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## A PAPER ON RHINOSPORIDIUM READ AT THE SCIENCE CONGRESS, 1926.

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Rhinosporidium has been classified, in all the text books, among the Sporozoa. It is considered to be a species of the Haplosporidia which are mostly parasites of annelid worms. This is in fact the only species so far known to have been recorded from man.

The members of the order Haplosporidia are characterised (1) by the presence of large spores each with a single big nucleus, (2) by the absence of polar capsules and (3) by a simple type of development.

Rhinosporidium Seeberi has been reported from Argentina, India, Ceylon and Tennessee and was first discovered by Seeber in Buenos Ayres in 1896 from a nasal polypus. The next record of this parasite—if it may still be called one—is that of Kinealy in 1903 from a case of Nasal polypus in a Bengalee in Calcutta. Minchin and Fantham, who carefully studied this polypus, assigned a place to the parasite in the order Haplosporidia, sub-class Neosporidia of the class Sporozoa, Phylum Protozoa. Other cases of human infection with this organism have since been recorded amongst Indian patients by Dr. Nair in 1905, (described by Beattie in 1906) by Castellani and Chalmers in Ceylon, by Ingram and Elliot in 1912, by Kirkpatrick in

1916, by Tirumurthi in 1914, by Wright in 1922 and by Ashworth and Turner in 1923. This organism has been met with by the above authors not only in nasal polypi, but also in growths involving the lachrymal duct, external ear, nasopharynx and penis. With the exception of Ashworth and Turner, all the others have apparently regarded the causative organism to be a sporozoon.

Prof. Ashworth of Edinburgh, who had an excellent opportunity in 1923 of studying this organism from a case of nasal polypus in an Indian student then in Edinburgh, considered that it did not belong to the Sporozoa, but to the lowest fungi--Phycomycetes and would therefore place it in the sub order Chytridineæ. His description of the organism would certainly entitle it to be so placed. He appears to have succeeded in growing the organism in culture although the growth was not profuse.

In April 1926, I had a specimen of a nasal polypus sent for examination, in the usual course from the Government General Hospital. I had a bit cut out for sectioning and utilised the rest for making cultures.

*Appearance in section.*—A number of sporangia were seen in the section lying embedded in the connective tissue. The fully formed sporangium is spherical or nearly spherical with a chitinous envelope lying embedded in the connective tissue and occasionally in the stratified epithelium. The immature spore has a vesiculated nuclear structure with ill defined Karyosome and Cytoplasm. Some of the ripe spores exhibit nuclear mitosis at various stages. The ripe sporangia are about 20 to 80 diameter and show three zones—

(1) Near the perephery the immature tiny spores preponderate.





(2) In the centre are found the ripe spores.

(3) Between these two are found spores in various stages of development.

*Cultural characteristics.*—Small bits of the polypoid material were cut and thoroughly washed in saline and planted in different media.

(1) Glycerine agar.
(2) Glucose agar.
(3) Saccharose agar.
(4) Hay infusion agar.
(5) Sabourad's medium.

On Hay and Sabourad's media sparse growth occurred in about two weeks. The colonies were irregular, small and smooth with a wavy margin and had the appearance and colour of small droplets of coloured cream spilt on the solid agar surface. A small portion of this growth smeared on a glass slide was stained and examined under the low power of the microscope. A large number of sporangia in different stages of growth and development were seen. The immature sporangium is a nearly spherical body with a very large number of spores lying loosely in the protoplasm material of the cell. A definite chitinous cell wall is present. As growth proceeds, the spores inside the sporangia increase in size and each spore shows a well defined outline, the internal nuclear and Karyosomic structures also becoming visible under the high power. It also revealed the presence of immature and mature spores that had got squeezed out of the sporangia, as also certain clubshaped bodies with nonseptate mycelia emerging from some of the spores. These latter are typical of the class Phycomycete and a familiar example of this class is Mucor Mucedo—the parasitic mould that has been known

# HÆMATURIA.

By N. MANGESH RAO, F.R.C.S.,

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For the Diagnosis of Hæmaturia.—It is essential to demonstrate Erythrocytes by the Microscope, from a fresh specimen of urine after centrifugalising it if necessary. Such an examination of the deposit may show in addition epithelium from different parts of the urinary tract or the presence of bits of a new growth. Chemical and spectroscopic examination may show blood-pigments, which must be distinguished from Hæmoglobinuria. Bacteriological examination of the urine is also to be done.

The Four Glass Test.—(1) The first glass receives the washings of the anterior urethra, with sterile normal saline. If this contains any blood a lesion of this part is to be suspected.

(2) Into the second glass the patient voids three or four ounces of urine. Being the first portion of his urine it washes the posterior urethra. If this is blood-stained and that in the third glass not so, a lesion of the Posterior Urethra, Prostate, or Seminal Vesicle is to be suspected.

(3) Into the third glass the patient voids all his remaining urine except the last ounce.

(4) Into the fourth glass he voids the last ounce of urine. In lesions of the Bladder, and the Prostate, this glass would contain almost pure blood "Terminal Hæmaturia."



If the urine is found to be uniformly mixed with blood in the last three glasses it is of Renal origin. A small quantity of blood in the urine of this type renders it "smoky".

If the Anterior Urethra is the sight, first exclude an acute attack of Gonorrhœa, then make an Endoscopic examination to find the cause.

If the Posterior Urethra is suspected, a rectal examination may show the condition of the prostate and the seminal vesicles. A posterior Urethroscopic examination will help in arriving at a diagnosis.

Cystoscopic Examination.—By this one can identify almost all the lesions of the bladder, their situation and the type of lesion. If hæmaturia is of renal origin blood may be seen issuing from the Ureteral opening. Lesions round the ureteral opening may help in the diagnosis. Chromocystoscopy, collection ureteral specimen of urine is to be done at the same time.

(A) Hæmaturia of Renal origin.—The most common cause of this especially when profuse is Renal Tumours. Benign tumours of the kidney are rare; malignant ones are more common.

In children tumour formation is an earlier symptom than hæmaturia, but in adults in 60% of the cases it is the first sign especially in renal carcinoma and papilloma of the renal pelvis. It is difficult to distinguish a benign tumour from a malignant one, clinically and often it is necessary to do an exploration. Malignant growths occur chiefly in children or in adults after 40 and 50.

Embryoma, Wilm's tumour.—Is commoner in children but rare in adult. It shows great variations in

structure with a connective tissue basis and grows to a large size. It is often bilateral. Hæmaturia is a later symptom.

Hæmaturia of Renal origin varies with the type and situation of the neoplasm. In the first stage the venules of the pelvis and calyces become varicose from obstruction to the veins by pressure of the tumour. These may rupture suddenly. In the second stage the pressure of the tumour and the resultant interstitial nephritis cause the Venae Recti of the pyramids to get dilated and bleed. In the third stage the growth invades and ulcerates into the calyces. Hæmaturia is spontaneous, sudden, profuse, and bright red fully mixed with urine. It is not releived by rest. Colic may be caused by passage of clots or pieces of the growth.

HYPERNEPHROMA.—(Grawitz tumour) forming 70% of renal growths occurs chiefly in adults, but may be met within children and remain latent for some time. Its situation is usually at the upper pole but it also occurs at the lower pole, often subcapsular or in the renal cortex.

Its structure resembles that of the suprarenal cortex and so some consider the tumour to arise from adrenal rests included in the developing kidney. Neither intensification of sex characters occurs nor can *adrenal* be identified in them.

Some others consider it to be an Adeno-papillary Carcinoma of renal origin.

Some others again consider it to be carcinomota arising from " the included Wolffian tubules."

It chiefly attacks adults between 50 and 60, affecting kidneys the subject of chronic interstitial nephritis. The tumour is smooth or faintly labulated, occurs at either



pole and is covered by an expansion of renal capsule. Secondary deposits occur by extension along the renal veins into the inferior vena cava resembling thereby a sarcoma. Blood borne emboli give rise to deposits in the skull, and long bones, and the vertebræ.

CARCINOMA.—Undoubted carcinoma is a rare tumour and is usually an adeno, or papillary carcinoma.

PAPILLOMA.—Is the commonest tumour of the renal pelvis and the upper part of the ureter. It has a great tendency to recur and to become malignant. Surface implanation of these growths may occur in the ureteral opening or the bladder.

SYMPTOMS AND SIGNS.—Spontaneous hæmaturia unaffected by rest, pain, gradual loss of weight and strength. Sudden development of a varicocele in an adult especially on the right side is always suspicious of malignant disease of the kidney. A palpable tumour may be present, but a carcinoma may give rise to no enlargement of the kidney.

CYSTOSCOPIC EXAMINATION.—Blood may be seen issuing from the ureter or worm-like clots may be seen hanging from the ureteral opening. Specimens of urine taken by ureteral catheter from both kidneys may show a diminished function of the affected side, also whether the opposite kidney is functionally good. A cytological and bacteriological examination of the specimens may help in the diagnosis.

PYELOGRAPHY.—May show deformity of calyces or renal pelvis.

1. A partial or complete obliteration of one or more calyces.

2. A spider-leg distortion of the calyces.

3. A distorted renal pelvis from growth protuding into it, or a complete obliteration of the pelvis as sometimes seen in a large papilloma of the pelvis.

A good Radiogram may also show the shadow of an enlarged kidney.

TREATMENT.—Complete nephrectomy with the perirenal fat is to be done, provided the other kidney is proved to be functionally good. Palliative treatment in non-operable cases morphia, aspirin, bromides for the pain, calcium and ergot for hæmaturia.

POLY-CYSTIC KIDNEY.—Hæmaturia is intermittent and usually small in quantity. The condition is by-lateral. One kidney may become palpable sometime before the other. Pain is usually absent. A high grade of renal ineffeciency is also present. The condition becomes apparent at the age of about 40 or after though the disease is a congenital one. No treatment is possible. Uræmia is the ultimate result ending in death.

RENAL TUBERCULOSIS.—More common in young adults of either sex with a slightly higher incidence in women. Increased frequency of micturition both by day and night is characteristic. Hæmaturia is slight and intermittent, occasionally severe in advanced cases of ulcerating type. Urine is passed every half hour with pain before and micturition, not relieved by rest. There is low fever, and gradual loss of weight. The urine is either faintly acid or neutral in reaction with a few erythrocytes and pus cells. Tubercle bacilli may be found. If on culture it appears sterile, a guinea pig inoculation test should be done.



CYSTOSCOPY.—Retraction of the ureteral opening "the golf hole ureter a symmetrical position of ureteral openings may be noticed, a pulling upwards and outwards of the ureteral opening of the affected side due to an involvement of the ureter in the tubercular process. Tiny greyish or yellow tubercles may be noticed around a congested ureteral opening. Catheter specimens of urine from the ureters should be taken for cytological and bacteriological examination and chromocystoscopy and other functional tests should be carried out at the same time.

PYLOGRAPHY.—In the early stages a widening of calyces with a fluffy outline and a widening of the upper ureteric opening, later the renal pelvis will also show dilatation (Braasch). Later still in an advanced condition, the pelvis is a large sac, the calyces distended and ragged cavities found in the cortex. An irregular thickening and dilatation of the ureter may also be seen. As far as possible a pyelogram should be avoided in these cases for fear of dissemination of the disease, and diagnosis arrived at by other means.

TREATMENT.—If the disease is unilateral—in 80% of the cases it is so—and the other kidney is proved to be efficient to carry on the work and no other contra-indication is present, nephrectomy is to be performed, and general and hygienic treatment carried out at the same time. In neglected cases the bladder becomes infected and the patient's life becomes a misery from the increased frequency of micturition which almost becomes a continuous desire for passing urine without any satisfaction.

RENAL CALCULI.—Blood in these cases is very small in quantity and detected only by the microscope,

but it may be profuse after an attack of renal colic. Hæmaturia is increased by jolting, walking, or renal palpation and is relieved by rest. A stone in a calyx may remain latent. Renal colic with its radiating pains is fairly characteristic, and caused by passage of clot, stone, gravel, or pieces of tumour. Radiographic examination will show the site of the stone. Small ureteric stones may give no shadows; oxalate and calcium stones give dense shadows. A pyelogram may show uric and urate stones as negative shadows. Both antero-posterior and lateral views should be taken. Functional tests of both the kidneys should be done.

TREATMENT.—Will vary with the size and situation of the stone, also by the fact whether the kidney pedicle is long enough for it to be out of the wound. Pyelolithotomy is the operation of choice for large stones in the renal-pelvis. A small stone passing down the ureter is best treated expectantly by giving anti-spasmodics and diluents. Calculi in the calyces not accessible by pyelotomy may have to be removed by Nephrolithotomy. In cases of calculous-nephrosis the kidney is so bad and functionally so useless, that if the other kidney is healthy, nephrectomy of the useless kidney is indicated.

RUPTURED KIDNEY.—Hæmaturia is absent if the tear is confined to the cortex without extending into the pelvis, when the ureter is torn across, or blocked by clot. It may occur without any external sign of injury as from acute flexion of the body. Shock and collapse usually accompany the injury. In children under ten owing to the absence of peri-renal fat the tear may extend into the peritoneum, and intra-peritonial bleeding may occur. If the renal-pelvis is also torn at the same time, urine will mix with blood and set up peritonitis. In adults bleeding



is extra-peritonial and into the peri-renal fat, and an area of dullness gradually increasing in size is demonstrable. If both kidneys are damaged anuria may occur.

DIAGNOSIS.—History of injury, the sudden onset of hæmaturia with shock and collpase and an increasing area of dullness in the flanks is characteristic.

TREATMENT.—When the injury is slight, rest in bed with flanks supported by a bandage and an ice bag will clear up the urine in a few days. If more severe hæmoplastine, calcium lactate, morphia, fluid diet with rest in bed will clear it up. Later a little urotropine is indicated. If a swelling is noticed in the flanks with no improvement in the symptoms or injury is severe the kidney is exposed by a lumbar incision, tears in the kidney sutured and the part drained. But if the kidney is damaged beyond repair and the other kidney is efficient nephrectomy is indicated. In these cases the bladder may be full with blood clot, which should be evacuated by Bigelow's evacuator or by supra-public cystotomy.

RUPTURED URETER.—The ruptured ends should be sutured and extravasated urine drained.

Presence of free fluid in the peritoneal cavity is an indication for an exploratory laparotomy with evacuation of blood and fluid, suture of the tear and drainage.

OTHER CAUSES OF HÆMATURIA.—Renal hæmaturia may occur by rapid emptying of a chronically once distended bladder, especially in prostatic cases. Slight hæmaturia may occur from intermittent kinking of renal vessels in a floating kidney. It may also occur in Hydronephrosis, Pyonephrosis, occasionally with Oxaluria. In Pyelonephritis it may be one of the earliest symptoms. It sometimes occurs in solitary abscess of bacterial embolism in an otherwise healthy kidney. It

may also occur in interstitial nephritis with high blood pressure, and in cardiac failure from a passively congested kidney. It also occurs in lukæmia.

ESSENTIAL HÆMATURIA.—It occurs suddenly without any sign of injury or infection, without pain except that caused by passage of clots. It stops as suddenly. Usually there is large quantity of blood mixed uniformly with urine, clots are rare. Radiography is negative. Between the attacks urine is clear and normal. Functional test show the kidneys to be normal. No apparent cause can be found. The possible causes of this condition are:—

1. Hæmophilia.
2. Purpura Hæmorrhagica.
3. Aneurysm of one of the branches of the Renal artery, which has leaked into the renal pelvis.
4. Infarcts of the kidney resulting from endocarditis.
5. Angiomatous condition of the renal pelvis, analogous to varicocele, varicose veins, etc.
6. A high blood pressure with a partial chronic nephritis limited to one kidney and due to some old organismal infection.

TREATMENT.—Rest in bed, hæmoplastin, calcium lactate, and morphia can be tried. Failing this exploration is indicated if the hæmaturia is severe. Removal of a papilla the seat of varix may be done. Hæmophilia should be first excluded. In cases of aneurysm, if small and limited to the kidney nephrectomy may be possible. As infracts may become bilateral palliative treatment only is to be done.

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# THE PHARMACOLOGY OF THE ORGANIC COMPOUNDS OF ARSENIC.

BY CAPTAIN J. C. DAVID, M. B. B. S.,

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Modern medical practice is intimately bound up with the use of organic compounds of Arsenic. The number of these compounds that are being manufactured and let loose on a believing world is legion! Some of them have stood the test of pharmacological and clinical methods and have established themselves as recognised therapeutic agents in the treatment of protazoan diseases. But the knowledge that an ordinary medical practitioner has of the pharmacology of these, in many cases potent, drugs, is unfortunately negligible. The ordinary text books on materia medica and pharmacology, if they mention these at all, have them in small print—which is suggestive of their unimportance from the examination point of view; and even professors seem to share this view. The British Pharmacopœia, the revision of which is long overdue does not yet recognise even the most important of these compounds, so that these are still classed among the non-official drugs. It is clearly obvious that it is nothing short of quackery to prescribe and administer drugs the action of which we cannot explain, and the toxic effects of which we are ignorant of. It is therefore intended in the following few pages to give a general account of the pharmacology of some of the Organic derivatives of Arsenic with a view to a better appreciation of their therapeutic and toxic effects.

The introduction of the organic arsenic compounds that are used in the treatment of syphilis to-day was the

result of a prolonged research by Ehrlich and his co-workers. This research was conducted with the definite purpose of discovering a compound which would have a maximal destructive action upon the parasites, and a minimal toxic action upon the host.

Previous workers found that trypanasomes were killed by a number of organic arsenic compounds, the chief being *Atoxyl* or *Sodium Arsanilate.* But a large number of injections had to be given and the animal acquired tolerance to this drug. So Ehrlich hoped to find a substance that would completely sterilise the body in one dose. With this view he examined a long series of organic arsenicals and determined the minimal quantity that was required to kill trypanasomes in an infect animal (curative dose) and the maximal quantity that could be given without killing the animal (tolerated dose). The ratio of the tolerated dose to the curative dose is termed the curative ratio and he considered that no drug could be safely used unless the ratio was at least three, and he made a systematic search for a drug with as high a ratio as possible.

One of the first compounds to be investigated was *Atoxyl,* which contains pentavalent arsenic ; and it was found that although atoxyl would cure animals of trypanasomiasis, yet it had no action on the trypanasomes in vitro. The general rule was discovered that only trivalent arsenic compounds could kill trypanasomes and that the action produced in vivo by the pentavalent compounds was due to their being reduced in the body of the animal to the trivalent condition.

Ehrlich found that the most efficient substances were compounds of trivalent arsenic united to a benzene ring, with an amido group on the para position. He examined



the action of para-amino-phenyl-arsenious acid and a number of substitution products ; but the results varied greatly. Dihydroxy diamino arsenobenzene was then produced and was found to have a more favourable ratio between the sterilising and the tolerated dose than any other substance previously investigated. This substance is amphoteric for its amino groups, can unite with acids to form salts and the hydroxyl groups can unite with alkalies to form salts. The free base and the alkaline salts are readily oxidised in air, but the acid salts are stable, and the dihydrochloride acid salt was chosen as the most suitable form in which to issue this substance for therapeutic use. This combination was termed *Salvarsan*, and was numbered 606 in Ehrlich's series. *Arsenobenzol dihydrochloride* is freely soluble in water, but it forms an acid solution which is very toxic and also is irritant and therefore cannot be injected intravenously. The addition of two gram-molecules of sodium hydrate to one gram-molecule of salvarsan sets free the neutral base ; this is insoluble in water and forms a turbid suspension. This suspension can be injected intramuscularly but cannot be used intravenously. The addition of a further two gram-molecules of sodium hydrate produces the alkaline salt of salvarsan which is freely soluble and is the form in which salvarsan is administered. The solution of the alkaline salt of salvarsan is strongly alkaline and cannot be given intramuscularly, but it can be injected intravenously provided that it is diluted with a large volume of water or saline. A dose of 0·6 gram is given diluted in about 200 C. C. of water. As the technique of injecting salvarsan was laborious, Ehrlich prepared *neo-salvarsan*, which is a condensation product of salvarsan and sodium formaldehyde sulphoxylate. This is a stable preparation and dissolves in water in

result of a prolonged research by Ehrlich and his co-workers. This research was conducted with the definite purpose of discovering a compound which would have a maximal destructive action upon the parasites, and a minimal toxic action upon the host.

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neutral solution and can therefore be injected intravenously in concentrated solution.

The discovery of salvarsan was a great advance in the treatment of syphilis and a number of other organic preparations of arsenic have been manufactured. It is a remarkable tribute to the genius of Ehrlich, with whom was associated the Japanese Hata, that no compound has been found which has any marked superiority over salvarsan and neo-salvarsan.

Other drugs which have proved of use in protazoal diseases are :—

A. Pentavalent Compounds of Arsenic :

1. Sodium Arsenilate, Atoxyl or Soamin.
2. Tryparsamide 3. Cacodylates and 4. Stovarsol.

These compounds have been used in the treatment of trypanasomiasis and have proved very effective, but unfortunately atoxyl occasionally produces atrophy of the optic nerve and blindness.

*Tryparsamide* is Sodium salt of N-phenyl—glycine amid p-arsenic acid. Exceptional power of tissue penetration is claimed for it and it is stated to be of value in the treatment of cerebral syphilis. It is a white amorphous powder containing only a small percentage of arsenic, about 25%. It can be given intravenously or intramuscularly. For intravenous injection it can be conveniently dissolved in 10 to 20 C. C. of cold sterile doubly distilled water. The average dose is 2 to 3 grams. Tryparsamide does not act clinically as a spirocheticide, for it has no effect against the primary or secondary lesion of syphilis nor against the gummata. It has apparently little effect in the early cerebro-spinal manifestations, but its value



seems to be confined to disseminated sclerosis before this has resulted in irrepairable degeneration of the nerve cells. The effect has been attributed to the provocation of local inflammatory reactions, that would resolve the sclerotic lesions. But the great danger in the use of tryparsamide is the risk of blindness ; and this has to be weighed carefully. Therefore this drug would generally be restricted to cases of the type in which it has been most successful and which have failed to respond to other treatment. In 1 to 5 per cent. of cases the impairment of vision is serious. The occurrence and outcome are at present largely unpredictable and unaviodable. They more often follow the first injection and do not seem to occur after the fourth injection. Its parasiticidal action is more marked for trypanasomes than for spirochetes. Tryparsamide has been extensively tried in the treatment of piroplasmosis in dogs belonging to the Madras Hunt by Symmons and Theodore with unsatisfactory results and they had to resort to salvarsan to effect amelioration of symptoms.

*Cacodylates :* The effects of cacodylic acid (dimethyl arsenic acid) are essentially those of inorganic arsenic, to which it is partly reduced in the body. Since this reduction occurs but slowly the action is more prolonged but is less toxic and the local irritant effects are avoided. The degree of reduction is variable ; and the cacodylate especially when given by the mouth, imparts a garlic odour to the breath, sweat, urine, etc. To avoid the more rapid reduction in the stomach, intestines and liver, it is usually administered hypodermically or intramuscularly. Excessive doses produce toxic symptoms, due mainly to the ionic arsenic although the cacodyl molecule may conceivably play a part. Thereapeutically it is used in the same conditions as inorganic arsenic.

In syphilis its efficiency has been questioned. It is said to give rise to fibrosis of the vein. Severe nephritis sometimes follows its use. Its chief use is in the anæmias. Cacodylates are derivatives of the aliphatic series.

*Stovarsol*: Acetyl-amino phenyl-arsenic acid has been exploited as a prophylactic against syphilis. It is supplied in tablets of 0·25 gm. In addition it is said to exert a rapid action on the surface lesion of primary syphilis. It is difficult to prove by conclusive evidence that it is a sure prophylactic. This fact, combined with the danger of its being ineffectual and of simply masking symptoms, and the danger of after-effects, if the drug is broadcasted to the general public as a preventive, should make it essential that every practitioner before using it keep the drug under his personal supervision and control, until a knowledge of its action and efficiency is much more definite than it is at present. A note of warning about the indiscriminate sale and use of this drug has rightly been sounded by the members of the British delegation on the prevention of venereal disease in their report to the Government of India. Stovarsol has also been introduced for the treatment of amœbic dysentery, both in the active and the encysted stages.

B. Trivalent Arsenical compounds :

1. *Salvarsan* or arsphenamine or arsenobenzol.
2. *Stabilarsan* or arsphenamine diglucide. This is a compound of one molecule of salvarsan and two molecules of glucose and it is freely soluble in water in neutral solution and the solution when exposed to the air is relatively stable. It is supplied in ampoules, a 10% solution of the drug in a 50% solution of glucose. It can be injected intramuscularly or intravenously without dilution.



3. *Neo-salvarsan* or neoarsphenamine or neo-arsenobenzol.
4. *Silver salvarsan* or silver arsphenamine. This compound is a combination of silver and arsenobenzol containing 20% arsenic and 15% silver. It has a stronger therapeutic action and also a stronger toxic action than arsenobenzol.
5. *Sulpharsanol*, sulpharsphenamine is a condensation product of salvarsan with two molecules of Sodium formaldehyde bisulphite and resembles neo-salvarsan in its actions, but its therapeutic activity is not so great. It has the advantage of being less irritant and can be administered subcutaneously.

*The mode of action of organic arsenicals* : Ehrlich, when he introduced salvarsan, put forward the theory that the drug had a simple paraciticidal action. His view was that certain side chains in the drug had a selective chemical affinity for certain side chains in the protoplasm of the spirochete, and therefore the drug killed spirochetes at a concentration which did not injure the tissues of the host. The superiority of salvarsan over the hundreds of other organic arsenicals tested was believed to be due to its possessing this selective chemical affinity. Recent researches have shown that the mode of action of the organic arsenicals is more complex than is suggested by the above theory, for although salvarsan has a trypanocidal action in vitro yet this action is too feeble to account for its powerful action in vivo. In other words it would seem that the trypanocidal and spirocheticidal activity of the organic arsenical preparation in vivo is not a direct and simple chemical action of these substances upon the parasites but that a change occurs in the blood and other tissues. This change may be (*a*) the formation of new combination compounds, presumably with

proteins, (*b*) a simple chemical change of oxidation or reduction without the formation of a combination product ; (*c*) a production of antibodies, or (*d*) a combination of one or more of these factors.

It was imagined that the liver substances formed trypanocidal combinations in the body. Solutions of salvarsan in liver emulsions and in saline after being incubated at 37° C for an hour or so were slightly more toxic and more trypanocidal than freshly prepared solutions. The saline solution was not less trypanocidal after incubation than the liver emulsion solution. Solutions of salvarsan exposed to the air acquire increased trypanocidal activity presumably by the formation of 'oxides'. In other words a chemical change had occurred tending to increase trypanocidal activity, but this is not appreciably influenced by the menstrum. It is possible that enzymes from the liver may hasten the process, but there is no evidence of the formation of therapeutically active combinations of the arsphenamine and cellular substances.

It has been clearly established that trivalent compounds of arsenic are more toxic and likewise more trypanocidal than the pentavalent compounds. The time required for the appearance of toxic symptoms or evidences of trypanocidal activity is generally longer for pentavalent than for trivalent arsenical compounds. It has also been shown that the arsenic is reduced in the body ; and so it is reasonable to assume that the longer latent period required by the pentavalent compounds is for the reduction of a sufficient amount of the drug to the trivalent form. It is also known that compounds containing arsenic in the 'oxide' form, like arsenious acid, exert toxic and trypanocidal effects much more rapidly than arsenobenzol compounds, in which the arsenic is



directly combined with the C. The immediate onset of the reaction and the great regularity with which it preceeds shows that the compounds of the 'arsenoxide' type are directly trypanocidal. But arsenobenzol derivatives and the pentavalent arsenicals do not produce such immediate effects, as these are not directly trypanocidal but must first be converted into the active 'oxides'. Of course in the preparation of the solutions sufficient 'oxides' may be produced or be present in the powder to exert some immediate effects, but the latent period required before the main trypanocidal effects are apparent, naturally leads to the conclusion that some change is required in the body ; and it is natural to surmise that the 'oxides' are important, as the first logical step in oxidation would be the breaking up of the arseno-grouping to the oxide grouping. The greater trypanocidal activity shown by the solutions after being left standing for some time and their increased toxicity under the same conditions is also attributed to the formation of oxidation products. This also explains why arsenobenzol has little action on trypanosomes in vitro. In the case of pentavalent arsenic compounds, they are reduced in the body and this reduction leads to the same As : O grouping as is formed on oxidation of the arsenobenzol grouping. Since however, reduction is less easily accomplished than oxidation it is to be expected that the latent period would be longer in these cases.

The question also arises whether curative activity is aided by the production of antibodies. Experiments show that salvarsan has no appreciable effect upon increasing specific antibodies in rabbits immunised with dead trypanasomes.

The organic arsenicals, therefore, form a very striking example of compounds which are introduced into the body in an inert form and which owe their therapeutic activity to changes which they undergo in the body.

*Fate in the body.* Pentavalent arsenic compounds, such as atoxyl are excreted with remarkable rapidity. Commencing within four hours, about 85% is excreted in 24 hours, in the urine. As Atoxyl is reduced in the body slowly it is not fixed and hence the rapid excretion. The trivalent forms are excreted more slowly. Salvarsan is insoluble in neutral watery solution and therefore cannot exist in true solution in the blood, but must form a colloidal suspension. Most of the drug appears to be broken down to some simpler forms in the course of a few hours. The maximal amount excreted in 24 hours is about 3%. Less than 2 mg. of arsenic is excreted in the urine. Neosalvarsan disappears from the blood slightly more rapidly. The arsenic retained in the body is stored chiefly in the liver.

*Toxic effects*: are very varied but can be divided into three main groups:

1. Immediate vasomotor reactions appearing within a few hours of injections.
2. Effects due to acute arsenic poisoning appearing in a few hours.
3. Effects due to delayed arsenic poisoning appearing after several weeks.

The vasomotor reactions occur most frequently after the first dose of salvarsan. The chief symptoms are chill and rigors, followed by pyrexia and headache, together with a fall of blood pressure. Oedema and urticaria are also noticed. These are alarming but not fatal. These may be due to salvarsan producing some alteration in the blood proteins. They can be inhibited by injection of adrenalin.

The effects due to acute arsenical poisoning which occur after a few days are much more serious than the vasomotor reactions, and are the most frequent cause of death. They occur most frequently after the third or fourth injection. They may manifest themselves by skin eruptions which may occur up to the eleventh day, in



some cases passing on to exfoliative dermatitis; nervous symptoms, usually appearing after three to five days with convulsions passing on to coma and death; and jaundice. The nervous symptoms seem to be due to the drug injuring the cerebral arterioles, for encephalitis hæmorrhagica is found post mortem. The symptoms of delayed arsenic poisoning only appear several weeks after the last dose of the drug has been given and the chief symptom is jaundice, which may be followed by death.

The chief precautions which may be taken to reduce the incidence of toxic effects are as follows: (1) the use of reliable preparations of the drugs. The drug is packed in tubes filled with nitrogen and if the tubes leak, products of oxidation may be formed; (2) the maintenance for an exactly constant technique in the preparation and administration of the drug; (3) the thorough preliminary examination of patients for possible visceral disease; (4) the careful observation of patients while they are receiving the series of injections.

Exfoliative dermatitis is successfully treated by injections as well as oral administration of Sodium thiosulphate or Hypo.

*The value of treatment* is tested by the wasserman reaction. Continuous injections have to be given to prevent the multiplication of surviving spirochetes. Salvarsan has also been used in the treatment of severa-trypanasomal infections. It cures 90% of cases of relapsing fever and 99% of cases of Yaws. It kills the trypal nasomes in blood in sleeping sickness but is no use in later stages.

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# THE EFFECT OF THE SEASONS ON THE BODY WEIGHT IN PULMONARY TUBERCULOSIS UNDER HOSPITAL CONDITIONS IN SOUTH INDIA

By Rao Bahadur M. KESAVA PAI, M.D.,

*Superintendent, Tuberculosis Hospital, Madras*

AND

C. A. VENUGOPAL, L. M. & S.

In all tuberculous conditions, including tuberculosis of the lung, increase in weight has been generally accepted to be one of the main points in judging the progress of a case towards improvement and recovery. Whilst it has been recognized that in the obese form of tuberculosis no great importance can be attached to increase in weight, in the vast majority of cases such an increase is a definitely favourable sign just as decrease in weight is a sign of a run down in the general condition. Several conditions have been known to cause a temporary fall in weight in tuberculosis in spite of a general clinical improvement ; for instance in the treatment of pulmonary tuberculosis by artificial pneumothorax, in the chemo-therapy of tuberculosis by gold salts, in the treatment of tuberculous conditions by tubercle vaccines and in the physical treatment of canvalescing cases by graduated exercises, an initial fall of weight is not uncommon in spite of an amelioration of the local condition and improvement in the general health. Such a temporary fall in the weight is, as a rule, followed by a subsequent increase, as long as the favourable progress is maintained.



It has been the general clinical opinion on the continent that rest in bed is very important not only in the acute stages of pulmonary tuberculosis, but in the fibrosing convalescent stage as well till the temperature drops quite to the normal, though the increase in weight by such a procedure may be due to the deposition of fat in the subcutaneous tissues and elsewhere. In England on the other hand, Marcus Paterson and others have insisted on the importance of graduated exercises much earlier in convalescence. Fibrosis is, in fact considered to be hastened by such exercises rather than by rest, for whilst absolute rest in bed has a tendency to fat deposition, graduated exercises by directly influencing metabolism and by auto-inoculation lead to an ultimate steady improvement in the affected tissues and an increase in weight by development of muscular and other tissues rather than by fat accumulation, after a temporary decrease in weight due to the burning up of the fat accumulated during the period of rest.

In Judging the effect of the seasons on weight amongst the generality of tuberculous patients under treatment in hospitals, it is therefore important to eliminate the factors that might temporarily upset the weight curve on account of certain patients losing weight for the time being under the clinical conditions described above. It is also important that the weights of patients in the very advanced stages who go rapidly downhill in spite of any treatment should be excluded from the calculations, as such patients unfortunately form a considerable proportion of those seeking admission into the hospitals of this country. In the investigations forming the subject of this paper we have therefore excluded such cases and in order to eliminate the temporary factors concerned in pneumothorax treatment, chemo-therapy

etc., we have taken the average weights by months, instead of by weeks, in preparing the weight curves. This minimizes the experimental error, though it cannot exclude it entirely. Thus for instance a large number of cases commencing either chemo-therapy or pneumothorax treatment in a particular month will vitiate the figures for that month, either by exaggerating the drop in the weight curve or by minimizing the rise therein. A preponderance of patients in the final stage of convalescence where weight ceases to increase or in the acute stage before the commencement of improvement when the weight will probably be on the falling side, will similarly affect the correctness of the figures, as also acute intercurrent conditions like epidemics of influenza, enteritis and dysentery to which hospital patients, like the general population, may sometime be subject.

Lunde [1] considers that increase of weight in tuberculosis is due mainly (1) to deposition of fat resulting from good feeding and assimilation and (2) to retention of water in the system depending on the temperature and humidity of the atmosphere. He argues that in the hottest part of summer there is increased evaporation from the body with decrease of water retention, with at the same time decreased assimilation due to the heat, both factors leading to loss of weight. During spring and early summer, on the other hand, there is both decrease of loss of heat from the body with the resulting maximum fat deposition and increased assimilation of food, leading to gain in weight. In winter again there is the decreased assimilation due to the severe cold with increased loss of heat by radiation from the body and the consequent increased oxidation of fat and lessened fat deposition, along with increased kidney function and discharge of water from the system, all these factors leading to loss



of weight. Lunde by his observations in Norway has produced weight curves which show a slight rise in spring and a higher rise in late summer and autumn, periods of the year when the temperature is neither very high nor very low, and the humidity of the air favourable for water retention, especially in the autumn.

Frimodt Moller's[2] observations at the Arogyavaram Sanatorium in South India show similarly interesting curves for the weight, but on account of climatic conditions being quite different from those in which Lunde worked in Norway, he found that at Arogyavaram patients showed a slight gain in weight in the later summer months, when the monsoon winds cooled down the atmosphere and increased its humidity and a marked gain in weight in the cooler months of October to January, with a fall in weight in the dry and hot months of February to May. The daily mean temperature at Arogyavaram is 78° to 81° F in the late summer, June to October, and 80° to 85° F in the hotter months, February to June. The hot months are dry and the cooler months comparatively humid, so that Frimodt Moller's observations confirm those of Lunde that a high temperature and a dry atmosphere decrease weight, whilst a lower temperature with humidity tend to increase the weight. Winter conditions do not exist in Arogyavaram and the winter dip of the weight curve is naturally absent.

The climate of Madras is again different from that of the two localities referred to in the abovementioned observations. Madras has a strictly tropical climate and being on the coast the air is humid during the greater part of the year, being less so in the summer months and more so in the cooler months, October to March, which coincides with the wet season due to the North East monsoon. The mean temperature of the air from March

**Mean Temperature, Rainfall and humidity in Madras.**

(*1923 to 1927.*)

| Month. | 1923 | | | 1924 | | | 1925 | | | 1926 | | | 1927 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tempa-rature. | Rainfall. | Humi-dity. | Tempa-rature. | Rainfall. | Humi-dity. | Tempa-rature. | Rainfall. | Humi-dity. | Tempa-rature. | Rainfall. | Humi-dity. | Tempa-rature. | Rainfall. | Humi-dity. |
| January .... | 75·2 | 4·46 | 70 | 75·9 | 2·37 | 77 | 74·4 | 1·33 | 77 | 76·7 | 1·11 | 79 | 77·0 | 0.55 | 77 |
| February .... | 77·7 | .... | 75 | 77·5 | .... | 72 | 76·8 | .... | 71 | 77·6 | .... | 73 | 79·0 | .... | 74 |
| March .... | 81·0 | 0·64 | 74 | 80·8 | 0·13 | 71 | 79·6 | 2·86 | 76 | 82·4 | .... | 74 | 82·4 | .... | 72 |
| April .... | 84·8 | .... | 74 | 85·6 | .... | 73 | 84·0 | 0·05 | 77 | 85·7 | 0·10 | 72 | 85·4 | .... | 72 |
| May .... | 87·1 | 0·03 | 65 | 88·0 | .... | 66 | 85·8 | 4·04 | 70 | 88·3 | 0·10 | 67 | 88·5 | 0·37 | 65 |
| June .... | 88·9 | 1·96 | 58 | 88·1 | 3·45 | 58 | 87·3 | 0·24 | 60 | 89·8 | 0·40 | 58 | 88·0 | 3·80 | 60 |
| July .... | 86·6 | 1·65 | 59 | 84·3 | 5·63 | 72 | 85·2 | 3·81 | 65 | 85·1 | 2·77 | 68 | .... | .... | .... |
| August .... | 85·3 | 3·30 | 62 | 85·0 | 2·57 | 71 | 83·4 | 5·99 | 73 | 84·8 | 4·57 | 69 | .... | .... | .... |
| September .... | 83·4 | 3·31 | 71 | 82·1 | 9·67 | 80 | 84·3 | 1·35 | 72 | 83·8 | 1·71 | 75 | .... | .... | .... |
| October .... | 80·8 | 15·89 | 80 | 81·8 | 4·94 | 77 | 80·4 | 16·72 | 80 | 81·5 | 7·36 | 78 | .... | .... | .... |
| November .... | 78·5 | 3·63 | 77 | 77·2 | 16·01 | 82 | 77·7 | 16·97 | 83 | 77·2 | 12·21 | 82 | .... | .... | .... |
| December .... | 76·5 | 2·56 | 78 | 75·0 | 0·85 | 76 | 75·2 | 13·48 | 84 | 75·9 | 1·09 | 76 | .... | .... | .... |
| Annual .... | 82·2 | 37·33 | 71 | 81·8 | 45·62 | 73 | 81·2 | 66·84 | 74 | 82·4 | 31·42 | 73 | .... | .... | .... |



to October varies from 80° to 90° F, maximum temperatures of 105° to 110° F, being often experienced on some days in May and June. The mean daily temperatures from October to March vary from 74° to 80° F (*Vide* Table).

The variations between the maximum and minimum of the day at any part of the year are comparatively slight due to the situation on the coast. The rainfall which depends on the North East winds is about 30 inches on the average per year and occurs mostly during the months of August to January coinciding with the cooler months of the year. It is evident from the temparature records that the climate of Madras is hot all the year round with the exception of the 3 months November to January when it is comparatively cooler, the temparature remaining below 80° F all the day. It is apparent therefore that though these three months must have a favourable effect on the progress and weight of tuberculous patients, the differences in this respect between these three months and the rest of the year cannot be so marked as in Norway or at Arogyavaram. The weight curves fully bear out this view, for whilst the general increase during the months of October to January is uniform all the five years of these observations, the variations during the remaining months have been neither uniform nor steady. There has however been a distinct dip in the curve during he hottest months of the year, *i.e.*, April to July.

The different curves in the accompanying chart are sufficiently explanatory by themselves. It is observed that the temperature and humidity curves vary inversely which is natural in the case of a coast station like Madras. The weight curve as will be observed in the chart is represented in percentages of increase every month over

the preceding month. In calculating the weight figures we have eliminated the weights of cases which were admitted into the hospital in a highly advanced condition and did not consequently show any improvement by any treatment, as also the weights of the ordinary cases during attacks of acute intercurrent diseases when the sudden fall lasting 2 or 3 weeks or more was apt to vitiate the normal variations. The weight figures have been obtained from 567 cases in the 5 years 1923—1927. It is very interesting to note the consistent general agreement between the 3 curves for temparature, humidity and weight during the 5 years, the former varying inversely as the two latter which run almost parallel to each other.

It is thus clear that the observations in the tropical coast climate of Madras City fully bear out the observations made in a hill climate like that of Arogyavaram and a colder climate like that of Norway, the differences observed being due to the differences in the climate of the three places. Thus whilst Madras has practically two main seasons for the year, *viz.*, the hot and comparatively dry months April to September and the cooler and more humid months October to March, there are only two variations in the weight curve corresponding to these two parts of the year, *viz.*, a rise during the cooler months and a fall during the hotter dry months. At Arogyavaram on the other hand there are more or less three different seasons for the year, *viz.*, the hot and dry months of March to May, the cooler and less dry months of June to August and the coolest and comparatively humid months September to February, causing a dip in March to May, a smaller rise in June to August and a larger rise during the rest of the year. In the cold climate of Norway there are four variations of the weight curve during the year corresponding to the four seasons, *viz.*, a fall during the



warmest months of summer, a rise during late summer and autumn, a fall during winter and a rise again in spring and early summer.

Observations made by different persons in different climates thus give identical results regarding the effect of the seasons on the body weight. Extremes of heat and cold and dryness of the air cause a loss of weight, whilst a pleasant temperature corresponding to the summer in colder countries and the cold seasons in the tropics with relative humidity of the air produce a gain in the body weight.

The rainfall, as is evident from the charts, has apparently no effect on the body weight.

Clinical observations in cases of pulmonary tuberculosis have thus borne out the correctness of the view that the increase of body weight and general improvement of the patients, which are coincident conditions, take place in different countries during those parts of the year when the temperature and humidity are consistent with personal comfort and conducive to assimilation and optimum metabolic conditions.

We are grateful to the Government Meteorologist of Madras for supplying us with figures for temperature, rainfall and humidity for the period covering the above observations.

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1. *Lunde, N.*—The Effect of the Seasons on the General condition and increase in weight of the Tuberculous patients—Tubercle, April 1925—p. 323.

2. *Frimodt Moller, C.*—Climate and Weight of Tuberculous patients in South India—Tubercle, 1921—p. 385.

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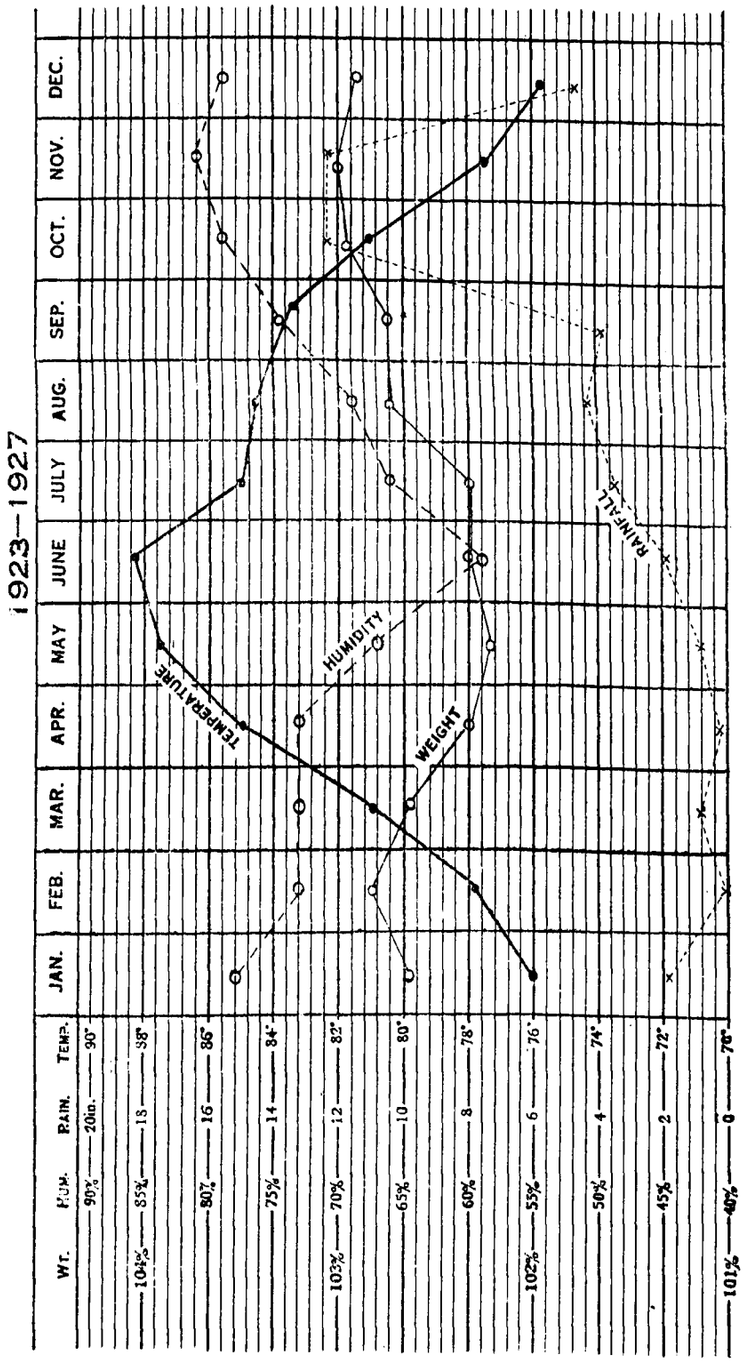


## EXTRACTS FROM JOURNALS.

### ON THE TUBERCULOUS NATURE OF PLEURISY

By H. B. ANDERSON,

*American Review of Tuberculosis,*
*February 1928—page 147.*

The author considers that pleurisy is very rarely a primary disease. The evidence adduced at autopsies proves that pleural inflammation is almost invariably secondary to the tuberculous infection of the lung. Pleurisy with effusion is almost invariably tuberculous, but dry pleurisy though usually tuberculous may include cases secondary to focal infections, Rheumatism, Septicæmia, Emboli, Bronchitis, Bronchiectasis, Injury, etc. Pleurisy is a mild phase of tuberculosis and mostly ends in recovery. The prognosis and prospects of life in healed tuberculosis in a person of over 30 years of age are favourable. It is the usual experience that persons who have recovered from pleurisy in childhood and early adult age are more immune to tuberculosis than the ordinary individual, unless the person is underweight and there is a bad family history and poor chest formation. In giving a prognosis, occupation, habits and environment are important considerations.

M. K. P.

## A NOTE ON USE OF BENZYL CINNAMIC ESTER IN TUBERCULOSIS

By H. GAINSBOROUGH, M. B. (Cantab.), M. R. C. S. (Lond.).

*Lancet 5th May 1928—page 908.*

The methods of treatment of tuberculosis by injection of Benzyl Cinnamic Ester first advocated by Jacobson has given good results in the hands of various French Workers. Cases of Tuberculosis of the skin, of glands, larynx and lungs are all benefited by the treatment. This consists of the intramuscular injections of the ester given in courses of 12 daily injections, the dose varying from 0·25 to 1 c.c. according to the nature of the case. The occurrence of severe reactions especially in pulmonary tuberculosis is an indication for the smaller dosage whilst lupus and the other chronic types like adenitis, Scrofula can be treated with the larger doses. A rest of fifteen days is to be given after each course and 3 or more series of injections will have to be given in different cases. The author gives an account of three typical cases treated by him, one of tuberculous cervical glands which markedly improved, one of tuberculous kidneys and cystitis which showed decided benefit; and the third of pulmonary tuberculosis complicated with laryngitis. This last case showed considerable improvement both of the pulmonary and of the laryngeal condition. Many other cases have also been treated with marked benefit. There have been no severe reactions and the results obtained so far are encouraging.

M. K. P.

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## FURTHER RESULTS WITH SANOCRYSIN IN PULMONARY TUBERCULOSIS

By FREDERIC HEAF, B.A., M.D.

*Tubercle December, 1927—page 105.*

The author gives an account of 50 cases treated with Sanocrysin. The cases were in different stages of the pulmonary disease. Of the 50 cases, 16 were clinically arrested, 12 improved without relapse, 5 relapsed after temporary benefit, 10 showed no improvement and 7 cases either got worse or died directly as a result of the treatment. It was found that a concomitant treatment with artificial pneumothorax gave better results than with bare Sanocrysin treatment. Slow and cautious dosage was essential to prevent reactions and complications. An initial dose of 10 cgr. and a terminal dose of 1 gramme for adult men and ·75 gramme for adult women were found adequate. The intervals should be sufficiently long especially on the occurrence of reactions. In cases of albuminuria, metallic poisoning, diarrhœa, abdominal pains and loss of weight, the treatment should be discontinued. The author concludes that the results of Sanocrysin therapy are not sufficiently encouraging to try it by itself apart from the usual routine methods; that only a small percentage of cases are suitable for the treatment; that the drug cannot always be said to be a safe one; that the results are not certain; that better results are observed when collapse therapy is employed alongside of Sanocrysin treatments; that childern take the treatment well; and that definite arrest of the disease as a direct result of the treatment is observed in a certain number of cases.

M. K. P.

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## THE VALUE OF BISMUTH THERAPY IN SYPHILIS

By C. LEVADITI AND FOURIER,

*Lancet 7th April, 1928—p. 692.*

The authors prove by experiments on rabbits that bismuth either alone or in combination with arsenic acts on the spirochætes of syphilis and on the lesions of syphilis. They consider that the insoluble salts of bismuth are much better tolerated than the soluble derivatives. The Spirochætes very often disappear after the first injection. They record cases of treatment by intramuscular injections of 2 to 10% solution of Bistovol (H. 13) and of the oral administration of Bismuth Stovarsol and conclude that this latter preparation whether in solution or in the solid state is well tolerated in doses of 2 gramme daily for 8 to 11 days corresponding to ·82 gramme of Bismuth and ·3 gramme arsenic daily, no digestive or other disturbances followed the oral administration. An erythematous rash occurred in two cases but subsided quickly. The Spirochætes disappear and the serum reaction becomes negative early and remained so for long. This method of treatment is, in the opinion of the writers, superior to that by administration of mercury. Both clinical and experimental evidence proves the superiority of bismuth Stovarsol over mercury, being much less toxic and attended with less of renal and mucous reactions and distinctly superior in its effects than mercurial preparations.

M. K. P.

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## THE SEDIMENTATION TEST—ITS TECHNIQUE AND ITS VALUE IN DIFFERENT DISEASES, WITH SPECIAL REFERENCE TO TUBERCULOSIS IN INDIA.

By C. FRIMODT MOLLER, M. B., CH. B.

AND

P. V. BENJAMIN, M. B., B. S.

The authors give an account of their technique of the red corpuscles stability test in pulmonary tuberculosis as carried on at the Tuberculosis Sanatorium at Arogyavaram. By using Morriss's modification of Westergreen's method in 218 normal or non-tuberculous cases and 282 tuberculous patients in different stages of the disease, they conclude that the test is a delicate one in diagnosing pathological conditions; that it is not a special reaction but an indication of destruction of cell tissue and increase of the fibrinogen content of the blood; that the figures obtained in tropical climates are higher than those of colder countries; that normal figures for South India are 10 to 15 for men and 15 to 20 for women equivalent on the Westergreen scale to 17 to 25·5 m. m. for men and 25·5 to 34 m. m. for women that the value of the test is similar to that of fever in tuberculosis; that when duly considered along with other clinical conditions it gives valuable information regarding the activity of the tuberculous process; that its prognostic value is considerable as it often gives very early warning of the coming onset of complications, enabling the physician to take early steps in the way of prevention and treatment; and that in patients under collapse therapy it gives a more correct indication of its efficacy or otherwise than other clinical signs. They lay particular stress on details of technique as they find that the longer the period that is allowed

to elapse between the extraction of the blood and the commencement of the test and the higher the temperature of the room, the quicker the sedimentation takes place so that it is absolutely essential in comparing the results obtained by different workers to know what the air temperature was at the time of the experiment and how long the blood was allowed to remain in the storage tube before being put up for sedimentation.

M. K. P.

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## THE CO-ORDINATION OF MEASURES FOR THE CONTROL OF PULMONARY TUBERCULOSIS

By HYSLOP THOMPSON, M. D., D. P. H.

*Tubercle, January 1924.*

Dr. Hyslop Thompson gives his experience of the efficacy of anti-tuberculosis measures as the Country Medical Officer of Health and Country Tuberculosis Officer of Hertfordshire. He lays great stress on the importance and necessity for better and earlier notification of cases, which means greater and more sustained co-operation of the medical practitioner with the tuberculosis officer; the importance of a routine examination of the sputa of patients with a view not only of diagnosing the disease but of supplying the health authorities with information regarding the location of the 'Open' cases and of tuberculosis nests; the desirability of having institutions for the treatment of early and of advanced cases of tuberculosis; the necessity for a better standard of dispensary treatment which depends on close co-operation between the dispensary officer and the local practitioner the importance of early diagnosis at the dispensary to enable Sanatorium treatment to be given at the right time



to enable the authorities to improve housing conditions and encourage health visiting with the object of instructing the public in domestic Hygiene and proper feeding; and the desirability of forming bodies like care-committees to guide the policy of the local body and do social and other work for the control and treatment of the disease.

M. K. P.

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## ON TWO APPARENT RECOVERIES FROM ANÆSTHETIC LEPROSY FOLLOWING PROTEIN SHOCK TREATMENT

By Dr. P. MANSON BAHR, D.S.O., M.D., (Camb) F.R.C.P., (Lond.)

*Lancet, 2nd June 1928—p. 1111.*

The writer narrates two cases of anæsthetic leprosy both patients from Asia, who were resident in England during 1925 and 1926, treated by ('Protein Shock'.) The first case who had typical anæsthetic patches on the forearm was treated with Hasson's vaccine consisting of 15,000 killed B. Pyocyaneus and 5,000 million leprosy bacilli per c. c. Six injections ranging from ½ to 1 c. c. at one week's intervals were given. The patch disappeared, sensation returned and hair began to grow on the patch. The second was a case of anæsthetic leprosy on both arms. He was treated with intravenous injections of T. A. B. vaccine and showed a similarly remarkable improvement. Both were clinically typical cases of leprosy and bacilli were demonstrated in one of the two. Protein shock treatment is worth a trial in cases of leprosy.

M. K. P.

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## ASSOCIATION NOTES.

*Minutes of a meeting of a General Body of the Association held on Tuesday, the 8th May 1928 at 4-30 p.m. at the Medical College, Madras.*

CAPTIAN. J. C. David, M.B.B.S., read a short paper on the newly introduced subject of Pharmacology in the Medical curriculum of studies which was followed by some very interesting graphic demonstrations on living animals, comprising of the actions of various drugs on the heart, on the respiration, pulse, blood pressure, bladder, etc.

Rao Bahadur Dr. P. Krishnaswami in a short speech thanked the lecturer of the evening on behalf of those who were present for the very instructive demonstrations conducted by him.

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*Minutes of a meeting of the Executive Committee of the Association held on 21st June 1928 at the President's House.*

PRESENT:—Dr. Kesava Pai, *President*; Dr A. Lakshmanaswami Mudaliar, *Vice-President*; Drs. G. Sreenivasamurthi, T. S. Tirumoorthi, P. V. Cherian, P. Venkatagiri and K. Koman Nair.

(1) Resolved that the officers of the Madras Medical Service do join the officers of the I.M.S., in giving a farewell dinner to the Surgeon-General, Major-General F.H.H., Hutchinson, I.M.S., who is proceeding on long leave.

(2) Resolved that the proposal to utilise the balance amounts from the previous and the coming annual services Dinners for obtaining an oil-painting of Major-General Hutchinson to be put up at the Medical College, be accepted.

(3) Read G. O. No. 488, Public, dated 26th May 1928, stating that Government Servants Associations must obtain permission of the Government before submitting Memoranda to the Indian Statutory Commission.

Resolved that the Association do not intend to submit any Memorandum to the Indian Statutory Commission.

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## NOTICES.

### EDITORIAL.

Original articles, Clinical lectures, Medical Society addresses and interesting 'cases' are invited. Contributors of original articles will receive 20 reprints of their papers *gratis* if applications for the same are made at the time the contributions are sent.

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