adequate reserves of Thiamine, Pyruvic acid accumulates in both blood and tissues, as noticed in experimental animals with vitamin B_1 deficiency and in human cases of beri-beri. Thiamine is definitely concerned with tissue respiration especially in the metabolism of Pyruvic acid and therefore acts as an essential factor in carbohydrate metabolism.

Thiamine is quite resistant to heat, particularly in the absence of alkali. Vitamin B_1 in ordinary food stuffs, is not destroyed by ordinary cooking, but pressure cooking at high temperatures causes progressive destruction. But when the cooking water is discarded 20–35% of vitamin B_1 is lost. This loss is greater when Sodium-Bicarbonate is added in the cooking of certain foodstuffs.

Thiamine occurs in large amounts in yeast, in germ layers and outer portions of cereal grains and in the organs and tissues of animals—polishing of grains removes Thiamine content from them and therefore milling of grains is to be prevented from a nutrition point of view. Egg-yolk and nuts, like peanuts and hazlinuts, are rich in Thiamine content. Beef, liver, pork muscle and leguminous vegetables are also good sources of vitamin B_1.

Daily requirement of Thiamine for normal healthy adults vary with individuals and depends particularly on the calories intake of the food and the proportion of fat to carbohydrate in the food. The greater the calories of the diet, the greater the need of Thiamine Hydrochloride. The greater the carbohydrate content, the greater the need of Thiamine; but fat has a sparing action so far as Thiamine is concerned. On the whole it may be stated that average individual requires one mgm. of Thiamine Hydrochloride per day.

The principal effects of thiamine deficiency:—The chief symptoms of thiamine deficiency are (1) cardiac enlargement and dysfunction, with a rapid pulse-rate, a throbbing systolic impulse, a bounding pulse, venous engorgement, warm extremities and œdema which are noted in human beri-beri; (2) degeneration of the nervous system; in man numbness and tingling sensations in the fingers and a gnawing pain running up the arms, especially in the night are experienced in thiamine deficiency. In experimental animals disintegration of myelin sheaths have been noted; but it is not yet settled whether they are due to thiamine deficiency or secondary effects; (3) gastro intestinal dysfunctions; loss of tone in the gastric musculature, gastric hypo-chlorhydria with anorexia have been noted in vitamin B_1 deficiency in experimental animals. Based on these experimental facts, gastro-intestinal hypotonia in humans has been treated with daily doses of 10 mgs. of thiamine with beneficial results. From the numerous reports on the subject it may be inferred that thiamine deficiency affects the gastro-intestinal tract, causing anatomical and functional changes, but the exact role of thiamine in gastro-intestinal physiology has yet to be determined; (4) muscular atrophy is prominent in thiamine deficiency but nothing definite is known about it; and (5) anorexia. Loss of appetite is one of the first symptoms of thiamine deficiency but it occurs in various diseases. However it appears to be very marked in vitamin B_1 deficiency; accumulation of pyruvic acid in blood appears to be related to anorexia.

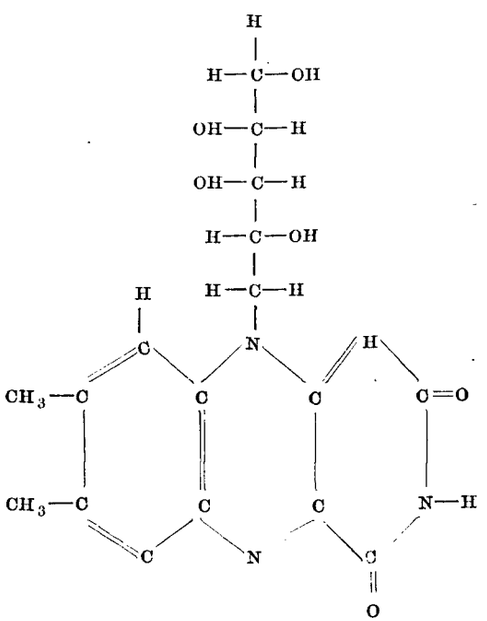
In the blood there is a tendency towards low plasma protein values, hyperglycæmia, increased pyruvic acid and possibly increased lactic acid. Electro-cardiac changes are chiefly: (1) flattening or disappearance of the T waves and (2) a lengthening of the S–T segment. Extra systoles are not unusual.

Vitamin B_1 Therapy:—Vitamin B_1 deficiency seems to be the most important etiological factor in beri-beri, but it appears to be a multiple deficiency disease, due to deficiency of riboflavine, pantothenic acid and probably other B complex factors.

It has been recently observed that the normal adult male excretes 90 μg. or more of thiamine in twenty-four hours and the normal adult female 60 μg. Any amount excreted below these levels suggests thiamine

under-nutrition; after a test dose of 5 mgs. thiamine, adult males excrete 14% and normal females 12% of the test dose in 24 hours following the test dose. For most conditions of thiamine deficiency, 10 mgs. of thiamine may be given daily for first five to seven days and then reduced to 2–5 mgs. daily. If larger doses are administered, the greater part of the dose is promptly excreted, as the storage capacity for thiamine is very limited. It is better to give thiamine in divided doses than in one single dose. In severe forms of beri-beri, 10–25 mgs. of thiamine may be given by mouth if there is no nausea, vomiting or diarrhœa, or by subcutaneous or intramuscular injection if the absorption is interfered with by gastro-intestinal disturbance. Here also it is better to give in three divided doses of 5–10 mgs. daily; as the clinical condition improves, the dosage may be reduced to 3–5 mgs. daily and then to the maintenance dose of 1 mgm. daily. As beri-beri appears to be a multiple deficiency disease Nicotinic acid may be given 300–500 mgs. daily together with Riboflavine, Vitamin B_6 and Ascorbic acid. It will be an advantage to add fat soluble vitamins also.

In alcoholic polyneuritis, 15–25 mgs. are given daily in divided doses. If gastritis is present Thiamine may be administered by subcutaneous injection or intra-muscular injection. Simultaneously alcohol intake may be gradually reduced and enough calories may be given by adequate amount of food. In alcoholics also there may be deficiency of other factors and they may be given nicotinic acid and riboflavine and a protein rich food containing at least 100 gms. of proteins. Poly neuritis of pregnancy and hyperemesis gravidarum are also nutritional deficiency conditions, requiring thiamine therapy along with riboflavine, nicotinic acid and other B complexes, ascorbic acid and vitamin E. Thiamine may be administered parenterally in 15–25 mgs. daily in divided doses. Besides the vitamins, replacement of fluids and salt, proteins and carbohydrates, is also required. In diabetic neuritis, if the condition is due to thiamine deficiency, the patient is very much benefited by administration of Thiamine. In vitamin B complex deficiency a general lowering of resistance to infection has been noticed.

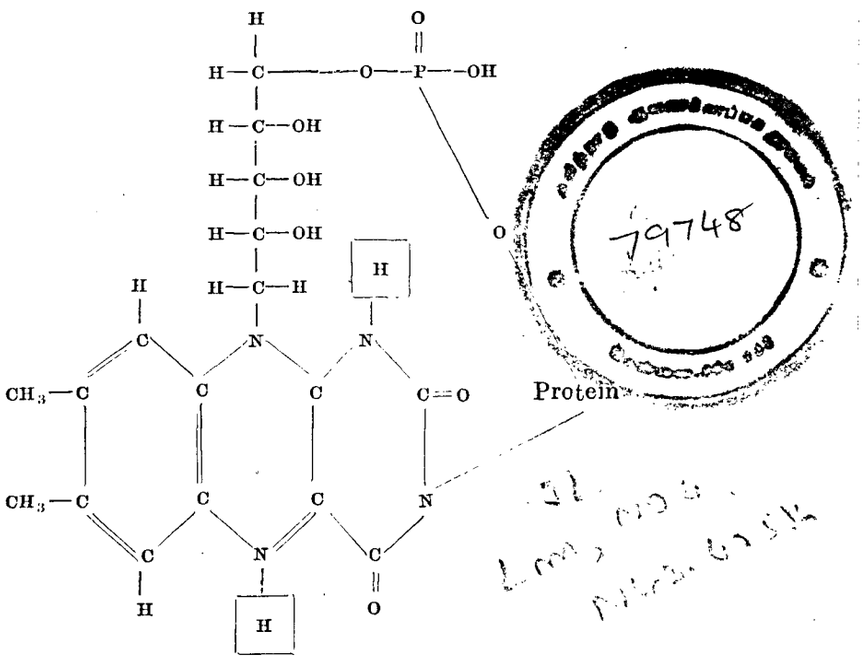


RIBOFLAVINE

Replacement therapy will be beneficial in such patients. Thiamine has been administered in cases of other diseases without any justification and without any evidence of vitamin B deficiency. It has also been used in anorexia often with considerable benefit although without any evidence of vitamin B deficiency.

Riboflavine :—This factor (vitamin B_2) was first called lactoflavin because it was first isolated from milk. From the structure of the substance it is called Riboflavine and this name has been accepted by the Committee on Vitamin Nomenclature and the American Society of Biological Chemists. Riboflavine has the structure given in the previous page.

Riboflavine is closely related to Warburg and Christian's Yellow oxidation enzyme which was shown to be of fundamental importance in biological oxidations. It is now known that the yellow enzyme is a compound of Riboflavine with protein and a molecule of phosphate and its structure is given below :—



WARBURG'S YELLOW ENZYME.

Riboflavine is active in biological systems as far as it is able to form the yellow enzyme with a protein and a molecule of phosphoric acid. The yellow enzyme has the remarkable property of being alternately oxidized and reduced *i.e.*, to give off hydrogen and take on hydrogen. The labile hydrogen which is alternately taken on and removed are enclosed with dotted lines in the structure of yellow enzyme. Riboflavine being the key structure of yellow enzyme plays an important part in biological oxidations and reductions.

Riboflavine has been isolated from natural sources and has been synthesized. It crystallizes in clusters of slender prisms of yellow brown needles. It has a bitter taste. It is soluble in water and insoluble in the usual fat solvents. It is highly heat stable and therefore withstands ordinary cooking. It is, however, sensitive to alkali and to daylight. Baking and roasting meat destroys a large percentage—upto 60%—of Riboflavine while stewing produces no change.

Riboflavine is abundant in nature. It is found in large amounts in milk, eggs, liver, muscle and yeast. The daily requirement has been estimated at between one and three mgs. daily. A normal healthy adult excretes 800–1200 μg. per day. In Riboflavine deficiency the excretion falls to low levels.

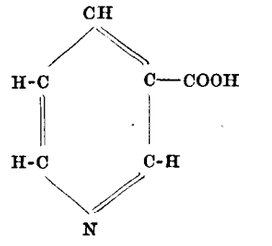
Effects of Riboflavine deficiency :—" Cheilitis " is one of the lesions due to Riboflavine deficiency. The lesions occur as redness, desquammation and finally ulceration, at the mucocutaneous border of the lips especially in the corners of the mouth. This condition has been described as " marginal stomatitis " and as " Perleche." Often associated with the lip lesions there is an oily desquammation around the nose in the naso labial fold and on the ears. In addition some patients give a history of visual disturbances, lacrimation and failing vision. This may be associated with intense bulbar conjunctivitis with severe burning sensations. This condition is completely cured by Riboflavine therapy 2.5–50 mgs. daily by mouth—a daily oral dose of 5 mgs. will in three days eliminate moderate deficiency. Recently it has been reported that " cheilitis " has been more rapidly cured by 20–50 mgs. daily of Crystalline B_6 which indicates that " cheilitis " is due to multiple deficiency.

Another lesion associated with Riboflavine deficiency is met with or without cheilitis. The lesion is the unusual vascularization at the sclerocorneal junction with fine filaments growing out towards the centre of the cornea. When studied with a slit lamp they were found on the anterior surface of the cornea. A clouding of cornea with anterior and interstitial nebulas was also commonly found. Photophobia, burning and smarting of the eyes were complained of by these patients. Riboflavine, administered daily, upto 5 mgs. in 1 mgm. capsules, cured the condition. Some of these cases developed acne rosacea along with the keratitis and both conditions were cured by Riboflavine therapy in 1 mgm. capsules, upto 5 mgs. daily. Riboflavine has been administered with other vitamin B complexes as noted before.

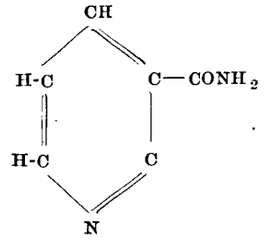
Nicotinic Acid :—" Pellagra " is a deficiency disease known from 1735 onwards in Southern Europe and later in Southern States of America and in Egypt. The researches of GOLDBERGER and his co-workers in America proved it to be a deficiency disease cured by Liver extract. It was found out about 1938, that the pellagra preventive factor of GOLDBERGER is chiefly Nicotinic acid. Nicotinic acid was known to biochemists for over seventy-five years. Nicotinic acid occurs in the Coenzyme which plays an important part in the fermentation of yeast and carbohydrate metabolism in animals. The structures of Nicotinic acid, Nicotinic acid Amide and Coenzyme are given in facing page.

Pellagra is now known as a multiple deficiency disease, the important deficiency being Nicotinic acid. It is a disease of the poor due to faulty diet. Nicotinic acid is abundant in cereal grains, yeast and animal tissues

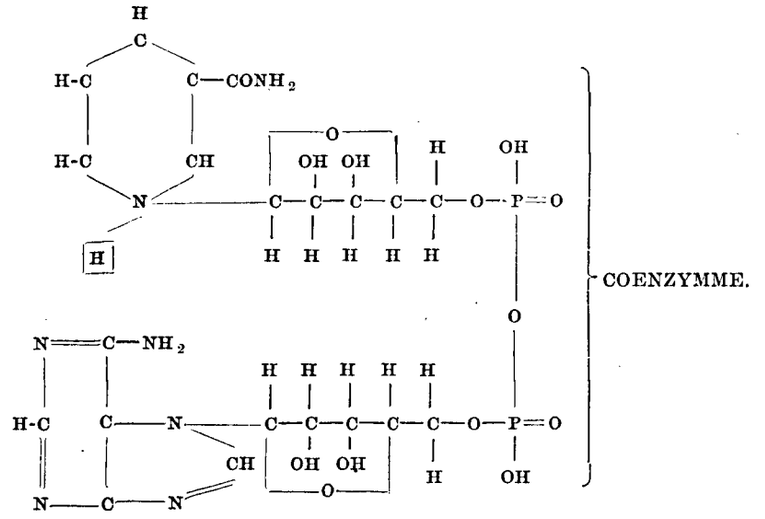
especially liver of animals. It is also present in milk, wheat germ, rice polishings and yolk of eggs. Liver extract and rice bran extract are rich sources. Nicotinic acid and its Amide are available now as crystalline laboratory products for therapeutic purposes. It is one of the most heat stable members of the B complex, not destroyed by cooking. The clinical symptoms of pellagra are: (1) Symptoms referrable to gastro-intestinal tract-red raw tongue with atrophied papillæ with sores at the tip and margin, inflammation along the gum margins and that of the whole of buccal mucous membrane ; loss of appetite, nausea and vomiting with complete absence of gastric secretion in about 50% and abdominal pain or diarrhœa. (2) Nervous symptoms—headache, burning sensation all over the body, nervousness, mental depression, mental confusion and insomnia. (3) Skin lesions. Characteristically symmetrical skin lesions over bony prominences,



NICOTINIC ACID



NICOTINIC ACID AMIDE

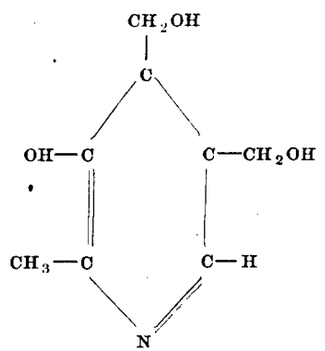


hands, wrists, elbows, face, neck, knees, feet and perenium ; at first erythema appears and later it becomes brown and makes the skin rough and scaly. Desquammation and cracking also may be present. (4) Multiple neuritis may also be present.

Vitamin therapy of pellagra effects a dramatic response. Nicotinic acid or Nicotinic acid Amide may be used. With Nicotinic acid peripheral vasodilatation of the face and neck appears with a sensation of warmth, tingling and itching. This however disappears in 15–20 minutes and is of no consequence. With Nicotinic acid amide therapy, this vasomotor reaction is not found. When the vitamin is given by mouth 300–500 mgs. daily are given for 5–7 days and then reduced to 100 mgs. daily. When there is nausea and vomiting the vitamin may be administered parenterally, either subcutaneously or intravenously. Then 25 mgs. doses are given each time with a total daily dose of 50–100 mgs. The results of Nicotinic acid therapy are dramatic. The mental picture clears up overnight and positively within two or three days. Skin lesions begin to heal immediately and healing proceeds rapidly. The lesions of the mouth heal promptly. For the cure of peripheral neuritis, Thiamine should be administered. To cure cheilitis which is often present in Pellagrins Riboflavin should be administered. Improvement in physical activity and sensation of well being are secured by the oral administration of 50 mgs. of vitamin B_6.

Although many other clinical conditions have been treated with Crystalline nicotinic acid, no proof of this vitamin deficiency has been adduced in those cases and until we have reliable and comparatively simple chemical methods of estimating nicotinic acid in blood and urine we have no method of proving this vitamin deficiency.

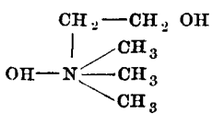
Other Complex B. Factors:—Vitamin B_6 or pyridoxine, choline and pantothenic acid have been prepared in pure crystalline form, but our knowledge of their physiological actions and the effects from their deficiency in human nutrition are meagre. Pyridoxine or vitamin B_6 was prepared in pure form in 1938 and was synthezsised in the following year. Like nicotinic acid it is a pyridine derivative and has the following structure :—



VITAMIN B_6 or PYRIDOXINE.

Seeds, legumes, cereals, and vegetable fats are rich sources of vitamin B_6. Fish and meat seem to be fair sources. The mode of action of pyridoxine is not definitely known, but it appears to play a part in metabolism of fats. In rats B_6 deficiency produces a characteristic dermatitis and in dogs and swine, a microcytic hypochromic anæmia. In human beings 50 mgs. of pyridoxine in pellagrin produces dramatic relief from the nervous symptoms and improvement in their physical activity. In cheilitis the lesions heal within five to six days with 50 mgs. of Pyridoxine.

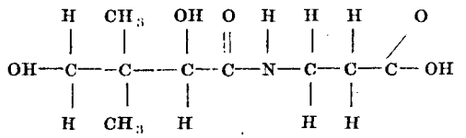
Choline and pantothenic acid are other two factors isolated from B complexes. Choline is an essential constituent of the phospholipid lecithin and has the following formula: It is Trimethyl, Hydroxyethyl Ammonium Hydroxide.



CHOLINE.

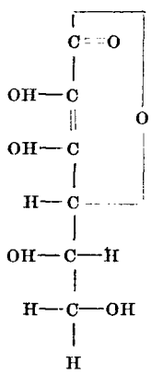
Choline prevents deposition of fats in the liver. Its derivative, acetylcholine, is found in the human body and has definite physiological actions.

Pantothenic acid produces, in experimental animals, by its deficiency, pathological changes in the central nervous system and some effects on the endocrine glands. What its effects are in human nutrition, is beinginvestigated. The acid and its calcium salt are made available for clinical trial. The acid has the structure on the left side.



PANTOTHENIC ACID.

Ascorbic acid or vitamin C:—The deficiency disease of scurvy was known to the navigators as early as 1600 and several descriptions of the disease and the ravages wrought by it among sailors have been recorded several times since then. The anti-scorbutic property of citrus fruits were also known for a long time. But it was in 1932 that the pure substance from adrenal cortex and cabbage was isolated and its synthesis was effected in the following year. Its structure is given on the right side and shows its close relation to Hexoses. It is freely soluble in water and can form salts with various cations. Its characteristic property is its unusual sensitivity to oxidation. It is therefore necessary to be careful to prevent its destruction in the preparation and preservation of foods. In acid solutions ascorbic acid is not easily oxidized by air except when traces of copper are present but in alkaline solutions it is easily destroyed. Many animals have the power of synthesizing vitamin C in their body but man and guinea pigs cannot do so and have to be supplied with vitamin C in their diet.



ASCORBIC ACID
(Hexuronic acid)

Physiological actions of vitamin C:—Vitamin C or ascorbic acid appears to be essential in cellular respiration and its deficiency may disturb various enzyme systems. It appears to play an important part in the formation of blood and maintenance of a normal level of erythrocytes in the circulating blood. It appears to be essential in the formation and regulation of intercellular matrix. Hence it appears to be essential in the maintenance of connective tissues of various kinds. Its deficiency produces a failure of fibro blasts to form collagenous connective tissue and thus a weakness in the walls of all capillaries in the body on accouut of the insufficient intercellular substance in the vascular structure. It appears to be essential for the normal growth and structure of bones and teeth.

Sources:—Citrus fruits, green leafy vegetables like cabbage, Brussel sprouts, cauliflower, peas, beans, spinach, parsley, water-cress, green and

red peppers, and tomatœs are all rich sources of vitamin C. Meats of all types are poor in vitamin C. Raw whole cow's milk is a fairly rich source of vitamin C. It should, however, be remembered that cooking especially in an alkaline medium in the presence of air destroys 40–60% of the vitamin content and copper has a destructive effect. Sunlight has also a destructive effect on the vitamin content of the food. It is better, therefore, that the fruits and vegetables are stored in a refrigerator in the dark and cooked in non-copper vessels anerobically as far as possible; preferably in an acid medium, if possible. Careful canning of fruits and vegetables by the best methods retain 90% of the vitamin content.

Normal requirement of healthy adults has been estimated to be between 50–75 mgs. of ascorbic acid per day; amounts below 25 mgs. daily produce mild deficiency symptoms. Infants under 1 year probably require 10 mgs. daily and children between 1 and 12 years are better provided with 60–75 mgs. daily. In certain pathological conditions like fevers, severe infections and thyrotoxicosis, need for ascorbic acid is increased. So also pregnancy and severe exercise demand extra amounts of vitamin C. Pregnant and lactating women should take 75–150 mgs. daily.

Vitamin C deficiency can be determined by the estimation of vitamin C in blood serum, excretion of vitamin C in urine after a test dose and measurement of capillary fragility and X-ray examination of bones. Capillary fragility tests and X-ray examination of bones cannot be relied upon. Some workers believe that the concentration of vitamin C in blood is a better index of vitamin C nutrition. Normally blood contains between 1–4 mgs. per 100 c.c. From 1 to 0.5 mgm. per 100 c.c. may be considered border line cases and below 0.5 mgm. per cent. may be considered a definite deficiency. In saturation tests 600 mgs. of ascorbic acid is given by mouth and 24 hour—samples of urine preserved in glacial acitic acid are collected before and thereafter and amounts of vitamin C excreted are estimated. In normal nutrition the curve of excretion rises quickly to a high level after the test dose and quickly falls to the pre-dose level. In deficiency cases the curve rises slowly to a low level and gradually falls to the basal level.

Effects of vitamin C deficiency :—Scurvy is the predominant condition resulting from vitamin C deficiency. The individual loses weight, becomes anæmic, weak and short of breath. The gums become swollen, bleed easily and sometimes ulcerate. Hæmorrhages under the mucous membrane, periosteum and skin take place. Blue-black spots, either spontaneously or after a trivial injury develop in the skin. Infants and children are very fretful. Teeth, bones and blood vessels are the principal structures affected. Development of enamel and dentine appears to be faulty in vitamin C deficiency, and so also development of bones is also faulty especially at epidiaphyseal junctions of long bones. The "cement substance" between endothelial cells of the capillaries is defective and consequently capillary walls are weak and bleeding from the gums and extravasations of blood into the skin and other tissues are due to the loss of intercellular material. Fatty degeneration of myocardium, skeletal muscles and liver have been recorded due to vitamin C deficiency. Degenerative changes in the testes have also been noticed.

Vitamin C. Therapy :—As the normal requirement of vitamin C may be widely between 25 and 100 mgs., the therapeutic doses must be much

higher than this. In severe deficiency 200–300 mgs. are given two or three times daily by mouth either before meals or with meals. It can also be administered subcutaneously, intramuscularly or intravenously as it is easily soluble in water. There is no toxicity from large doses of vitamin C. For border line or sub-clinical states of vitamin C deficiency 50–100 mgs. of ascorbic acid daily are adequate. Vitamin C therapy produces very satisfactory results if adequate amounts of ascorbic acid are administered. Most of the symptoms of vitamin C deficiency disappear rapidly. But if hæmorrhages have taken place into the tissues their re-absorption takes sometime.

Ascorbic acid appears to play a significant part in the prevention and cure of rheumatic fever, pulmonary tuberculosis, diphtheria and pneumococcal sepsis. But this claim has not been substantiated by other workers. Administration of ascorbic acid to diabetic patients appears to improve their general condition. From the evidence at present available all that can be concluded is that the ascorbic acid requirement is increased in rheumatic fever, pulmonary tuberculosis, diphtheria and pneumonia, and in these and all diseases with elevated temperature increased amounts of ascorbic acid should be administered, 100—150 mgs. daily. Patients with peptic ulcers are given ascorbic acid, as their diets are deficient in vitamin C. The nature of relation of ascorbic acid to anæmia is unknown. Addison's disease appears to be associated with vitamin C deficiency and vitamin C therapy appears to decrease pigmentation. However further studies of this subject should be made.

Vitamin P :—SZENT-GYORGI and his associates stated that another factor, vitamin P, is essential besides vitamin C to cure the capillary hæmorrhage in scurvy. They isloted from extracts of Hungarian pepper or lemon juice a crystalline flavone "citrin." This substance has been identified as "eriodictyol." Another closely related chemical compound "Hesperidin" with similar properties has been isolated. Both these compounds have been attributed to be the cause, by their deficiency, of hæmorrhagic tendency in scurvy and their administration cures the condition. However, this claim has not been substantiated. Vitamin P concentrates are found to be helpful in the treatment of purpura. But much more work is necessary to prove that vitamin P is essential in human nutrition and that it has definite functions to perform in human physiology.

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Egmore.

Minor Defects and Deficiencies in General Practice

BY

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DISEASE (dis-absence of,—ease) means a physiological reaction in altered circumstances (CLAUDE BERNARD), or according to GEORGE ADAMI "is a process or a succession of disturbances induced by any agent which disturbs the normal activities of the organism as a whole or its component parts." Thus, disease would necessarily include anything that is not normal or natural, occasioned alike by developmental defect, deficient nutrition, accidental infection, deliberate indiscretions, or else by the normal wear, tear and trauma. Both in the field of experimental medicine and clinical practice one comes across innumerable subjects presenting subnormal development, due certainly to various plausible factors, probably each a clinical entity, worth exploring. Quite a larger number present ailments mostly attributable to various grades of deficiencies, anatomical (endocrinal), or nutritional, most of which have been studied and classified ; but there certainly exists a far larger section with minor grades of deficiencies, usually neglected, evidently due to our ignorance or else to carelessness and in the matter of their timely recognition some portion of the responsibility must rest with the 'Doctor', who also would not care to devote the time and attention necessary to recognise the inherent conditions, due largely to apathy, ignorance or carelessness. It is not enough to recognise a case of beri-beri or scurvy, a cretin or a pituitary dwarfism with clear-cut classical picture but the clinician or the medical staff of the Child Welfare Unit must be equipped fully with the necessary data to be able to recognise the minor defects and deficiencies, to be able to cut short the abnormality in the anatomy, where possible, or to abort the deficiency-climax before it may be too late. In the present state of our knowledge it is quite possible to render a cretin or a pituitary dwarf a better prospect of life and growth, to abort hyperthyroidism or adrenal virilism, to prevent the possibility of a fully developed haunch-back or a bow-leg of rachitis, as also the blindness due to xerophthalmia or keratomalacia due to avitaminosis-A. Early recognition of the defects and deficiencies in nutrition is more helpful as the corrections are easier, whereas most of the developmental defects are more difficult to deal with, as in some of them the remedy, although well-defined, may not be possible to be applied ; the substitution therapy, while manifestly useful, becomes a burden and very often left out. I have known many cases of cretins, under prolonged and sustained thyroid therapy, improving remarkably but how often left in the midway, simply for the fact that the treatment was not continued.

In the field of nutrition, deficiency of certain essential food-factors has earned special attention during the last 25 years and extensive work on the subject has led to the definite chapter of Vitamins. Their classification, physiology and identification have been very fairly studied and within recent years most of them have been synthetised also.

Most of the text-books label down 'deficiency diseases' as purely vitamin-deficiency apart from other deficiencies. I should, however, personally feel that the term 'deficiency diseases' ought to include all types of deficiencies—developmental (endocrinal), and nutritional, and in this short paper I would touch on both the subjects. In dealing with 'nutritional deficiency' again, one would only touch a fringe if he deals with vitamins. Items of the food, a general balance in the dietetic items in accordance with the individual or at least the class-requirements, are factors worth inclusion and consideration. Deficiency in the several items of food as happens in times of war or famine, would occasion several diseased conditions, as much as deficiency of oxygen (anoxia) would. In ordinary medical practice, a large number of cases do not conform to any particular type of disease described in text-books and no two cases of the same disease look, any more than two individuals, exactly alike. Deficiency of iodine leads to goitre, deficiency of Iron to anæmia, of Ca. and P. to rickets ; these are only few amongst many recognised diseased conditions as myxœdema in thyroid deficiency or Addison's disease in suprarenal deficiency.

Endocrinal.—In diseased conditions, the endocrine glands are either under-or over-functioning. The thyroids normally control 40% of tissue oxidation. Deficiency of iodine leads to the development of a colloid goitre. Gross lesions of thyroid hypofunction would give rise to cretinism or myxœdema, but sub-normal functions may lead to various grades of structural and metabolic defects, not usually recognised. Similarly minor hyperfunction of thyroids leads to many manifestations of Grave's disease, most often atypical and unless particularly scrutinised, the conditions are explained otherwise. In many subjects toxic conditions, as infantile diarrhœa or cæliac disease, vitamin D deficiency or alkolosis lead to subnormal parathyroid secretion, hypocalcæmia and development of tetany. Osteitis fibrosa has been found associated with hypercalcæmia and hyperparathyroidism. Posterior pituitary hyperfunction may be responsible for many a colic (oxytocin, acting on plain muscles) and hyperpyesia, either transient (as in neurotic hyperpyesia) or persistent (due to vasopressin). Many cases of polyuria, not due to hyperglycælmia or chronic azotæmic nephritis, are due to hypofunction of post-pituitary, and effective amelioration has been attained by post-pituitary administration. Manifestations of hypofunction of the ant. pituitary are too numerous and the sub-clinical cases are only labelled down as developmental defects or climatic characteristics. Many cases of relative dwarfism, characterised by hypogonadal development are definite cases of hypofunction of the ant. pituitary and many cases of obesity are also due to the same defect, not recognised, nor treated early. I have treated successfully cases of definite dwarfism in some families of short heads, with early and persistent course of ant. pituitary extract. Collip's 'growth complex' was helpful in one case of undersized child. The gonadotrophic hormone of the ant. pituitary is of definite value in the treatment of menorrhagia, Frohlich's syndrome, definite deficiency of corpus luteum activity, impotence and hypogonadism in the male. Diabetes mellitus is definitely a condition of hypoinsulinism, possibly also due to, or associated with hypofunction of ant. pituitary and I could definitely record at least 3 of my diabetic cases during the last 2 years, responding remarkably to a long and persistent oral therapy of ant. pituitary and pancreas (raw glands chopped up and taken with boiled

potatoes), or freshly prepared glycerine extract. Many cases of vertigo and occasional fainting fits or psychosis have been due to relative hypoglycæmia or hyperinsulinism. There is a reputed surgeon at Calcutta, who is a subject of this type and having known his own condition would carry some sweets always in his pocket.

Transient hyperglycæmia after a shock or strain, are most often due to hyper-adrenalism, the secretion is due to sympathetic stimulation. Sudden shock or sustained fright has occasioned many an apoplectic fit, where adrenalin was certainly a determining factor. Early muscular fatigue, growing weakness and apathy, sometimes associated with pigmentation here and there, not accountable to any definite metabolic upset, are cases of hypofunction of the renal cortex. I had two cases of this type, later on exhibiting fully Addison's disease and one of them still living with fair amount of energy as a ship's clerk, who regularly takes adrenal cortex for the last 11 years. Many cases of sex aberrations are certainly accountable to defect in the cortex, the changes in the females are more often recognised but in the males the changes are often unnoticed or ignored. The ovarian and testicular secretions are dependent on the gonadotrophic hormone of the anterior pituitary and as such any minor hypofunction of the latter would reflect on the functional competence of the gonads, and the various sub-normal manifestations of sexual dysfunctions and disabilities might thus be possible. The follicular hormone is responsible for the menstranal cycle and preparation of the ground for implantation, whereas the luteal hormone is concerned in the development of the placenta, fœtus and other concomitant changes of pregnancy. This luteal hormone also stimulates the Prolan B of the anterior pituitary, acting symbiotically, and the occasion of the full term expulsion of the fœtus by the oxytocic hormone of the post. pituitary is governed by the maximal concentration of the luteal *cum* pituitary hormones. The *Ascheim-Zondeck* test for pregnancy is dependent on this horminic principle, as also the optimial concentration of this principle is detectable in the placenta, amniotic fluid, C.S.F., as also in the urine of the pregnant women. According to J.S.L. BROWNE, the luteal hormone, if judiciously used, will act as " medical curettage" and effect cure in metropathia hæmorrhagica or cystic hypoplasia of the endometrium. It is very useful in emergency control of uterine hæmorrhage and for prophylactic treatment of habitual abortion (non-syphilitic) and actual control of threatened abortion. Very small doses (2 mg.) daily of Diethylstilbesterol for a week or 10 days, repeated, if necessary, 2 or 3 times after a month or so; would generally cut out the climateric disturbances. Precocious sex development and premature puberty are associated with hyperfunction of the adrenal cortex (adrenal virilism) and desoxycorticosterone is closely related, if not identical with progesterone, and again is interrelated to Prolan A or the adrenotrophic hormone of the ant. pituitary. It is thus this trio, ant. pituitary, adrenal cortex and gonadal hormones, not only control the normal development of the sex characters but regulate the entire sexual life of both the sexes, and it is quite rational to assume that many of the minor maladies of sexual life are probably due to minor hypofunction in this triumvirate or even in one of them, reflecting its disabilities on the others. Menstrual disorders, pregnancy toxæmia, premature delivery or abnormal delivery may possibly be accountable to some endocrine disturbances, worth careful investigation, and with judicious selection of the missing link, many a mal-drugging and

melancholia might be avoided. KEMP (1931), FREEMAN and MELICK (1936) and recently KOTZ and KAUFMAN strongly advocated almost specific action of adrenal cortical hormone for prevention and treatment of the nausea and vomiting in the first trimster of pregnancy. The suprarenal medullary secretion, adrenalin, has a profound functional influence on a variety of tissues and organs of the body and as such is an essential item in the good government of the human institution. It acts peripherally and not through the sympathetic ganglia, although it is sympathotonic. possibly acting on the myo-neural substance. Very careful and detailed studies have been made on the effect of adrenalin on the heart-muscle, coronary vessels, arteries, arterioles and capillaries, eyes, bronchi, liver, spleen, gall bladder, metabolism, intestines, uterus, skeletal muscles, kidneys, spinal cord etc., and one could well appreciate how and why any hypo- or hyper-activity of this set of glands could affect quite a variety of tissues and organs of the body in their work. The clinician is certainly aware of the prompt action of adrenalin in asthma, or as a cardio-circulatory stimulant, or as an antidote to hypoglycæmic crisis, but a closer study of its physiological effects might throw a flood-light on a variety of symptoms exhibited in many a diseased condition, where judicious use of this principle may prove extremely useful. In conditions of intestinal colic with diarrhœa or dysentery and also in cholera, adrenalin in repeated doses, 10–15 m. every ½ hour, for 3–6 doses, has been found very useful. One of my colleagues reported that in early cases of cholera he would only depend on adrenalin, both parenterally and per os and in the early stage of muscle-spasm, after moderate dehydration, adrenalin was his main-stay. Pigmentation of the skin is a prominent feature in Addison's disease and melanin is closely related to adrenalin and is a guide to the phenomenon. PAL has shown that on repeated and prolonged exposure to ultra-violet radiation, the medulla is depleted of the adrenalin granules and this is possibly why the pigmentation of the skin due to actinic rays is the formation of melanin from the parent chemical substance. Adrenalin plays an important role in the carbodydrate metabolism, besides its general stimulating effect on the tissue metabolism.

(1) Adrenalin is antagonistic to insulin,--insulin aids storage of sugar, while adrenalin mobilises.

(2) Thyroids are antagonistic to the pancreas. Hyperglycæmia in hyperthyroidism, while in hypothyroidism there is more sugar tolerance.

(3) Diabetogenic and ketogenic hormones of the ant. pituitary are antagonistic to insulin. Pituitrin is also antagonistic to insulin.

Suprarenal cortex has a profound influence on metabolism. It controls and regulates the water and mineral metabolism. With the extirpation of the cortex there is rapid excretion of sodium and chloride in the urine. There is a fall of sodium and a rise of potassium in the blood, there is rapid loss of water with a rise of concentration in the plasma, less diuresis follow owing to depressed circulation and kidney insufficiency, there is accumulation of fluid in the tissues, less absorption of glucose from the intestines, less formation of glycogen in the liver and muscles and fall of blood-sugar also ; fat absorption is deferred and there is rise of cholesterol in the blood. Now, if there is hypo-activity of the cortex, due to whatever causes, there is bound to be disturbances in the metabolism as detailed above, the severity depending on the grade of deficiency. A closer

study would materially help the clinician to interpret many of the manifestations in some of the diseased conditions and sub-normal demonstrations, and if timely detected, it is quite possible that many irremediable results might be averted.

Nutritional.—*Vitamin* B_1 :— Partial deficiency of vitamin B_1, *aneurin*, leads to loss of appetite, loss of weight, sometimes hypotonicity of the gastro-intestinal tract, constipation and peripheral neuropathy rather than a neuritis. Alcoholic neuritis and polyneuritis of pregnancy are styled as 'conditioned deficiency', due to faulty absorption or to loss of appetite. Some obscure cardiac disorders, as extra-systoles, palpitation of the heart and pseudo-angina (not the angina of efforts), have been related to deficiency of vitamin B_1 (WEISS and WILKINS, 1936, Abt., 1935). Many cases of gastro-intestinal disorders with neuritic symptoms are only precursors to beri-beri. In long-standing sub-acute vitamin B deficiencies degenerative changes occur in the heart, liver, pancreas and kidneys and timely recognition would save many a pitfall and worse injury. Tests of urine have been introduced to determine the level of nutrition of the human subject with regard to Vitamin B_1 and in suspected conditions this should serve as a guide (HARRIS and LEONG, 1937-'38-'39).

Vitamin B_2 (1):—Cheilosis, angular stomatitis, "shark-skin" comedones, idiopathic ulcerative colitis, exhaustion, anorexia and retarded growth have been found to be due to vitamin B_2 (1) (*Riboflavine*) deficiency and cases with these symptoms in their early manifestations should draw our attention to the possibility, and timely administration of this factor would remarkably cut short graver conditions. Absence of this factor in diet produces cataract in rats and it is worth-while remembering the possibility of its deficiency at least in cases of premature cataract.

Vitamin B_2 (2) :—The classical symptoms of pellagra, the three D's, diarrhœa, dermatitis and dementia, may not be evident, clear-cut and all at once, but, as already stated, minor grades of deficiency leads to a variety of ailments of the like nature. Many cases of dermatitis, specially in the exposed parts, with gastro-intestinal symptoms have responded to *nicotinic acid* and one must take these cases as early cases of pellagra. Neuro-syphilitic disorders,tic douloureux, Sydenham's chorea have all in the early stages responded remarkably to vitamin B therapy and in advanced stages may certainly render relief. HUGH KIENE and HIMON MILLER (*J. A. M. A.*, 114, June, 1940) conclude that alcohol is not the principal factor in the production of polyneuritis or delirium tremens and that a deficiency of vitamin B in the brain parenchyma is chiefly responsible. A cerebral neuronitis, an irritative phenomenon, is caused by a perverted carbohydrate and vitamin B relationship, which, if treated with vitamin B, responds more remarkably than do the peripheral lesions of alcoholic neuritis. SMITH and MASON (*Mayo Clinic Proc.* 15, Aug., 21, 1940) have established the significance of vitamin B in the metabolism of carbohydrates. Deficiency leads to an accumulation in the tissues and blood of products of intermediate metabolism of carbohydrates, namely, pyruvic acid, lactic acid and methylglyoxal. It is further known that tolerance of dextrose is definitely diminished in avaitaminosis-B. Vitamin B has proved to be a detoxicating agent in the system and is extensively used in morphine abstinence, irradiation sickness and sulphonamide and sulphapyridine toxicoses. Many cases of mental disorders with signs of involvement of peripheral nerves, with or without atrophic paralysis and sensory

disturbances, have responded wonderfully to administration of vitamin B complex. The case No. 8, as reported in *B. M. J.* Feb., 21, 1942, would show clearly how vitamin B deficiency leads to the picture, not easily to be recognised.

Vitamin C:—The clinicians often come across with cases having vague symptoms, as pain in the limbs, sloth and laziness, loss of appetite, a pallor, weakness, easily breathless and some of them possibly with spongy gums or bad pyorrhœa. They are usually taken to be "bad liver," 'dyspeptics' or even 'malingerers' and receive very scant attention either with the doctor or with the household, until some petechæ appear or hæmaturia, or else there is a joint swollen and painful and the gums are spongy and bleeding, when the diagnosis of scurvy becomes quite obvious. In the ordinary course, he usually receives a 'tonic' of the type of syr. Æstonæ or advised to go out for a change of climate, if the patient is well off. Vitamin C deficiency could easily be found out by a simple urine test or by the capillary fragility test, and the attention of the medical men is earnestly drawn to this aspect of the clinical practice, where the clinician and the laboratory expert should work in close co-operation. HESS (1916) and COMBY (1921), maintained that incipient, latent or subacute scurvy in infants was relatively common but often escaped diagnosis or was mistaken for rheumatism. Symptoms are vague, the child looks pale and fretful but not wasted. Amongst adults this type of cases are very rare. But during pregnancy and lactation or during prolonged pyrexias the symptoms of pain in the limbs, uncommon laziness, loss of appetite, constipation, growing anæmia and spongy gums are purely due to vitamin C deficiency and possibly of vitamin B also. In infectious diseases, particularly in pulmonary conditions, "for any given intake, the excretion is decreased, possibly there is destruction of ascorbic acid, or else a change in the chemical configuration, as happens with insulin in infective conditions in diabetes." Hypovitaminosis C is quite common amongst the people, if the excretion tests are done, taking 25 mgms. as the daily standard requirement but it does not necessarily mean that they are all to be taken as cases of latent scurvy any more than they would be found, on close scrutiny, deficient in many other factors, but it would, however, be fair to expect that if the deficiencies were made good, better health and more fighting strength are assured. In patients subjected to restricted diet, as in gastric or duodenal ulcers or in long-continued fevers, as enteric etc., evidences of avitaminosis become manifest and the clinician is expected to guard against the possible encumbrances to the already burdened system. Absence of adequate vitamin C definitely retards the healing process of fractures and wounds and in most of the hospitals, the diets contain little or no fresh fruits, being left to rely on gifts brought in by the friends and relations and how few of our patients would really receive such gifts. CLAUS W. JUNGEBLUT (*Jr. Exp. Med.*, Sept. '39) showed that vitamin C is capable of inactivating *in vitro* multiple paralytic doses of poliomyelitis virus and several other plant and animal viruses and even bacterio-phage, as also a number of bacterial toxins, as of diphtheria, tetanus, dysentery, staphylococcus and also anœrobic toxins. Vitamin C may thus be designated as the "anti-toxic and anti-viral" vitamin. Possibly vitamin if pushed in good doses may "do nothing more than tip the balance in favour of a successful outcome by increasing the forces of natural defences." Although *in vivo* vitamin C has not proved to be so far an

anti-toxic or prophylactic agent in infections, it is certainly very useful in definitely altering the picture and possibly cutting short the course of the diseased process and convalescence too.

Vitamin D:—Rickets or rachitis has been definitely proved to be due to deficiency of vitamin D, a fairly common condition in the temperate zones or wherever the sunlight is deficient, *e.g.*, in humid climates, in smoky or overcrowded industrial areas. In the typical condition there is irregular growth of the soft osteoid tissues and consequent swelling of the epiphysial junction and rachitic metaphysis follows. There is inadequate calcification of the bones and overgrowth of osteoid tissue, leading to bow-legs, knock-knees, rachitic pelvis, green-stick fractures etc. The actual chemistry is a low Ca. and P. (HOWLAND and KRAMER 1923),—inadequate net absorption of P. or Ca. as also blood phosphatase (SMITH 1923). There must, therefore, be either a deficiency of vitamin D in the diet or lack of ultraviolet rays to generate vitamin D from one's own source of Ergosterol. In the tropics actual rachitis is rare but milder grades of deficiency do exist, evidently due to inadequate and improper diet. Dental caries, infantile tetany, cæliac disease, associated with definite deficiency of vitamin D, are quite common. How often do we find children with pot-bellies, carious teeth, having frequent attacks of catarrah and broncho-pneumonia, severe constipation, badly formed chests with definite Harrison's sulcus coming to our clinics, who readily respond to vitamin D, either raw cod-liver oil or vitaminised oil as BI-Adol.? Many patients are in a condition of marginal deficiency and may show no marked signs. When actually symptoms appear, it is usually a multiple vitamin deficiency and vitamin preparations containing four or five vitamins are justified in the treatment of persons who are not actually very ill but are poor eaters and in poor health. It should be remembered that there is never any storage in the system of vitamins B, C, and K.

Vitamin A:—Night-blindness occuring off and on in subjects is not rare and they quickly respond to a few days' use of eggs, butter or cod-liver oil. Xerophthalmia is common in the children of the poorer section of the people who could never get a drop of milk or fats of any kind, whose entire dietaries consist of rice, cooked vegetables and sometimes a little *Dal* (pulses). There is definite lack of growth and vitality and attacks of diarrhœa, dysentery and recurrent broncho-pneumonia are very common. The usual early manifestation of vitamin A deficiency is generally epethelial xerosis—various grades of "phrynodermia" (toad-skin). It is characterised by generalised dryness of the skin, with keratinised papular eruptions originating at the pilo-sebaceous follicles—rarely on the face. Xerophthalmia in India is quite a common cause of blindness among the poor (WRIGHT, 1930; KIRWAN, 1931). PIER M. CASASSA and MARCO PESCARMONA, (Min. Med. 31, May 19, 1940) conclude that vitamin A proves very useful in early cases of hyperthyroidism and should be tried either alone or with nerve sedatives.

Dark-adaptation test is quite a delicate test for avitaminosis-A. An adult should daily get 2500 to 3000 Int. Units of vitamin A, which means a daily supply of 7/8 of a pint of good milk, one egg, an ounce of butter and a good quantity of leafy vegetables (for *beta*-carotene)—(LEAGUE OF NATIONS, Bulletin of Health Organisation, 1938). How few of our people, even of the better classes, could really afford this, not to speak of the starving millions? In fact, more than 90 per cent. of our people do not get

even 1/10 of the quota and thus our people suffer from chronic avitaminosis-A, are deficient in growth and susceptible to infections in all seasons of the year.

Vitamin E:—Sterility in males is usually due to diseases of the testes, often tubercular or syphilitic, besides the endocrinal deficiency as hypo-pituitarism or hypo-thyroidism. The latter conditions, if early spotted, could be effectively cured by substitution therapy. It is not yet clear how far avitaminosis E affects male potency. But in females, repeated still-births of premature fœtus (not due to syphilis or any ovaro-uterine condition) have been definitely found to be due to vitamin E deficiency and in subjects who have had a like history would remarkably come to full term on timely exhibition of vitamin E.

Vitamins K and P:—In hæmorrhagic diathesis, with definite capillary fragility, vitamin P or Citrin is definitely vitamin C—sparing and in conditions of delayed clotting time vitamin K has been found useful. In cases of idiopathic hæmorrhagic conditions with definite thrombocytopenia vitamin K has proved its usefulness.

A few *illustrative cases* of minor deficiencies are noted below which were, by early detection and correct therapy, saved from worse terminations:

1. M., aged 11 years, brought for defective vision at night. Eye specialist found vision normal. Growth definitely retarded and frequent attacks of catarrh of the lungs or of the bowels. Had some psoriatic dermatitis on the body. On inquiry dietetic deficiency was clearly manifest. A combined course of vitamins A and B-complex proved a definite cure, when vitamin A alone was not sufficiently useful.

2. Mrs. A., aged 28, multipara, had attacks of neuritis and neuralgia off and on. A subject of mucous colitis for years, lately developed eczema-like dermatitis in the hands and feet. Intensive course of vitamin B complex in the form of yeast and nicotinic acid proved extremely useful and for the last one and a half years with a close attention to her diet she has been keeping very good health and has gained in weight by more than a stone.

3. Three brothers and a sister of the same house had enteric fever, with Widal strongly positive 1/100, each having some different feature—one with constipation, requiring glycerine enemata every other day, one having a daily evacuation, the third having two or three loose motions daily and the fourth had bad diarrhœa. Every one had spongy gums, more or less, and the first boy, from the end of the second week used to bleed a lot from the gums and even from the cracked lips, while the fourth patient (with bad diarrhœa) developed petechial hæmorrhage on the 24th day and on the 26th day, inspite of injections of Calcium and Hæmostatic serum had a fairly big hæmorrhage in the bowel and melena. Vitamin C only just came in the field and every one was put on vitamin C *per os* and the fourth patient had several injections also, which was later on followed up by a poly-vitamin course and I could feel that the vitamin course definitely did cut out a lot of toxic symptoms and shortened the course of the infection. Earlier use of the vitamins, at least of vitamin C, was indicated and, if timely given, might possibly have averted many a trouble.

4. Mrs. B., et 22, mother of 5 children, a subject of chronic anæmia, came with acute enterio-colitis, extreme anorexia, nausea, palpitation of the heart and some œdema of the hands and feet. Last child 4 months ago and she had no milk to feed the baby for the last 3 months. Stool examination revealed no particular infection, plenty of mucous, blood, pus cells and serous fluid. She could not retain much of food or drug. To meet the acidosis she was put on daily injections of glucose and sodii bicarb I.V., Vitamin B intramuscularly and had some B1-Intesto-Phage also. At first she could like and retain a little of *dahi* (home-made curd) and a drink of some sugar and fresh lime juice in water, but gradually she had to stick to her *dahi* and the quantity had gone up to 3½ seers per day, *plus* 6 to 8 oranges and her drink. By sticking to this particular diet the whole intestinal flora could be altered and the vitamin B complex gave her a fresh lease of life. She gained a health which she had never before.

5. A motherless child was brought to the clinic with extreme marasmus, diarrhœa, ulcers in the mouth and lips, tongue heavily coated, which on cleaning produced red raw bleeding sores. Growth was definitely delayed. The child was put on daily injections of Coll. Calcium with vitamin D and *per os* a few drops of cod-liver oil, a few grains of calcium in honey to be sucked from the finger tips off and on. The baby improved and very soon could take one orange and one tomato juice daily. With a little attention to his diet the child went on improving all round and is having a normal growth.

6. Miss S., et 4 years, came to the clinic with a history of repeated crops of boils, polyuria, abnormal thirst and appetite. The growth was definitely stunted and the urine examination showed sugar 2.5% and the blood sugar was 205 mgms.%. Symptoms of polyuria was particularly evident since an attack of a prolonged pyrexia, which the mofussil doctor said was typhoid, eight months ago. The W. R. was found to be positive 50%. The child was put on a combined course of Ant. pituitary and antisyphilitics and also a modified diabetic diet with full caloric quota for a growing child. Within two weeks the child showed signs of improvement and was free from sugar very soon. She was advised to continue the treatment for at least a year and then to report. A year after she was taller by 2½ inches and was aglycosuric, but her W. R. was not yet negative and she was advised to continue the course, slightly modified, for six months more. I saw her a few days ago, after 1½ years and now she looked a normal child all round in health and growth, and no glycosuria.

7. Baby P., aged 1 year, brought for his inability to talk and stand, the teeth had also not yet erupted. Had a forceps delivery and was unconscious for 20 hrs. after birth and the head showed signs of compression. The child babies a little but articulation was definitely blurred. Saliva always trickling the mouth, the child would unusually cry a lot for nothing. He was put on a compound gland extract with thyroid, pituitary whole gland, and pineal besides, calcium and cod-liver oil. The child is now aged 3 years and has improved remarkably all round, although not yet a normal of his age but if the treatment is persisted on there is every likelihood of a normal growth and a normal life. There was a clear evidence of hypo-pituitarism. Another remarkable fact was that the mother of the baby was a short lady of 'Lorrain-Levy' type of hypopituitarism.

8. ELIOT SLATER reported a very interesting case of psychosis associated with vitamin B deficiency:

Progressive loss of weight, indigestion, diarrhœa, vomiting and nervousness, 8 months. Felt that his left leg from knee down and right foot 'dead.' Treatment improved the condition but the numbness continued. Six days after admission in the hospital he had a fall on the floor of the ward. Developed signs of psychosis, talking loudly and incoherently. There was dysarthria and also echopraxia; deep reflexes increased, pupils sluggish and a diagnosis of G. P. I. was made. DR. SARGANT however suggested 'confusional state due to vitamin B deficiency.' Lumbar puncture proved a normal fluid. He had loaded bowels, soon followed diarrhœa, buccal mucosa and tongue bright red, raw and clean. 100 grms. of Nicotinic acid and 50 mgms. of Ascorbic acid daily brought on improvement, immediate and remarkable, all troubles vanished and within a month a normal healthy state was attained. (*B.M.J.*, Feb., 21, 1942).

I could cite only a few stray cases but I feel sure every practitioner must have had many such cases during their clinical practice. With the advance in the modern knowledge in the physiology of the endocrines in the normal growth and maintenance of the various metabolic functions of the body, it certainly behoves us, practitioners, to utilise the knowledge to the best advantage of our patients. In the field of vitamins, more wonders have taken place; not only are they better classified, their physiology worked out, but most of them have been synthetised and their chemical equivalents put in the market at a fairly cheaper rate to be utilised whenever and whereever any deficiency is brought to the notice.

While concluding this paper I feel tempted to quote a few wonderful lines on the 'Way of Practice' by Sir HUMPHRY ROLLESTON in the 'Introduction' of the British Encyclopedia:

"The great majority of the members of the various divisions of the medical profession are in general practice and so stand in the position of guide, philosopher and friend of the individuals, for whose care and cure they are responsible. It should be remembered that each patient is a distinct problem, and that ill-health may be due to combinations of such different influences that one cause or one name could no longer be possible. During this century the conditions and methods of general practice have gradually changed; its approach has become more individual; the investigation of each patient and his human and other relationships must in the main be acquired by example, practice and experience. Treatment, founded on legacies of past, has recently advanced as a result of much help from the experimental methods and it is perhaps more clearly than ever realised that it should be primarily directed to the individual rather than to his reactions or symptoms."

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Hypo-Vitaminosis in General Practice

BY

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HYPO-VITAMINOSIS of more than one vitamin is much more common than avitaminosis of any one particular vitamin. Hypo-vitaminosis is common in bottle-fed babies, in children coming from slums and in adults who have been put on special diet as during the course of strict ulcer diet for duodenal ulcer patients and in subjects of chronic interstitial nephritis.

Vitamin A Deficiency.—Vitamin A deficiency is clinically seen very commonly for their eye lesions. They have xerophthalmia. In the early stages the conjunctiva is smoky. A little later, in the palpebral fissure are seen chalk-like deposits called Bitot's spots. Still later wrinkling of the conjunctiva occurs. At this stage the patient complains of night-blindness and experiments show poor dark adaptation. If the patient is not treated, then the cornea is involved and becomes softened. Keratomalacia and degeneration occur, resulting in blindness. Recovery from night-blindness occurs in 3 or 4 weeks adequate doses of vitamin A.

Skin-lesions :—These are usually met with in cases with eye lesions. The lesions consist of black spiny elevations of the hair follicles particularly on the extensor aspects and on the back and the nape of the neck. Atrophy of the sweat glands and keratinizing metaplasia of the ducts cause loss of sweating. The writer had a case of vitamin A deficiency in a middle aged man with night-blindness and lack of sweating which was confined to the entire right arm and the right upper half of the body. Investigations failed to reveal any other cause for the lack of sweating. The patient was put on 2 drams of shark-liver oil three times a day. At the end of a fortnight his night-blindness cleared up but the loss of sweating persisted. As he was discharged at that stage, the time taken for the re-establishment of the sweating could not be made out.

Children suffering from avitaminosis A are prone to frequent attacks of cold and lung infections. These children benefit a great deal by regular administration of vitamin A.

The other lesions described as defective enamel formation, renallithiasis and nervous manifestations occuring in the experimental animals are not met with clinically. The few cases of renallithiasis that I have come across did not show any evidence of avitaminosis A.

The assimilation of vitamin A depends upon a number of factors. Chief amongst which are the presence of unsaturated oils, bile (particularly for the utilisation of carotene) and a healthy alimentary tract. Many cases of avitaminosis A and D have been cases of chronic enteritis, cœliac disease or tuberculous enteritis, conditions in which there is rapid peristalsis and poor absorption.

Therapeutics of Vitamin A.—In patients who are free from gastro-intestinal disorders, either pure vitamin A or cod-liver oil or shark-liver oil 2 drams, administered three times a day after food, is sufficient. After the symptoms have cleared, a diet containing 2000 to 3000 units, of vitamin A is enough. This will contain enough vitamin A for the needs of the body and for a moderate storage. In growing children 4000 to 5000 units of vitamin A intake is necessary. In children with gastro-intestinal disorders the vitamin should be administered either in concentrated form,

or as inunction. The latter method is too slow as a rule. Some cases tolerate emulsions of cod-liver oil but in any case inunction may be given, the only objection being the smell. The vitamin A requirement of pregnant women is about 5000 units a day and this is best given as milk, butter, cheese, eggs, green leafy vegetables and small additions of cod-liver oil.

Vitamin B.—In Madras frank cases of beri-beri are not common. In a large hospital like the General Hospital, Madras, with nearly 700 beds, more than one or two cases are not seen in a year. It is very much more common to see cases of poly-neuritis with atypical signs, as tenderness of the calf muscles, certain amount of wasting and the knee jerks still being present. The cases that are admitted with loss of knee jerks and inability to walk, take nearly six weeks before they are able to walk and cease to have tenderness of the calf muscles. Frank cases of beri-beri with signs of cardiac failure respond very well to massive doses of Thiamine preparations. Two useful tests to spot these cases are: (1) Diuresis test and (2) Adrenalin test.

Diuresis test :—Administering 1500 c.c. of water and measuring the quantity of urine excreted in the next four hours. In cases of beri-beri the volume of urine exceeds 1000 c.c. after one or two doses of Thiamine, whereas in congestive heart failure Thiamine has practically no diuretic effect.

Adrenaline test :—On auscultation over the brachial artery at the cubital fossa either no sound is heard or pistol shot sounds are heard. Then on administering $\frac{1}{2}$ c.c. of Adrenalin subcutaneously, a pistol shot sound is heard, or if it was already present the sound gets accentuated. Both the tests are reliable and are useful in so far as they can be carried out by the bed-side.

Vitamin B_2 Deficiency.—Recently HEILEIG has reported a number of cases with non-specific diarrhœa, responding to Nicotinic acid injections of 50 m.g. daily, for five days. These cases were charecterised by moderate glossitis, with a few red patches on the tongue in the acute cases, and in later stages slate coloured pigmentation with widespread epithelial atrophy. Subjective symptoms included a burning sensation on taking spiced food. Several loose motions were passed with blood and mucus. These cases benefited by the addition of crude liver extracts. The few cases under the writer's care benefited with raw liver extract without any Nicotinic acid.

Fully established cases of pellagra are occasionally seen in patients coming from Ceded Districts. These cases show the typical text-book description such as diarrhœa, dermatitis and delirium. They also suffer from glossitis and rawness of the tongue.

Riboflavine deficiency, causing angular stomatitis and angular conjunctivitis are the commonest clinical manifestations of avitaminosis B_2 met with in out-patient practice. Even 2 or 3 cases are seen in a day. The clinical features in a well established case are a craggy fissured tongue, (aptly called a 'scrotal tongue') and on the scrotum a whitish coating which is slightly scaly, and angular stomatitis and angular conjunctivitis. This is commonly met with in children of 7 or 10 years and rarely in adults. These cases benefit considerably by local application of glycerine boracis for the angular stomatitis and yeast administered orally.

Vitamin C deficiency.—Deficiency in children, causing echymosis in several parts of the body over the pressure points, is seen but is not common. Typical infantile scurvy is also seen, about one or two cases a year. These cases are very often missed for a time at least,

Hypovitaminosis C is even more uncommonly seen in adults. Only 2 or 3 cases for a year have been seen by the writer and even they had spongy gums and bleeding around the teeth. All the cases were men living alone, consuming milk or curds with rice, lacking fresh vegetables in their diet. All the cases are quickly cured by vitamin C administered as tablets and by correcting the diet. There are a few cases of un-united fractures getting united shortly after correcting the diet. As it is very easy to find out deficiency of vitamin C by testing the urine, its deficiency should be looked for in any case of long standing un-united fracture.

Therapeutics of Vitamin C.—Artificially fed infants should have 20 m.g. a day. This may be given by giving tomato juice. INGALL says, "vitamin C administration is particularly important for premature infants and artificially fed infants and for those suffering from disease, as histological sections of bones and costochondral junctions of a small group of premature infants, receiving only pasteurised mother's milk and dying before the age of four months showed unmistakable signs of vitamin C deficiency not detected during life." Breast milk being much richer in vitamin C than cow's milk, breast fed babies do not require additions of vitamin C.

Children between 2 to 5 years require 100 to 120 m.g. The amount of vitamin C required to ward off scurvy is much below the desirable amount for health.

Adults require 40 to 50 m.g. a day. Pregnant and lactating mothers should have nearly 100 m.g. due to the depletion of vitamin C. Vitamin C is best secured by ensuring a diet containing fresh leafy vegetables and fruits. The citrus fruits are a good source of vitamin C. As this vitamin is easily destroyed by heat, particularly on exposure to atmosphere, cooking, prolonged heating and boiling of fruits and vegetables should be discouraged.

Vitamin D deficiency.—This is commonly seen with vitamin A deficiency cases, as these two vitamins occur together in animal fats. The common clinical feature met with in practice are rickets and tetany. Well-marked cases of rickets, with the rickety rosary and the frontal bossing and curving of the limbs, are seen commonly in the poorer classes of patients. Tetany or latent tetany is much more commonly met with in hospital practice, in the poorer classes of patients.

In adult men tetany is only rarely encountered in Madras, and the writer has seen only one case in the last four years. In women, tetany and osteo-malachic pelvis are relatively more common; but not so commonly met with as reported in the North Indian literature. This may be explained by the absence of *purdah* to a great extent in S. India.

Therapeutics of Vitamin D.—Babies artificially fed require 300 to 400 units a day. For children 500 units a day and adults about 400 units a day are sufficient. For pregnant and lactating mothers 800 units a day are sufficient.

In treating cases of rickets it is good to administer Calcium along with vitamin D, as otherwise sudden lowering of blood-calcium is likely to occur and cause tetany. In frank cases of rickets as much as 10,000 to 20,000 units of vitamin D are required. During the first week or ten days Calcium can be given an l then it may be stopped. In some rare cases, due to faulty metabolism, rickets may be refractory and require enormous doses of vitamin D, as high a dose as 150,000 units being required. Conditions associated with refractory rickets are glycosuria with a low blood-sugar, acidosis, retardation in physical development, rickets of an osteoporotic type and obstructive jaundice.

Conclusion.—There are a large number of cases with hypovitaminosis met with daily in general practice. Cases are usually deficient in more than one vitamin. Correcting the fault in the diet is the ideal to be aimed at, though in typical cases of avitaminosis, diet has got to be supplemented by massive doses of pure vitamin or vitamins that may be deficient.

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Deficiency Diseases in Ayurveda

BY

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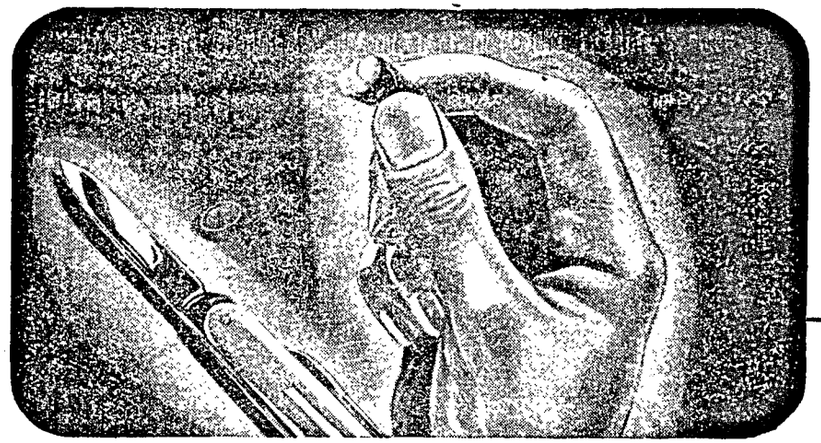
IT should be a matter of great interest for the practitioner of modern medicine to know how the deficiency conditions have been dealt with in Ayurveda, the ancient system of Hindu medicine. The knowledge of deficiency diseases is progressing day by day due to various researches conducted by modern scientists and though originally dietetic deficiencies alone were studied under this heading, now it has come to include other deficiencies also, such as iron, copper, and other metals as also the deficiency of even the hæmopœtic factor in anæmias. Ayurveda has explained these deficiencies under three main headings :—

(1) The deficiency of *doshas, viz., vatha, pitha* and *kapha.*

(2) Deficiency of *dhathus, viz., rasa, rakta, mamsa, medas, asthi, majja* and *sukra.*

(3) Deficiency of *malas, viz., purecsha, muthra,* and *sweda* mainly.

The deficiencies of these *doshas, dhathus* and *malas* are also responsible for all ill health of the body. Especially the *doshas* or the three active factors in the body being responsible for the proper maintenance of the bodily functions, when they are decreased or increased in quantity, the bodily functions cannot be properly performed. The *dhathus* are meant for *dharanam* or upkeep of the body, and they are responsible for maintaining the various tissues of the body in their normal proportion and for giving the usual bulk and proper appearance to the body. The presence of *malas* or waste products in the body up to a certain proportion is also necessary



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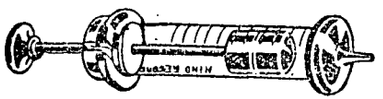

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for the proper maintenance of health. The symptoms that appear when the above three constituents of the body are decreased are as follow :—

When *vatha* is decreased, the following symptoms are produced : Incapacity for work, scanty speech, diminution of activities, depression of spirits and loss of consciousness.

Symptoms of decreased *pitha* are : Impaired digestion, loss of lustre of skin, and diminution of the bodily heat.

Symptoms of the decreased *kapha* are : Dryness, giddiness, burning sensation, thirst, palpitation, looseness of joints, insomnia and weakness.

The question that has to be considered now is how the deficiency in these constituents of the body is occurring.

That the food is the prime factor is admitted on all hands. The food that is taken in any form must contain certain essential constituents in due proportion for the formation of the various elements of the body. The food that is taken, whether in the form of breast milk, in the case of infants, or in the form of vegetarian or non-vegetarian diets in the case of adults, contains certain physical and chemical properties and they are responsible for the supply of the necessary constituents. Ayurveda classifies these properties of substances into five kinds, as *rasam, gunam,veeryam, vipakanam* and *prabhavam. Rasam* is taste, and *gunam* is the physical property as heaviness, roughness, etc. *Veeryam* is the potency or the active principle. *Vipaka* is the chemical change in taste of a substance that occurs due to coming in contact with the various digestive secretions of the body. *Sakthi* or *prabhavam* is the special action of a drug that cannot be accounted for merely by its *gunas, rasas* etc. The *doshas* have certain relation to the *rasas.* By the use of certain *rasas* certain *doshas* get decreased while others get increased. Here we are chiefly concerned with the deficiency of the *doshas.* We shall explain how the *doshas* get decreased by certain *rasas.* The tastes are of six kinds, according to Ayurveda, and they are sweet (*madur*), *amla* (sour), *lavana* (saline), *tikta* (bitter) *katu* (pungent) and *kashaya* (astringent). Out of these six, the first three *viz., madhura, amla* and *lavana,* decrease *vatha, thiktha ushana or katu* and *kashaya* reduce *kapha,* while *madhura, thikta* and *kashaya* diminish *pitha.* So also, the physical properties, *viz., gurutwam* (heaviness), *snigdhtwam* (oiliness) etc., would reduce *vatha,* while *kharatwam* (roughness) and *rukshatwam* (dryness) etc., would reduce *kapha.* Similarly cold etc., reduce *pitha.* The substances possessing these properties are formed by the combination of the five *Mahabhutas,* the *Prithvi* (earth), *Ap* (water), *Agni* (heat or radiant matter), *Vayu* (air), and *Akash* (ether). These five are the sole constituents of every substance found in this world. So the taste or any other property in a substance depends on the proportion of each of the five *bhuthas* in their formation. It has also been said how these *doshas* are diminished by the influence of these *bhuthas.* SUSRUTHA, an authoritative writer, says that vatha could be reduced by supplying more of *Ap* and *Prithvi bhutha* substances, *pitha* by *Ap* and *kapha* by *Agni, Vayu,* and *Akash.* The properties and actions of the *bhuthas* are as follow :—

The properties and actions of *Prithvi bhutha* are heaviness, grossness, firmness, immobility, dullness, compactness, thickness, roughness, strong-smell, mostly sweet taste with slight astringency in it. When substances having these are taken, the effects produced in the body are increased firmness, strength, hardness, and they serve as emollients, nutritives and purgatives to the body.

The properties and actions of *Ap bhutha* are cold, fluidity, moisture, mobility, softness, glaziness, sweet taste with a shade of astringent, sour and saline. When substances containing this *bhutha* are taken, it will cause in the body glazy appearance and moisture, favour the bringing together of the divided parts, promote sense of well-being and satisfaction and increase fluid contents of the body. They serve as nutritives, emollients and purgatives to the body.

The properties and actions of *Agni bhutha* are heat, dryness, light, brightness, pungent taste with a shade of sour, and saline taste. When substances with a predominance of this *bhutha* are taken, they produce burning sensation, good digestion, increase of heat and improvement of the eye sight and complexion. They serve as emetics, appetisers and expectorants.

The properties and actions of *Vayu bhutha* are roughness, lightness, dryness, cold, with the property of touch, and astringent taste. When substances with this *bhutha* predominance are taken sliminess is removed, body becomes light, dry and emaciated and activity will increase. They serve as astringents, emetics and expectorants.

Properties and actions of *Akash bhutha* are smoothness, nonsubtilty, porosity and sound. When substances with an excess of this *bhutha* are taken, softness, lightness and porosity will be caused to the body. They act as sedatives in general.

From the above, we may see that everything in this world is formed of the five *Mahabhuthas,* so also the food which is responsible for the nutrition of the body. The food that is to be consumed should be of a nature which would preserve the health. Such food substances which would maintain the balance of the five *bhuthas* in the due proportion as they are required for the body should be taken. Charaka, an authoritative writer on Ayurveda, gives a list of substances required for daily use and they are *sali* and *sashtika* (varieties of paddy), *godhuma, yava,* (wheat variety), *mudga* (green gram), milk, water, ghee, meat, salt, *amalaka* (amla), fruit and honey. These substances should necessarily be there for properly balancing the diet. These can according to modern medicine be divided into six groups namely, proteins, carbohydrates, fats, salts, water and vitamins, the last coming under the *jeevaniya* or life-giving group. They have also prohibited the use of dry vegetables, dry or putrified meat, spoilt milk or improperly curdled milk as they are not useful as food materials to the body. This shows the view point of Ayurveda, regarding the supply of necessary constituents, apart from the bulk of the food, which has also got its own importance, with reference to the nutritional value of it. The food that is taken in required proportions of these constituents, after digestion and assimilation in the body would go to form the *dhathus* that is the *rasa* (lymph and chyle), *rakta* (the blood), *mamsa* (flesh or muscle), *medas* (fat), *asthi* (bone), *majja* (bone marrow), *sukra* (semen), and also *ojas* (the extract of all the seven *dhathus*). The waste matter left out of digestion form the *malas, viz., pureesha* (fæces), *muthra* (urine) and *sweda* (sweat) etc. The following are the features present

when there is a loss, decline or diminished production (*kshayam*) of the *dhathus* :

I. **Rasa kshayam.**—Dryness, fatigue, emaciation, languor, intolerance to noises and sounds, thirst, discomfort, pain, palpitation and a sense of emptiness in the heart.

II. **Rakta kshayam.**—A desire for sour and cold things, dryness of the skin, a loose and lax condition of the siras (vessels of the body), roughness of the skin, cracking of the skin, a longing to live in cool places, a withered or faded condition of the body.

III. **Mamsa kshayam.**—Exhaustion of the special senses and of action senses (*aksha glani*), pain in the joints, a wasted condition of the buttocks, cheeks, lips, thighs, genitals, breasts, arm pits, neck, calfmuscles, waist and belly ; dryness and pain in the various parts of the body and a relaxed condition of the Dhamani vessels.

IV. **Meda kshayam.**—Slimness of the lower abdomen and waist, emaciation, enlargement of the spleen, a sensation of the emptiness in and bursting of joints, dryness of the skin, a craving for fatty flesh, fatigue, and tiresomeness of eyes.

V. **Asthi kshayam.**—Pain in the bones, falling off of hair, nails and teeth, dryness of the skin nails and teeth, fatigue and looseness of joints.

VI. **Majja kshayam.**—Rarefaction and porosity of bones, pain, weakness, lightness, and a feeling of emptiness of bones, pain in the joints, diminished formation of sukram, giddiness, impairment of vision (*timira darsanam*). Vatarogas (diseases due to vata vitiation) also arise.

VII. **Sukra kshayam.**—Impotence, delayed emission of a small quantity of vital fluid or ejection of blood, with intense pain in the testicles and burning sensation in the penis during sexual intercourse, general weakness, dryness of the mouth, pallor, languor, and fatigue.

VIII. **Features of Oja kshayam.**—Various phobias, weakness and dryness of the body, emaciation, frequent brooding with discomfort in the various organs, loss of body lusture, lack of enthusiasm and interest in the surroundings.

Symptoms and signs when there is a decrease or kshayam of the malas :—

I. **Pureesha kshayam.**—*Vayu* moves with noise in the intestines causing a griping sensation ; it wanders all over the abdomen and courses upwards causing much pain and discomfort in the heart and the sides of chest or abdomen.

II. **Mutra kshayam.**—Passing of a small quantity of urine with great difficulty, pain in the bladder ; the urine is altered in colour or mixed with blood.

III. **Sweda kshayam.**—Absence of perspiration, dryness and cracking of the skin, abnormalities of sensation in the skin, falling off of hair and their standing erect.

VAGBHAT and KASYAPA, two authoritative writers on Ayurveda, have described a disease called *pari bhadraka* according to VAGBHAT and *phakka roga* according to KASYAPA occurring in infants fed on the breast milk, while the mother is pregnant. The later describes the disease to be of three kinds : (1) *Ksheeraja.* (2) *Garbhaja.* (3) *Vyadhija.*

Extreme emaciation is the prominent feature of the disease. The patients will become lame, lazy or dumb. The other symptoms are : weakness of senses, indigestion, diarrhœa, fever, reduction of the lower part of the body, inability to walk, falling off of hair, emitting of bad smell, breathlessness, etc. These symptoms may very well be compared with the signs and symptoms of deficiency states in infants, children and adults. The treatment recommended for this condition is the use of Kalyana Ghritham and other preparations, which would reduce the emaciation and increase the strength of the body. The scope of deficiency states has also been extended to almost all ailments of the body, since diseases are produced only when the *doshas*, *dhathus*, and *malas* get aggravated (*vridhi* or *pokopan*) and attenuated *(kshyam)*. The latter condition is considered as more serious than the former.

It will be interesting to note that this conception of deficiency diseases has been recently brought into focus by several American authors who have enumerated a list of signs and symptoms in adults and infants as suggestive of early deficiency states (*Journal of American Medical Association*, Feb. 21, '42, pp. 615–616.)

Symptoms and signs suggestive of early deficiency states in infants and children :—

SYMPTOMS	PHYSICAL SIGNS
1. Lack of appetite.	1. Lack of subcutaneous fat.
2. Failure to eat adequate breakfast.	2. Wrinkling of skin on light stroking.
3. Failure to gain steadily in weight.	3. Poor muscle tone.
4. Late period of sitting, standing and walking.	4. Pallor.
5. Aversion to normal play.	5. Rough skin (toad skin).
6. Chronic diarrhœa.	6. Hæmorrhage of new born.
7. Inability to sit.	7. Bad posture.
8. Pain on sitting and standing.	8. Nasal black heads and white heads.
9. Poor sleeping habits.	9. Sores at angles of mouth, *cheilosis*.
10. Backwardness in school.	10. Rapid heart.
11. Repeated respiratory infections.	11. Red tongue.
12. Abnormal intolerance of light, photophobia.	12. Square head, writs enlarged, rib bending.
13. Abnormal discharge of tears.	13. Vincent's angina, thrush.
	14. Serious dental abnormalities.
	15. Corneal and conjunctival changes *slit lamp*.

Spmptoms and signs suggestive of early deficiency states in adolescents and adults :—

SYMPTOMS	PHYSICAL SIGNS
1. Lack of appetite.	1. Nasolabial sebaceous plugs.
2. Lassitude and chronic fatigue.	2. Sores at corners of mouth, cheilosis.
3. Loss of weight.	3. Vincent's angina.
4. Lack of mental application.	4. Minimal changes in tongue colour or texture.
5. Loss of strength.	5. Red swollen lingual papillæ.
6. History of sore mouth or tongue.	6. Glossitis.
7. Chronic diarrhœa.	7. Papillary atrophy of tongue.
8. Nervousness and irritability.	8. Stomatitis.
9. Burning, prickling of skin and paresthesias.	9. Spongy, bleeding gums.
10. Night blindness.	10. Muscle tenderness, extremities.
11. Abnormal intolerance of light and photophobia.	11. Poor muscle tone.
12. Burning or itches of eyes.	12. Loss of vibratory sensation.
13. Abnormal discharge of tears lachrymation.	13. Increase or decrease of tender reflexes.
14. Muscle and joint pains, muscle cramps.	14. Hyperæsthesia of skin.
15. Sore bleeding gums.	15. Bilateral symmetrical dermatitis.
16. Tendency to bleed.	16. Purpura.
	17. Dermatitis ; facial butterfly, casal necklace, perineal, scrotal and vulval.
	18. Thickening and pigmentation of skin over bony prominence.
	19. Non-specific vaginitis.
	20. Follicular hyperkeratosis of extensive surfaces of extremities.
	21. Rachitic chest deformity.
	22. Anæmia not responding to iron.
	23. Fatigue of accommodation.
	24. Vascularization cornea.
	25. Conjunctival changes.

In the light of the above facts, it will be of great utility if medical men make a comparative study of the Ayurvedic and modern conception of deficiency diseases and make use of the new orientation of ill-health in the treatment of various human ailments.

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Vitamins and Eye Affections

BY

DR. S. GURUBATHAM,
Mary Taber Schell Eye Hospital, Vellore.

DURING the past five years many of the vitamins have been isolated in Crystalline forms and that has helped to recognise many clinical pictures due to vitamin deficiencies and to a more accurate dosage and treatment of the condition. As our knowledge of nutrition advances, newer light is thrown on the etiology of many obscure but common diseases in this country which are considered to be of doubtful venereal origin. India and China, countries where diet is maintained close to the subsistence level on polished rice, are fertile fields for the study of avitaminosis. In this paper though a particular clinical picture is described under a particular vitamin, in actual practice a combination with other vitamins is essential for a more effective and rapid control of the condition. This indicates that other vitamins also have a part to play, though not in the same proportion as the particular one.

Vitamin A.—This is very essential for the normal growth and function of epithelial tissue, and in the absence of it, epithelial structure in the body is affected, the earliest consequence being an atrophy of the epithelial tissue. As this atrophy progresses, while keeping up its appearance, its physiological function of covering the cell membrane is impaired. An attempt at repairing this atrophied epithelium ends in the formation of 'stratified keratinizing epithelium.' Any mechanical irritation produces ulceration and the epithelium is not able to throw off any invading organism. This explains the cause of several affections as dyspepsia, infantile diarrhœa, gastro-intestinal disturbances, catarrh of the respiratory tract, running of the nose, ear etc., phrenoderma-all more or less found together with eye affections like night-blindness, xerophthalmia, keratomalacia etc.

Another very important part played by vitamin A is in the retina. A is a chemical component of the retina which has a component called visual purple, very sensitive to light. This visual purple in the retinal cones, when light falls on it, is bleached to an orange pigment called visual yellow. The yellow colour gradually fades and the retina becomes colourless. If sufficient vitamin is supplied to the retina through the blood stream, it rapidly recovers its original appearance and function. If A is not adequate, there is a delay in returning to normal and gives the early symptoms of avitaminosis A. This is measured by what is called dark adaptation test in an absolutely dark room. An instrument called photometer is being perfected and coming more and more into use. Night-blindness and asthenopia are more advanced symptoms. Night-blindness is a common symptom of several affections of the fundus because retina is affected, its supply of vitamin A is not adequate.

Affections as blepharitis, angular conjunctivitis, ordinary acute conjunctivitis complicated with ulcers and phlyctenules, follicular catarrh with granular pharyngitis, keratitis following small-pox and measles, hypopyon ulcers etc., all commonly met with in out-patient work, have some cause—an infection. But these would not assume such proportions had it not been for deficiency of A and B. Among other causes, mention has to be made of poor quality or absence of mother's milk, bad substitutes for mother's milk, want of sufficient fat and calcium and iron in the

diet in addition to vitamins; living in congested, ill-ventilated, damp surroundings, lack of adequate exposure to sunlight and a proportionate deficiency in D which is essential for the assimilation of calcium and vitamin A and proper metabolism. There is often a history in the case of children that mother is dead or that the mother became pregnant before the proper weaning time.

Xerophthalmia:—Xerosis of the conjunctiva—a disease common in India and China at all times and in other countries when famine conditions prevail. I found that it is as common among ragi-eating people as among rice-eaters, a fact which enthusiastic advocates of ragi as a good substitute for rice have to note. Though poverty is the contributary cause it is also common among the well-to-do, due to faulty notions of a good diet.

The earliest symptom is a discolouration of the bulbar conjunctiva appearing as a dirt-like triangular patch on either side of the cornea more marked on the temporal side. The colour gets deeper with the intensity of the affection. In advanced cases it extends to the whole of the bulbar conjunctiva and when it invades the palpebral conjunctiva it has the appearance of an argyrosis. White foamy patch called Bitot's spot and wrinkling of the conjunctiva often are present. Neither tears nor any fatty substance can moisten this spot. Night-blindness either precedes or follows these symptoms; but not in all cases. As the disease advances further, cornea loses its lustre, turns grey, then rapidly yellow and melts like wax—keratomalacia.

The incidence of xerosis in children is roughly sixteen times as in adults and, while adults rarely go in to keratomalacia, among children it is a common sequela. Children respond to treatment more quickly than adults. In many cases Bitot's spot does not disappear inspite of prolonged treatment though all other symptoms have disappeared. These patients stand a coarser treatment than keratomalacia cases.

Keratomalacia:—This is the last but one stage of deficiency A—last being death. It is a complex where not only deficiency of A, but also imperfect assimilation of A due to affections of the liver, the store house of A, diseased condition of the gastro-intestinal tract which prevents its assimilation, plays upon it. Another cause is varied toxæmia which rapidly exhausts the body reserve of this vitamin. In children it is the sequela of chronic dysentery, diarrhœa, rickets, cirrhosis of the liver and congenital syphilis. In women it is common during the latter months of pregnancy and early puerperium and in adults following prolonged illnesses like typhoid and fatty degeneration.

Its onset may be in the form of xerophthalmia mentioned before and night-blindness. It is not uncommon that it sets in without The cornea loses lustre, is dry and not sensitive to touch. A faint gray haze appears or irregular white patch may develop in the centre or periphery of the cornea. These coalesce and cover the whole cornea or a hypopyon appears. Sometimes there may be excessive lachrymation, but more frequently due to drying of the lachrymal gland there will be no lachrymation at all. The gray patch deepens into yellow, covering the whole cornea and rapidly melts like wax, commencing at the limbus all round. The iris is exposed with lens matted together with it and ends in a staphyloma. Or infection may supervene and ends in panophthalmitis. First it begins in one eye

and invariably spreads to the other within twenty four hours. The patient is in a very low condition—listless, and the pitiable cry in children is very characteristic. If diarrhœa or pneumonia sets in at this stage, it invariably ends in death. Though prognosis is very grave, if treatment is started early, response is good and often useful vision is restored.

Night-blindness:—Hemarelopia nyctalopia, is the inability to see after dusk, common among children and adults with affection of the choroid and retina and avitiminosis A. First attention of the parent is drawn to it when the child at night tumbles over something or feels for the drinking tumbler or food bowel placed in front. During the day vision is normal, there is no reduction in the field of vision and fundus examination reveals nothing abnormal. In a few cases the fundus round the papilla and the macula has a grayish tint—an appearance described by COL. ELLIOT as 'slate fundus.' It may be associated with xerophthalmia or may appear without any affection of the cornea or conjunctiva. Ancients in India and Greece knew that liver given internally cures the condition. Rice bran mixed with jaggery is also an old favourite in South India. Dark adaptation test has been mentioned before. Even before the patient complains about it, it could be diagnosed by this test. In one investigation about 25% of school children out of 500 showed symptoms of delayed vision with this test. Many other conditions of the eye which have been puzzling the ophthalmologists are beginning to be classified under nutritional disorders of the eye. They are associated both with A and B.

Recurrent catarrhal ulcers of the cornea:—In the out-patient department of any hospital during the season of acute conjunctivitis one often meets with cases of minute ulcers all round between the limbus and centre of the cornea, especially in children. A mild form of epithelial dystrophy less marked than that described by FUCHS, where the changes are confined to the epithelium without much loss of vision is also common. These patients are easy victims to any slight infection of the eye and the ulcers appear several times in the year, or year after year they are the earliest to come to the hospital during acute conjunctivitis season. Though these very often yield to treatment with Silver Nitrate sol. 2%, more often they are intractable until nutritional treatment is added. In this class should be included some intractable forms of trachomatous ulcers, especially in young girls, and ulcers of the cornea and keratitis following measles and smallpox. In about 80 to 90% of the above conditions angular stomatitis with angular or subacute conjunctivitis, angular affection of nasal orifice, fissures on the tongue, squamous blepharitis, and red denuded condition of the lips with fissures are also present. These conditions readily yield to treatment with vitamin B and incidentally the eye condition also improves. Hence they are brought under this heading. Some have reported good results by the administration of A and some B. A combination of the two is more effective.

Asthenopia or eye strain is from Greek, meaning weak sight. Reading or concentrating on some object is followed by a sense of weariness and eye strain. Patient speaks often of eye giving out or pulling out. There may be burning, irritation, watering and photophobia. Dark glasses do not give relief. If this is due to refractive error it has to be corrected. But more often an examination reveals nothing and the doctor may send the patient saying that the patient is neurotic or hysterical or malingering.

The patient goes disappointed. These patients show some sign of angular conjunctivitis etc., in a very mild degree, and that has made me treat these cases with yeast and cod-liver oil and a change in diet, persisting through several weeks or months even with good results. A regenerates the epithelium and B soothes the nerves with satisfactory results.

Recurrent headaches :—Youthful patients, more commonly of the fairer sex, seek a general practitioner complaining of headache. The practitioner after a thorough examination finds no explanation and gives some tonics, Iron, Calcium etc., which fails to improve the condition and the patient is referred to the specialists. This number is increasing daily. The specialist also does not find any definite error of refraction. But since the patient believes and persists in having headache glasses, 0.50 spherical lens is prescribed. Patient being youthful accommodates to the lens and some psychological effect relieves the headache. But this is temporary and the glass is discarded as useless or persisted in inspite of no relief. Here I should protest against this arbitrary way of prescribing what I call consolation glasses. I am not speaking of headaches in migraine, or that which comes after reading, or in the evening after heavy work, or reading in artificial and dull light. I am referring to headaches that come on in the morning even after a good night's rest and come on at any part of the day. This is on the increase among school-going children and of late I find it among even village girls, all due to the progressive habit of taking fine, well-polished rice. Like asthenopia, persistent prolonged treatment with A and B is indicated and a change of diet to a coarser but balanced food has to be kept up, to prevent recurrence.

Vitamin B Complex.—In this group three are more important than others, Thiamine or anti-neuritic, anti beri-beri vitamin, Riboflavine and Nicotinic acid anti-pellagra vitamin. Though each of these is associated with a definite affection of the eye, the combination of the whole group is more effective in the treatment, in addition to the administration of the particular one. Yeast is found to be one of the richest sources of this complex. Rice bran is found to be richer.

In avitaminosis B nervous tissue is first affected and followed by the heart and symptoms of beri-beri and pellagra confirm this factor. Some of the conditions described before and to be described hereafter are symptoms of milder forms of this deficiency, pellagra and beri-beri being more advanced stages of it.

Superficial keratitis described by DRS. AYKROID and VERMA with dramatic results by treatment with Riboflavine is another typical condition. This was not generally recognised, because they were not so frequent as they are to-day due to increase of malnutrition under modern conditions of refined life! From my experience I could say that it is on the increase and is common among boys and girls of orphanages, more so because for the same old budget food has to be provided though the present purchasing value is very low.

The common symptoms are photophobia, burning pain, and lachrymation. On examination there are a number of fine superficial dots on the cornea which are visible sometimes only to the slit lamp. Sometimes a central line with irregular branches at the two ends of it or a number of streaks appear on the cornea. Or there may be a superficial ulcer or aberration of the cornea which is very painful. Cornea is hazy and vision

is impaired. Superficial vessels grow from the periphery towards the affected spot and round the cornea. The diagnosis from other similar affections is made from the undernourished appearance of the patient and the angular stomatitis etc., and fissure of the tongue and complaint of a burning sensation in the mouth when food is taken.

Riboflavine 2 milligrams parenterally until the eye condition clears is the choice of treatment. But under the present conditions when this is not available we have to take to yeast and rice bran; wheat bran is not so good. Recovery is naturally slower. Unless the patient's diet is changed to a more nutritious one recurrence is frequent.

Amblyopia is a term used to describe disturbances of vision without any visible changes in the fundus or media. Retrobulbar neuritis and toxic amblyopia due to alcohol and tobacco smoking have to be mentioned in this connection. CARROL and JOHNSON have drawn attention to the fact that slowly progressive loss of central vision due to nerve degeneration resulting from abuse of alcohol, recovered rapidly, if given adequate quantity 20 mg. daily of Thiamine Chloride. The same holds good for tobacco ambylopia. Occurrence of retrobulbar neuritis due to beri-beri is reported also and optic neuritis in pellagra. These cases have been successfully treated with yeast. On this suggestion attempts have been made to treat retrobulbar neuritis occuring in women during the puerperal period with favourable results. Besides these it is worth investigating how vitamin B therapy arrests conditions like uveitis, retino choroidal affections, retinal atrophies and retinal hæmorrhages.

Partial optic atrophy or temporal pallor of the optic disc :—Patients undernourished, generally from a boarding school, complain of dim vision coming on gradually. On examination nothing abnormal is seen in the eye except a temporal pallor of the optic disc of varying degree. This is very often associated with symptoms as xerosis, angular affections etc. There is no relationship between the intensity of the pallor and the loss of vision. The loss of vision does not also progress beyond a certain degree and if untreated, may remain stationary. Since the accompanying general symptoms indicated avitaminosis, I had been treating these conditions for the past twelve years with cod-liver oil internally and subcutaneous injection of Sodium Morrhuate 3% sol. twice a week commencing with 10.0 c.c., increasing it by 0.05 c.c. at every second inj. until 0.50 c.c. is reached. This treatment was continued from two to four months with satisfactory recovery of vision, sometimes normal vision was restored. Since angular affections were described to be related to B, I had been adding yeast to the above with more satisfactory results. Night-blindness with gray fundus may come under this head. The above experience drives one to include yeast to the general treatment of all types of optic atrophy.

Riboflavine and crystalline lens :—Research workers have found that rats fed on a diet deficient in Riboflavine showed symptoms of cataract which was arrested if the vitamin is restored. But observations on the human subject so far has not yet confirmed this experience. It is also observed that the yellow translucence often observed in the lens of some people is attributed to Riboflavine deficiency. Here is a field for a research worker. There are innumerous drugs suggested for the arrest or cure of cataract. To them Riboflavine is to be added. My own position is that once cataract is formed it goes on to maturity. The time taken may vary

widely in different patients. Even in normal individuals without any interference a cataract stops growing in some rare instances.

Vitamin D.—Continuing the same subject—cataract; there is some relationship between D deficiency and the development of lamellar cataracts in children who had rickets or tetany in the deficiency of calcium D or Viosterol essential for the proper absorption of calcium and A—hence its importance in ophthalmology. But one has to be very careful because this is the only vitamin where an overdose of it results in abnormal deposits of calcium and phosphorus.

Phlyctenular conjunctivitis and keratitis which are diseases due to metabolic disturbances also come under this category. In myopia and keratoconus this vitamin is employed to promote calcium metabolism and this strengthens the sclera, thereby preventing undue stretching of the cornea or sclera or both. This vitamin has no effect on the spring catarrh.

Ascorbic acid C:—It has to play an essential part in cellular respiration and formation and regulation of intercellular matrix, as such the delicate tissues of the eye will be affected if there is an ill-balance of this vitamin. Lens is said to suffer most and some claim to have arrested cataract development by administration of large doses of this vitamin. Post-operative hæmorrhages after cataract extraction and intra-ocular hæmorrhages especially into the vitreous could be prevented by administering it.

So far other vitamins have not yet been studied in relation to the eye. Still for a human nutrition all vitamins have a part to play and in the absence of a clear knowledge I should include them under treatment of all conditions requiring nutritive treatment.

I am not including in this paper details about treatment because I expect detailed articles about dosage etc. But I should add a serious note that malnutrition is increasing very rapidly in this country and war is aggravating it. In the interest of the future well-being of this country the public should be educated and legislative methods have to be adopted wherever necessary, to enforce people to take to a balanced diet. Proper attention should be paid to cultivation, distribution, storing and cooking of the normal food.

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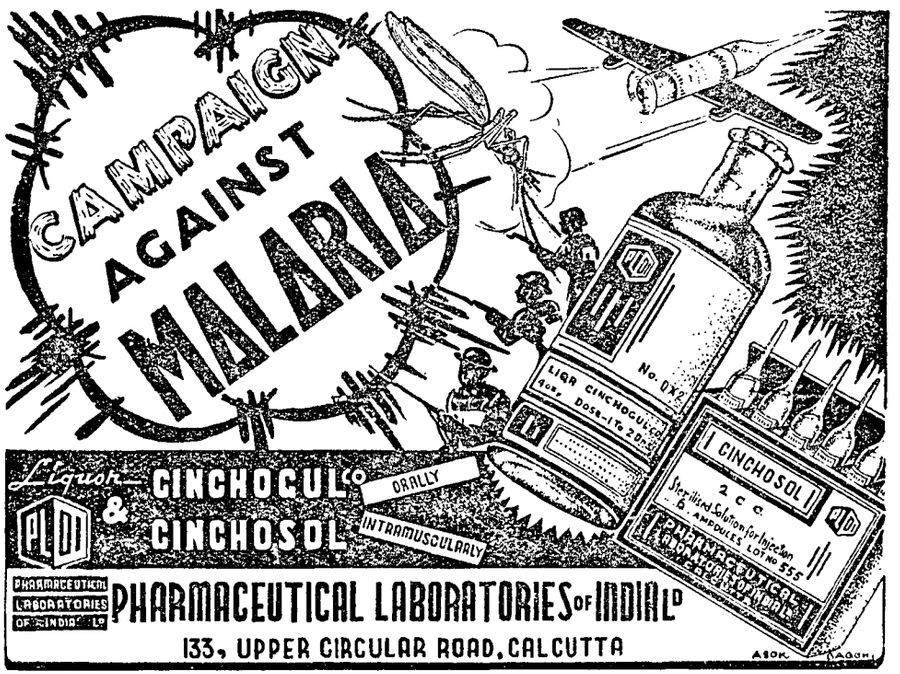

Vitamin Deficiency and Pregnancy

BY

Dr. K. L. CHOUDHURY,

Department of Obstetrics, Medical College, Agra.

THE study of vitamins with regard to the part they play in nutrition as a whole is of great interest and receives considerable attention but very little definite information is available however as to their behaviour during pregnancy. New vitamins are discovered at intervals and new theories are being added concerning the role played by them in the causation of deficiency diseases but the importance of the relationship of the vitamins to reproduction has never been apparent till very recently. Unfortunately the problem is still largely in the animal experimentation stage and as such most of our modern conception on this subject is from recent laboratory investigations. Its deficiency is a common occurrence during pregnancy especially in hospital patients and in those who live in industrial areas. The mode of action of the vitamins is not clearly understood but they probably act as catalysts of the chemical processess of the body.

Vitamin A.—This growth-promoting vitamin seems to have direct influence on reproduction. It has been shown experimentally that vitamin A deficiency produces keratinization of the germinal epithelium of the testis and therefore absence of spermatogenesis. In women, they have been found to produce non-embedding of the ovum in the uterus. Its deficiency has been reported by MACLEOD, EVANS, BISHOP, SURE and SHERMAN to produce sterility though this fact has not yet been universally accepted. VOGT believes that its deficiency in the diet of pregnant women may result in abnormal or dead-born babies. All investigations seem to be agreed that vitamin A is essential to the individual for maintenance of body resistance to infection. In pregnancy it is certainly of utmost importance when we think of the various intercurrent diseases like pyelitis, pneumonia and puerperal sepsis. GREEN, PINDAR, DAVIS and MELLANBY took two sets of patients each consisting of 275 patients and treated one group with cod-liver oil. They found that the number of cases of puerperal sepsis in the control were 56 as compared to 30 in the group of patients treated with cod-liver oil. This role of vitamin A against puerperal infection is not uniformerly accepted and authors like BURTON and BALMIN do not agree to this. MELLANBY further carried his work and has shown that this vitamin defiinitely raises the resistance against infection of pyogenic organisms. He treated 2 sets of rats—one with all vitamins and the other with all except vitamin A. In conclusion he found that those who did not have vitamin A, die due to septic foci.

It has been concluded by MAXWELL that this vitamin is required to neutralize the toxic products during pregnancy especially in cases where the protein intake is high. In this way it prevents toxæmias of pregnancy. The same author has also shown that the deficiency of this vitamin along with B and calcium produces osteomalacia.

During the last Great War (1914–18), it was found that pregnancy was prolonged than the usual period in an increasing number of cases in Germany. This was attributed to the deficiency of diet (partial starvation), specially of vitamin A.

Vitamin A also prevents abnormal vaginal discharges during pregnancy and its deficiency produces *marasmus* and underweight in fœtuses.

Vitamin B (complex).—It seems to have a definite function during pregnancy. MOORE and BRODIE found pyloric obstruction and bleeding in babies and an increased incidence of post partum hæmorrhage in mothers, where there has been deficiency in these vitamin complex. There seems to be a tendency towards anæmia and atrophy of the ovaries following such a deficiency. WRIGHT has recently shown that vitamin B is less secreted in urine in toxæmias of pregnancy and the content is less in placenta than in a normal case. In view of the above findings and occurrence of œdema and suppression of urine in eclampsia, which appears a striking similarity to the clinical picture of beri-beri, it is suggested that vitamin B_1 therapy might be beneficial.

More recently it has been seen to produce polyneuritis of pregnancy. It is mostly seen in patients of hyperemesis gravidarum (FOUTS 1934). Similar observations have been made by SZE (1934), THEOBALD (1936). WINDEN BAVER (1936) points out that avitaminosis is due to loss of intake and impaired bowel action, excess loss in hyperemesis and due to increased requirements during pregnancy.

MARGARET BALFOUR has recently shown that premature births are due to the defiiciency of vitamin B. It has also been attributed to produce abortions, hæmorrhages in newborn and disturbances like cardiac irritability, loss of weight, digestive disturbances, intestinal stasis and post-partum hæmorrhage. It produces toxæmia and osteomalacia as already mentioned.

Vitamin C.—The importance of this vitamin in pregnancy is mostly for the proper development of the off-spring. INGIER observed that in guinea-pigs, a deficiency of it was followed by still-born off-spring often premature or under developed. Even on slight deficiencies in vitamin C pregnant guinea-pigs will show an anæmia and lowered calcium content of the tooth-pulp according to REYHEN and WALKOFF. In woman it produces gingivitis, caries, scurvy and gastro-intestinal disorders. It has been used as a prophylaxis for post partum hæmorrhage.

Vitamin D.—This anti-rachitic vitamin is essential during pregnancy. Its deficiency during pregnancy produces increased bleeding and clotting time. RICHARDSON has therefore administered viosterol during pregnancy and thereby has minimised the blood loss. It seems to act by influencing the phosphorus-calcium metabolism. Some authors believe that its administration during pregnancy helps in the prevention of subsequent rickets in new-born children. HESS is rather optimistic about this view. Of late the lack of this vitamin has been found to produce habitual abortions. Its deficiency usually produces osteomalacia and dental caries. It may be mentioned here that frequent child-bearing is one of the potent causes of the deficiency of this vitamin which in turn produce osteomalacic conditions.

Vitamin E.—This vitamin is important for the development of the embryo. Its deficiency in males leads to degeneration of the germinal epithelium of the testis. In the female it has more appreciable effect on the ovum than on the mother herself. It has been shown that though

ovulation and conception is normal, its deficiency produces early death of the embryo in the blastodermic stage.

There is an important relationship between this vitamin and the anterior pituitary and that a deficiency inhibits leutinization, which is so important for the maintenance of pregnancy. JAMES YOUNG has published the very striking results he has obtained in case of abortions by treating them with Prolan and Vitamin E. Of 17 women who between them had 51 pregnancies terminating prematurely, with this treatment produced 15 live births out of 17 further pregnancies. Very recently EVANS SHUTE has shown that a disturbance of the relation of vitamin E and oestrin produces accidental hæmorrhage and therefore he advocates their prophylactic use or its administration during the premonitary stage of such a condition.

There is good reason to believe that vitamin A and E influence the production of leutinizing hormone either by action on anterior pituitary or on the tissues of chorion or both (CAMPBELL and JHONSON).

Very recently the American Council of Medicine and Pharmacy has withdrawn their opinion regarding the influence of vitamin E in habitual abortions because they do not find any convincing proof about the same (BROWN F. J. 1942). On the contrary SHUTE has shown that vitamin E is important for habitual miscarriages.

So in short the deficiency of this vitamin produces sterility and abortions especially habitual. (VOGE MOLLER).

More recently many other vitamins like vitamin H, vitamin P and vitamin K, have been discovered. The role of these vitamins have not been studied much in relations to pregnancy except vitamin K, which has attracted much attention.

Vitamin H.—Its deficiency produces dermatitis. It has been successfully used in seborrheic dermatitis and in some cases of psoriasis. How far it helps in pregnancy dermatitis is very difficult to assess but it seems to give good results in some cases.

Vitamin P.—The deficiency of this vitamin increases the capillary fragility and therefore leads on to hæmorrhages during pregnancy and post partum hæmorrhage. It increases more blood loss in anæmias of pregnancy. So this vitamin is important to avoid such hæmorrhage especially in cases of post partum hæmorrhage and anæmias of pregnancy.

Vitamin K.—The deficiency of this vitamin produces hæmorrhages and diminished clotting time. This is due to fall in the prothrombin content. The brunt of its deficieney during pregnancy falls mostly on the new-born child, who suffers from hæmorrhages from various parts of the body. (MACPHERSON).

My sincere thanks are due to my colleagues Dr. P. C. DAS, M.B., D.G.O., Lecturer in Midwifery and to DR. P. N. Laha, M.D., Lecturer in Diseases of Children, Medical College, Agra.

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Errata

In the Cases and Comments "M & B 693 in Dysentery" by Dr. Ram Krishan Likhyani, published in May '43 issue of THE ANTISEPTIC, the following corrections are to be noted:

On page 271 in last paragraph	3rd line	*read*	pulse 120 p. m.	*for* 26 p. m.
,, ,, ,,	,,	*add*	respiration 24 p. m.	*after* pulse 120 p.m.
,, ,, ,,	6th line	*read*	frequency of stools was 25 to 30 per day	*for* 2 to 3 per day.

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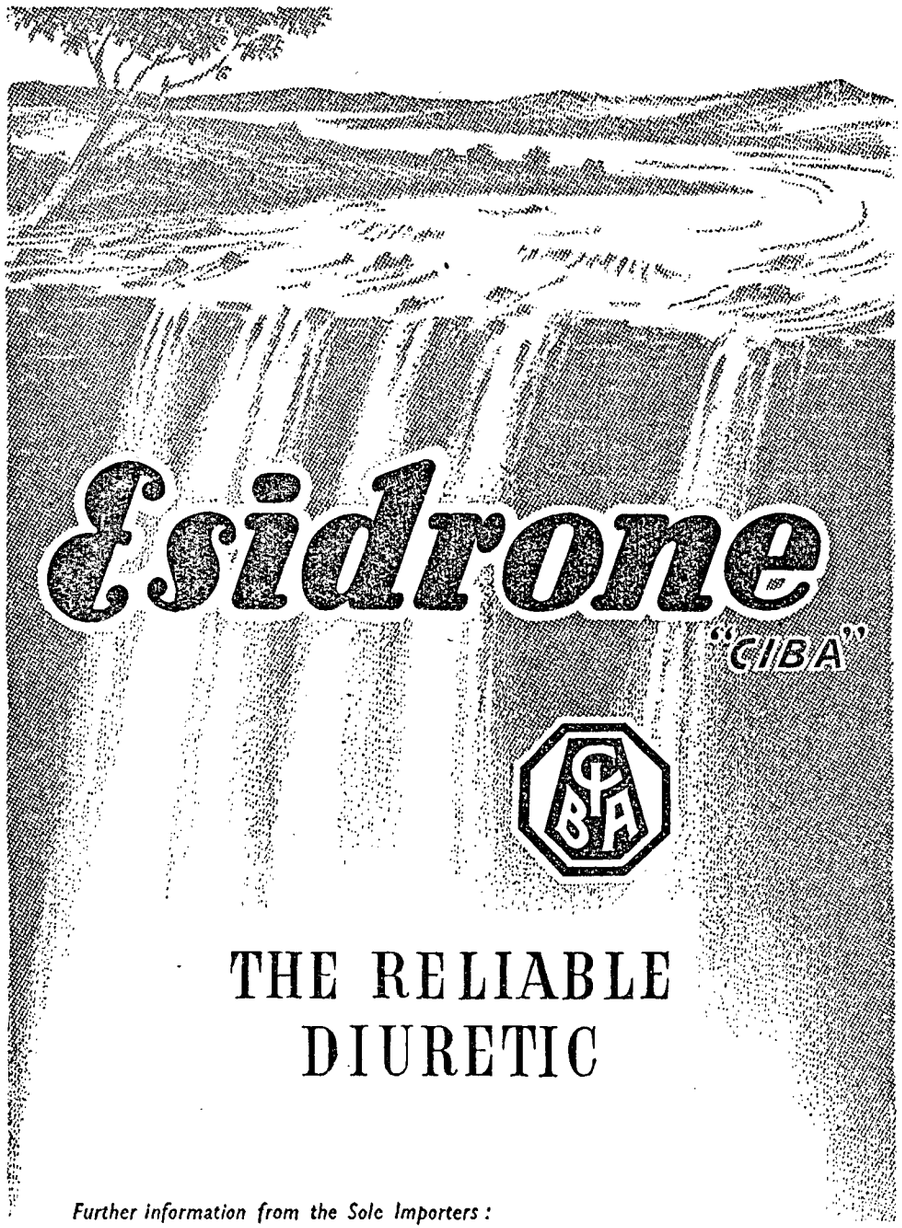

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