MALARIA

IN ITS RELATION TO

MAN AND MOSQUITO.

by

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1. Malaria in its restricted sense means a disease of humans caused by a microscopic organism which invades the corpuscles of the blood, feeding on them, destroying them and excreting poisons which cause fever.

2. Malaria in its fullest sense includes all the factors immediate and remote which have an effect on the growth and dissemination of the malaria parasite.

3. At one time thought to be a simple subject, investigation has proved it to be very involved. Professor Kunen, the celebrated Dutch investigator, said recently " ten years ago we knew all about malaria—now the only thing we are sure of is that we only know the fringe of the subject." You will get some idea of the magnitude of the problem when I tell you that what we already know fills books.

4. In this article I can only sketch out briefly the evolution of our knowledge of the aetiology of the disease, the life history of the parasite, its effects on human progress.

HISTORY.

5. The term malaria is a combination of two Italian words *mal*, meaning bad, and *aria* air = bad air.

For centuries the disease has been known to be in some way connected with swamps and that people who live near swamps,

especially those who spend the night in the vicinity, are particularly liable to contract the disease. Nothing was known of germs or microbes in the old days and diseases were often attributed to the inhalation of poisonous gases.

It was noticed that mists formed over swamps during the night and that these mists had a chilling effect on the body. What was more natural than to attribute the shivering attack of malaria to this mist or bad air, the malaria of the swamp.

Laveran, a French surgeon, while examining the blood of malaria patients under the microscope in 1880, in Algiers, noticed moving bodies in some of the red corpuscles. He concluded that these were the cause of the disease, the parasites of malaria. He was right.

King in 1883, suggested mosquitoes as possible intermediate hosts.

Manson in China proved the mosquito to be the vector of filaria, a worm which causes elephantiasis in man. He argued that the parasite of malaria might well be carried by the same insect and that the fact that mosquitoes breed in swamps would explain the connection between swamps and malaria.

Ronald Ross had the same theory. From 1897-1899 he worked it out and proved that malaria is carried from man to man by a certain species of mosquitoes belonging to the family anophelines. He showed that the anopheline is not a mere mechanical tool like a vaccination lancet, that it does not infect one human with the infected blood of another, but that the parasite actually invades the tissues of the insect and causes a general infection. When the saliva becomes infective which it does after an interval of 10 days, then and then only, is the mosquito capable of passing on the infection to another human.

Malaria may now be defined as a disease of man and of certain species of anophelines caused by a micro-organism (the malaria parasite) which passes from mosquito to man and from man to mosquito through the sucking proboscis of the insect. The human infects the mosquito and the mosquito infects the human, there is no direct infection from man to man or from mosquito to mosquito.

Proof of the Mosquito theory.

Sambon, Low, and Terzi resided for three months in one of the most malarious districts in Italy in 1900. They lived in a hut protected from mosquitoes by wire gauze. They were out all day in all weathers often did hard manual work, drank the water of the place, but from sunset to sunrise stayed inside their mosquito-proofed hut. They took no quinine or any other precaution beyond staying in the mosquito proof house from sunset to sunrise, the biting time of the anopheline.

Neither of the three contracted malaria. Their neighbours all around who were not protected from mosquito bites—went down repeatedly with the disease.

Anophelines fed in Rome on malaria patients, were sent alive to the London School of Tropical Medicine where they fed on two volunteers, Dr. Manson and Mr. Warren. Neither of these gentlemen had ever been out of England, neither had ever suffered from malaria and neither of them had malaria parasites in his blood. In 10 days both went down with malaria, parasites were found in the blood of each, and these parasites were the same as those which occupied the blood of the Italian patients at Rome.

Similar experiments have been carried out in various parts of the world and it is now universally accepted by scientific men that malaria is spread from man to man by certain species of anopheline mosquitoes.

That malaria often breaks out after ground has been opened is frequently cited as a proof that the disease can be spread by something set free from the earth by the turning over of the soil. The disturbance of the soil certainly is frequently followed by malaria, but the effect is not direct but indirect. Water on new earth somehow has an attraction for the female anopheline. What that attraction is has not yet been worked out. I believe it to be of a chemical nature for it disappears on weathering. Perhaps it is a chemical in solution which has some influence on the food supply of the larva. Perhaps it is that the anopheline finds the pool first and that the eggs hatch and the larvae reach maturity before the natural enemies have found out they are there. Whatever it is the fact remains that more larvae are likely to be found on water in connection with new earth than in pools adjacent but in contact with old earth. After a month or more some change takes place, and in the water which was formerly thickly populated with larvae, a few or none are to be found. This is one reason why earth works are so often followed by a temporary wave of malaria. Another reason is the tapping of underground reservoirs, the water from which forms springs which flow until the reservoir is emptied when they dry up.

THE LIFE HISTORY OF THE PARASITE.

The life history of the parasite may be described as a cycle within a cycle. The little cycle takes place in man; the big cycle partly in man partly in the mosquito.

The small cycle, the parasite in man.—The parasite is a living organism so minute that it can only be seen through a microscope magnifying hundreds of times. For the benefit of those who do not know, I will explain that our blood is a colourless fluid in which

are floating innumerable little discs called red corpuscles. To the presence of these corpuscles is due the redness of the blood.

The parasite is a living body and like all living matter it feeds and it excretes, and what it excretes is poisonous.

The parasites find their way into the corpuscles, feed on their substance, and destroy them. As the parasite grows the substance of the corpuscles disappears but the corpuscular skin remains whole. Inside the skin are the remains of the corpuscle, the parasite, and its excretions.

When full grown the parasite breaks up into segments which are arranged around a centre containing the excretions. Each of the segments is a young parasite.

The corpuscular skin bursts liberating the young parasites and the poisons.

The poisons upset the body and bring on an attack of fever.

Some of the young parasites get destroyed, some find their way into fresh red corpuscles and commence a new cycle.

The little cycle in man is called the asexual cycle because there is no conjugation between different sexes before multiplication.

CYCLES OF MALARIAL PARASITES.

*in the red blood corpuscles both in the human
and in the mosquito bodies.*
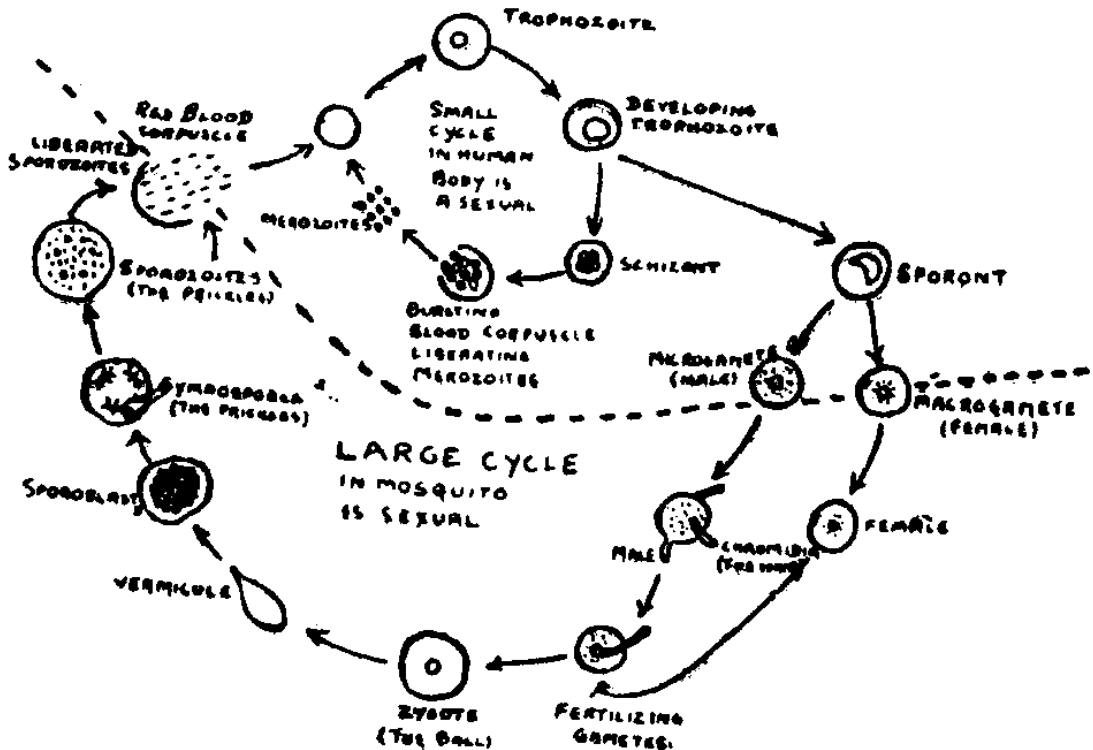
*The cycle above the broken line is endogenous in the human body.
Below the broken line the cycle is exogenous in the mosquitoe's body.*

The reaction of the human.—The human body is not a passive agent in disease. It resents the intrusion of any foreign matter and it takes measures to rid itself of any which may find entry. It has a factory for the manufacture of anti-toxins or antidotes to foreign poisons. It has a factory for the manufacture of poisons, substances which have a detrimental effect on foreign organisms but which do no harm to itself. It has a factory for the manufacture of leucocytes or white corpuscles, the policemen and scavengers of the body.

The anti-toxin neutralizes the poisons of the parasite and brings the temperature back to normal. The opsonins or detectives, lower the vitality of the organisms and prepare the way for the attacks of the leucocytes or police. The police gobble up the parasites and dispose of them.

It is by the provision of anti-toxins, opsonins and leucocytes that the body resists any disease. The factories work better when the body is maintained at a high tone and that is the reason why malaria relapses occur when the constitution is lowered by chills or other untoward influences.

But neither the anti-toxins, the opsonins, nor the police (white corpuscles) can touch anything protected by the corpuscular skin. And it is the periodic bursting of the corpuscles and the liberation of the successive doses of poisons which causes the intermittent rises of temperature which are so characteristic of malaria.

The big cycle—*man to mosquito and mosquito to man.*—After a time the resistance of the body becomes so great that the parasite finds it difficult to carry on. When this happens the intra-corpuscular parasites change their habits. They refuse to divide when they have reached maturity. Their internal arrangement changes somewhat and they become more resistant to outside influences. Two forms can now be distinguished, one is male and the other female.

It is here that the mosquito comes into the field as a host for the parasite.

Not all mosquitoes can act as hosts for the sexual forms, the stomach juices of the vast majority are too strong and the parasites are killed. The stomach juices of most mosquitos will kill the *sexual* forms. But the gastric juices of some species of anophelines instead of killing the sexual forms stimulate them to action. The male throws out certain whip-like processes which break off, swim to a female and become absorbed in it.

The impregnated female now becomes elongated and its anterior end pointed. It bores its way into the mosquitoe's stomach wall where it stays and undergoes development. It forms a ball. Inside the ball little round prickly bodies like chestnut burrs form. The prickles

which are the young parasites leave the burr and fill up the ball. The ball or tumour bursts, the prickles escape into the tissues of the insect and are distributed all over its body by its blood stream.

Some enter the salivary glands and find their way into the saliva.

When a mosquito bites it injects saliva to make the blood run better. It is this saliva which causes the irritation which most of us have experienced.

Incubation periods.—After inoculation into a human it takes ten to 24 days according to the kind of Malaria, for the parasites to increase to such a number that their combined poisons can cause symptoms of fever. After symptoms of fever appear 10 days elapse before the sexual forms become manifest. After ingestion by the mosquito of the sexual forms a further period of 10 days elapses before the young forms appear in its saliva.

One infected mosquito may infect any number of humans and one infected man may infect any number of mosquitoes. Remember that the infected human is a focus for the spread of Malaria and that an infected baby is just as dangerous as an infected adult. Native children are most dangerous as they are not screened by mosquito curtains from the bites of susceptible anophelines.

THE ECONOMICS OF MALARIA.

Malaria in the tropics causes more sickness, more invaliding and more deaths than all other diseases put together.

It causes a high death rate and low birth rate.

It is the chief reason why such large tracts of fertile land in the tropics remain sparsely populated and undeveloped.

It is probably the chief of the factors which has decided the difference in population between Java and the Federated Malay States, Java with its 40 million the F.M.S. with its ½ million.

Malaria more than anything else frustrated the efforts of the French to cut a canal through Panama. After 8 years the company went into liquidation with bond and share indebtedness roughly estimated at *70 million pounds sterling.* Many hundreds of lives had been lost and the canal was only one fifth through. Valuable plant estimated at *6 million pounds* was left to rust in the jungle.

The Americans made a success where the French had failed because American sanitary officers headed by Gorgas and backed by President Roosevelt made it possible for the engineers to carry out their great task.

Ross in his "Prevention of Malaria" states that the mean annual death rate for the whole of India is 5 per 1,000, and that it kills 1,130,000 persons per year or more than the mortality of Plague at its height, or of that of Cholera and Dysentery combined.

The deaths from fevers in Malaya were in 1921 over 17,000 and the death rate was over 13 per 1,000. The economic loss reckoned in money amounts to millions of dollars per year.

But malaria is not confined to the tropics. It is prevalent in many semi-tropical lands and in many temperate countries, in Mesopotamia, Greece, Italy, the Balkans, America, etc., etc. Until a quite recent period there was malaria in England. In Dickens' *Great Expectations* the convict who was released by the hero of the novel was suffering from the disease contracted from the marshes. James the First of England and Oliver Cromwell are said to have died of malaria. The decline of Greece and Rome is attributed by some to malaria, certain it is that there are ruins of cities in localities where it would now be impossible for large bodies of people to exist.

THE ERADICATION OF MALARIA.

There are three essential factors concerned in the spread of malaria viz : the mosquito, the parsite, and the human, and if either of these factors be eliminated or if the chain of sequence of man to mosquito and mosquito to man be broken it is impossible for the disease to spread.

In attempts to control malaria the following methods have been tried :—(1) *destruction of the parasite,* (2) *breaking the chain of sequence by placing a barrier or net between man and mosquito during the feeding hours of the insect,* (3) *elimination of the mosquito carrier.*

Destruction of the parasites.—The parasite has only been found in the human and in the mosquito. There may be a free-living stage but no one has ever seen it : we assume it does not exist.

Leaving out of consideration the killing of a few malaria infected mosquitoes, the only means we have of destroying the parasites is the poisoning of them in the human body by administration of quinine. Quinine is a poison which has more effect on the parasite than it has on the cells of the human. If one takes enough of the drug one can sterilize the tissues of malaria but in poisoning the parasites one partially poisons the body. The more parasites there are in the human the more quinine is required to kill them. Quinine taken prophylactically will become scattered through the body before it is thrown out by the kidneys. It stands to reason that, provided there is a sufficient concentration, any parasite injected by a mosquito will be killed before it has time to get into a corpuscle and multiply. It also stands to reason that the fewer parasites there are injected, the less quinine is required to kill them.

Quinine taken in small doses (gr. 5 to 10) may keep off fever in mildly malarious places but in highly infected regions the results of prophylactic quininization have been disappointing. In epidemic areas as much as 30 grains a day may be necessary. Strong minded individuals may take 30 grains a day for a time but the symptoms are so severe that few will keep it up for long.

If men were slaves, and fully under control, quininization might succeed in eradicating malaria. But while man is free and objects to having his tissues poisoned by the drug, eradication even in small areas is impossible, all that can be hoped for is a lowering of incidence.

Breaking the chain of sequence.—The chain of sequence can be broken (a) by placing the human outside the range of flight of the mosquito between sunset and sunrise; (b) by screening the human during the same period.

The withdrawal of humans has proved effective in many cases. On certain estates in America it has been found more economical to house the labour force a couple of miles distant from the anopheline breeding grounds and arrange for their transport than to deal with breeding places or screen the houses.

When the Kuala Lumpur water works were being constructed the coolies were first housed on the spot. The many pools on the newly turned earth soon became thickly populated with *maculatus* lavæ and malaria became epidemic. The coolie lines at the works were abandoned and the labour force was housed two miles away; the results were excellent. I may mention that time changed conditions at the works, the anophelines disappeared, and now coolies are residing there keeping free from fever.

As anophelines normally bite only between sunset and sunrise malaria in any district would be eradicated if all humans remained behind screens during the feeding hours of the insect. But a human will not go behind screens at sunset and therefore complete eradication by this method is impossible. Screening helps but is not a complete solution of the difficulty.

Theoretically, screens should be down during the day time and put up at sun-down. Experience has shown that the human cannot be trusted to close the screens in time—the mosquito gets there first. The best results are got from fixed screens—with as few openings as possible.

Fever patients being foci for the infection of the mosquito should be kept behind screens until they cease to be infectious.

The more comfortable conditions behind the screens are the more likelihood is there of screens being used. Often the difference between

the inside and outside of a screen is the difference between comfort and discomfort.

The larger the mesh the less will the screen obstruct air currents. A mesh of 18 strands to the inch will keep out all mosquitoes a mesh of 12 strands to the inch will keep out the vast majority. In Java and Sumatra and America 12 strand meshes are common and they are effective. The majority of bed curtains used in Malaya are between 10 and 12 when stretched and they have been proved to be effective in keeping out mosquitoes.

The effective screening of coolie lines is a possibility but strict discipline is necessary to ensure success.

By screening it is possible theoretically to keep a crowd free from malaria but by such screening as is practical it is only possible to keep individuals healthy.

Elimination of Mosquitoes.—Before you can eliminate anything with surety you must know something about it, and the more you know the more chance you have of succeeding.

It is impossible to eliminate all mosquitoes from Malaya—or even all anophelines—but it is possible to rid local areas of the malaria carrying anophelines by attacking their breeding places.

The eradication of malaria by this method seems easy to those who have but a smattering of mosquitology—but it is not by any means as simple as it looks.

An American Medical student after watching an eye surgeon do an operation said, " Well, Doctor, that looks easy." " Young man," replied the surgeon, " it does look easy but believe me I spoiled a whole hat full of eyes before I could do it like that."

The amateur mosquitologist is apt to spoil a whole hat full of estates or towns before he gets the requisite knowledge which leads to success. He must learn by his own failures or by the experience of others.

In dealing with malaria you must first find the breeding places of the anophelines at fault, and you cannot find the breeding places until you can spot the larvæ and can distinguish one species from another.

It is just as absurd to suppose that a man who knows nothing of mosquitology can rid an estate of malaria-carrying anophelines as it is to suppose that a man who has never seen a tiger and knows nothing about its habits can rid an estate of a man-eater.

War against particular races of mosquitoes can be compared to war against particular races of men. In isolated cases amateur efforts

may effect small local successes—usually however they fail quite often : successes are put down to measures taken when the credit is due to nature.

Campaigns of any magnitude can only be successful when planned by those who have studied the enemy's habits and who are acquainted with his life history.

In an anti-mosquito campaign every effort must be made to bring untoward influences to bear upon the enemy mosquito and upon his reserves, the larvæ. Not only must the General know his work but each individual down to and including the Private must be so trained that he will do his work without a hitch. In an anti-mosquito campaign thoroughness is everything : lack of attention to detail will spoil all. And when success appears to have been achieved constant care is necessary to see that the enemy does not reconcentrate and turn success into failure.

Remember a mosquito army is an aeroplane army and has a wide range of operations.

Anti-malarial work (mosquito elimination) is health work or preventive medicine, it has little to do with curative medicine. I mention this here because planters and others so often make the mistake of thinking that any medical man is competent to advise on anti-mosquito measures. Every doctor has the foundation for this health work but every doctor has not progressed beyond that stage.

A military campaign would certainly fail if generalled by one who only knew how to take care of the physical condition of his own army and knew nothing of the enemy. An anti-mosquito campaign will fail if it be generalled by a physician or a surgeon who has not studied the mosquitoes.

But the study of mosquitoes is not confined to medical men. Anyone can become acquainted with the habits and life history of our anophelines if he goes the right way about it.

Classification of Mosquitoes.—Entomologists are not yet agreed on the subject of classification of mosquitoes, but for our purpose it will be sufficient if we divide them into anophelines and culicines.

There are at least 150 kinds of anophelines known. Some come from one region of the globe, some from other regions. It is very important to remember this, for one of the reasons why anti-malarial eradication has often failed is that the measures adopted have been blindly copied from other countries and it has not been realised that the anophelines in the two places are different and have different habits, and that what is suitable for the eradication of one species is quite unsuitable for the other. The American varieties differ from the African and the Asian and the fauna of the different continents

differ in different districts. The anophelines of Panama are quite different from the anophelines of Malaya, or China.

Not all species of anophelines carry malaria, in fact the great majority play no part in the spread of the disease. In Malaya there are 20 kinds but only three seem to have any bearing on the malaria problem.

Life history of Mosquitoes.—The life of a mosquito is divided into four stages, the egg, the lava, the pupa, and the imago or adult fly.

The eggs are laid on water. After a couple of days they hatch and a free swimming larva or wriggler emerges. This larva can breathe or get its oxygen from the water or the air. I am aware that most authorities say they only breathe air but I have kept them alive for 24 hours submerged in water and out of contact with air. The laval stage lasts about 10 days in the temperature of the F.M.S.

The larva becomes a pupa, a comma-shaped body surmounted by two tubes, through which the immature fly inside takes the air it requires for breathing purposes. After a couple of days the pupa hatches and the mature insect emerges. For a few minutes it rests on the pupal case or on the water unfolding its wings and letting them dry. It then flies away.

The whole metamorphosis lasts about a fortnight.

Distinction between Anophelines and Culicines.—Anophelines can be distinguished from culicines in all four stages. One anopheline can be distinguished from another in all four stages, but the anti-malaria worker need only bother about the adults and the larva.

The anopheline adult when resting holds itself so that the head, thorax and abdomen are in a straight line, like an expert diver taking a header. The culicine adult has a humped back attitude when resting.

Anopheline larvæ are more or less cigar shaped. They rest in a horizontal position on the surface of the water. Culicine larvæ are more irregularly shaped than the anophelines. They rest beneath the surface of the water and get what air they require through a tube projecting from the hind end of the body.

Distinction between different anophelines.—One anopheline larva is known from another by their eyebrows and by their whiskers.

Anophelines are like birds in that each species has its own favourite breeding place or place where it lays its eggs. Why this should be has not been worked out, probably facilities for food supply and protection are important factors.

The English school boy collecting eggs knows the likely places for the nests of the various kinds of birds. He gained his knowledge chiefly through work in the field. The anti-malarial worker to be

successful must know the breeding places of the anophelines he wants to get rid of and he can only learn this from work in the field. Anyone can learn the job but you cannot learn it without getting dirty. The anti-malaria inspector who is always neat and clean is not worth much.

The adult mosquitoes are too agile to be hunted with success and the eggs are too small to search for.   The larvæ are confined to pools and other collections of water and are large enough to be seen. We search for the larvae and when we have located them we know we have found the breeding place of the adults.

Malaria carriers and their breeding places.—The three great carriers of Malaya are *A. maculatus, A. umbrosus* and *A. ludlowi.*

Maculatus breeds in hill land especially in the water issuing from the bottoms of slopes as springs or seepages.   *Maculatus* larvæ are only found in cleared valleys, not in those covered with jungle, thick blukar or thick ferns.   By some they are called light breeders though it is not certain that light is the only determining factor.

Umbrosus larvæ are found in jungle covered country especially flat land near the coast.

Ludlowi larvæ are found where the water is brackish and exposed to the light.   Such conditions are found in clearings near the coast, as towns, villages, or estates.

Elimination of Malaria Carriers.—To get rid of *Maculatus* keep the hill foots covered or clear them and drain bone dry by underground pipes or by open drains and oil the drains.

Umbrosus.—Clear and drain with open drains, oiling the drains if necessary.

Ludlowi.—Clear and drain with open drains oiling the drains if necessary.

THE ERADICATION OF MALARIA A SPECIAL STUDY.

The eradication of malaria by the elimination of mosquitoes is primarily an entomological problem, and no scheme of any magnitude has any chance of success unless framed and carried out under the supervision of those familiar with the habits and life history of the species it is intended to get rid of.

A scheme suitable for the elimination of one species is not necessarily suitable for another.   The methods found successful in the case of *A. umbrosus* proved worse than useless in the case of *A. maculatus*.   Schemes suitable in one country should not be slavishly followed in another where the mosquito fauna is different.

A thorough mosquito survey is an essential preliminary to any scheme and the scheme should be framed according to the mosquito findings.

A problem full of indeterminate elements (such as the mosquito problem is) is impossible of solution without trials and experiments. Unforeseen difficulties are certain to arise in the course of the work and allowance should be made for any deviation from the scheme which may eventually prove necessary. In many cases the estimate of costs can only be a guess, and a scheme should not be allowed to fail for the want of a little extra money.

AFFECTIONS OF THE EYE IN GENERAL PRACTICE.

by

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(*Continued*)

DISEASES OF THE SCLERA.

The sclera and cornea form the fibrous tunic of the bulb of the eye, the sclera being opaque but not so opaque as to prevent the interior of the eye being illuminated from without. In this way neoplasms such as sarcoma of the choroid are detected by means of transillumination. The cornea is, of course, transparent and forms the anterior sixth while the sclera constitutes the posterior five-sixths of the fibrous tunic of the eye.

The sclera, as its name denotes, is extremely dense, its hardness serving to maintain the form of the bulb. It is much thicker behind than in front. The posterior part is 1 mm. thick. Its surface is white and smooth except at the insertion of the muscles, the Recti and Obliqui. Behind, it is pierced by the optic nerve, and it is of importance to remember that the sclera is continuous through the fibrous sheath of the optic nerve with the dura matter.

When the optic nerve pierces the sclera, the structure of the latter is represented by a thin cribriform lamina, the lamina cribrosa. It is through the minute orifices of the lamina cribrosa that the nerve filaments pass. Also a larger opening in the lamina transmits the central artery and vein of the retina.

When the optic disc is examined by the ophthalmoscope, the edge of the optic nerve is clearly defined, and frequently, the central artery is seen issuing from the depth of the physiological cup. If the bottom of the cup is carefully focussed, the transverse fibres of the lamina cribrosa are clearly seen.

Immediately outside the entrance of the optic nerve are small apertures in the sclera for the transmission of the ciliary vessels and nerves, while midway between the entrance of the optic nerve into the eyeball and the corneoscleral junction that is at the equator of the eyeball, are four or five large apertures for the transmission of veins (Venæ vorticosæ).

In front, the sclera is directly continuous with the cornea, the sclero-corneal junction, or the limbus. In the substance of the sclera close to the sclero-corneal junction is a circular canal (canal of Schlemm). The sinus communicates internally with the anterior chamber of the eye, and externally with the anterior ciliary veins. There are some

elastic fibres scattered throughout the white fibrous tissue constituting the sclera, the fibrous tissue being aggregated into bundles arranged in longitudinal direction.

It is not alone for this brief chapter that I have described the above anatomy, but for the better understanding of some of the articles yet to follow.

Redness of the eye is produced in many ways. As the conjunctiva covers the sclera in front, an inflammation of this membrane will produce a red eye, but if the eyelid is gently pressed with the finger against the conjunctiva, the vessels in the latter will easily empty showing a white patch where pressure had taken place. If the sclera is inflamed, pressure of any kind will not empty the vessels and a white patch cannot be obtained. Indeed, in a scleritis, few patients will allow pressure to be made on the eyeball.

It is common to describe the inflammation of the superficial fibres of the sclera and the deeper layers of the conjunctiva together as an episcleritis. Some text-books do not divide episcleritis, although many who have read Swanzy's *Diseases of the Eye* will remember that there episcleritis is divided into (1) periodic transient episcleritis of Fuchs, or the hot eye of Hutchinson, and (2) episcleritis of the usual type.

Sometimes it is very difficult to draw a dividing line between the two. Episcleritis is characterised by frequently recurring attacks of inflammation of the episcleral connective tissue. The vascular injection is of a violet hue and is commonly confined to one quadrant of the eye, and gradually wanders from one place to another. The pain varies greatly and there is some lacrimation and photophobia. It is a disease of adult life. It is this type which is known as the hot eye of Hutchinson, whereas episcleritis of the usual type may appear two or three mms. from the corneal margin. There may be very little pain, but in a severe case, if there is a decided node at the affected place, the pain is pronounced. The duration of this type is usually long, whereas the periodic type may recur once or twice a year, lasting from several days to several weeks.

The causes of both are practically the same. Rheumatism, where such a condition may express the toxic effect of a septic focus such as infected roots of the teeth and the alveolar process surrounding the roots of the teeth. Sometimes it is impossible to find a septic focus, but the response to salicylate treatment commonly shows the origin of the disease. Again, the disease may be caused by tubercle or syphilis and possibly also by the gonococcus toxaemia.

In the rheumatic variety patients will often bitterly complain of pain. In one case I saw some time ago, the whole of the episcleral tissue surrounding the limbus of the cornea was swollen and overhanging the cornea. It occurred in a patient a martyr to rheumatism

and did not yield to anything less than 30 grs. Sod. Salicylate t.i.d., together with hot fomentations, atropine, and rest in bed. The atropine is of use, for the disease may spread to the iris and posterior synechia must be avoided at all costs.

In specific disease specific treatment must be given. A young man who had suffered from Interstitial Keratitis, but who had not received adequate treatment at the time, developed a chronic episcleritis which would yield to nothing else than mercury inunctions together with Mist. Pot. Iod. 10 grs. t.i.d.

In scleritis (deep scleritis) the whole of that part of the sclerotic which is in front of the equator is more likely to be affected than in the milder forms. Sometimes there are nodules, or a single nodule. The swelling is at first dark red or bluish, but later it becomes a paler blue. If it extends completely round the cornea, the condition is that of annular scleritis. Scleritis is a much more serious disease than episcleritis in that the cornea and uvea are usually involved. There may be a cyclitis with " K.P." on the back of the cornea, or there may be an anterior choroiditis, and floating opacities may be found in the vitreous. The end result, due to absorption of the sclera, may be a ciliary staphyloma.

Both eyes are usually affected, and in contradistinction to episcleritis, young adults are the most common subjects. It attacks females more often than males. A somewhat common result is to see the sclerosing opacities gradually spreading across the cornea. When these opacities are examined through the corneal microscope, deep blood vessels are seen extending from engorged scleral vessels, but superficial vessels also take part in the process so that the whole depth of the cornea is affected.

As the disease occurs more commonly in females than in males, it is but natural that one should give attention to the state of the pelvic organs. There a cause may be found. On the other hand, syphilis, congenital or acquired, rheumatism, gout, or tubercle may be responsible.

If no direct cause can be found, the nasal sinuses should be searched for a possible septic focus.

The worst possible result that can happen in this disease is unsightly bulging around the cornea known as ciliary staphyloma. Vision is impaired not alone by this deformity of the globe, but by the effects of the uveitis and secondary glaucoma may completely destroy the eyesight.

The treatment for scleritis is the same as for episcleritis. Atropine must never be omitted, and in the case of tubercle, injections of tuberculin will be found of great use.

Closely associated with scleritis is gumma of the sclera. It may take the form of a single nodule or of several nodules situated near the limbus, or they may completely surround the cornea. Specific treatment by some form of arsenical preparation such as Novarseno-billion given intravenously, combined with Mercury and Iodides will effectively arrest the progress and save the eye and the sight.

Also there may be a single nodule or tubercle of the sclera. It may require excision or scraping.

Lastly, blue sclerotics are seen in babies, but a more pronounced blue coloration is sometimes seen in several members of the same family. It is hereditary and persists throughout life, and it is curious that such patients often suffer from fragility of the bones of the skeleton.

I may add that a clean cut perforating wound of the sclera will heal, especially if the conjuctiva is neatly brought across the wound, without pressure on the globe.

DISEASES OF THE IRIS.

The iris is the contractile and coloured membrane which is seen through the transparent cornea and gives the colour to the eye. In its centre is an aperture, the pupil. Peripherally, it is continuous with the choroid and also, by means of the ligamentum pectinatum, with the cornea.

The anterior surface, when looked at through a magnifying glass, consists of fibres of trabeculæ running mainly towards the pupil. When greatly magnified with the corneal microscope, there are large cavernous spaces formed by these trabeculæ. In dark brown eyes these spaces are filled with brown pigment.

The framework or stroma of the iris consists of delicate connective tissue containing numerous blood vessels and nerves. The endothelium layer on the back of the cornea is continued over the front of the iris. The posterior surface of the iris is covered by two layers of pigment epithelium. This pigment epithelium is continuous with the pigmentary layer covering the ciliary processes.

The colour of the iris depends partly on the colour of this layer, entirely so in infants, but in black, brown and grey eyes the colour is due to and affected by the pigment cells scattered through the substance of the stroma itself.

The muscular tissue of the iris forms a ring (sphincter pupillæ) around the pupil, but it is also disposed as rays from the sphincter to the circumference, (dilator pupillæ.) The sphincter is much more apparent than the dilator in a microscopic section.

The long ciliary arteries, two in number, which pierce the sclera behind, near the optic nerve and gain the interval between the sclera and choroid, pass forwards to the ciliary muscle.

Just behind the attached margin of the iris, each vessel divides into an upper and a lower branch, and these anastomosing with the corresponding vessels in the opposite side, and with the anterior ciliary arteries which pierce the sclera in front close to the insertion of the recti muscle, form a vascular ring, the circulus major. The smaller circle formed from the most internal of these branches form the circulus minor around the pupil.

The vessels pursue a somewhat tortuous course so that the blood stream is not affected by the contractions of the sphincter and dilator pupillæ.

In the fœtus the pupil is closed by a thin transparent vascular membrane, the vessels in which are continuous with those of the iris and the caspule of the lens which is also vascular. In the foetus, about the 7th or 8th month of foetal life, this membrane becomes
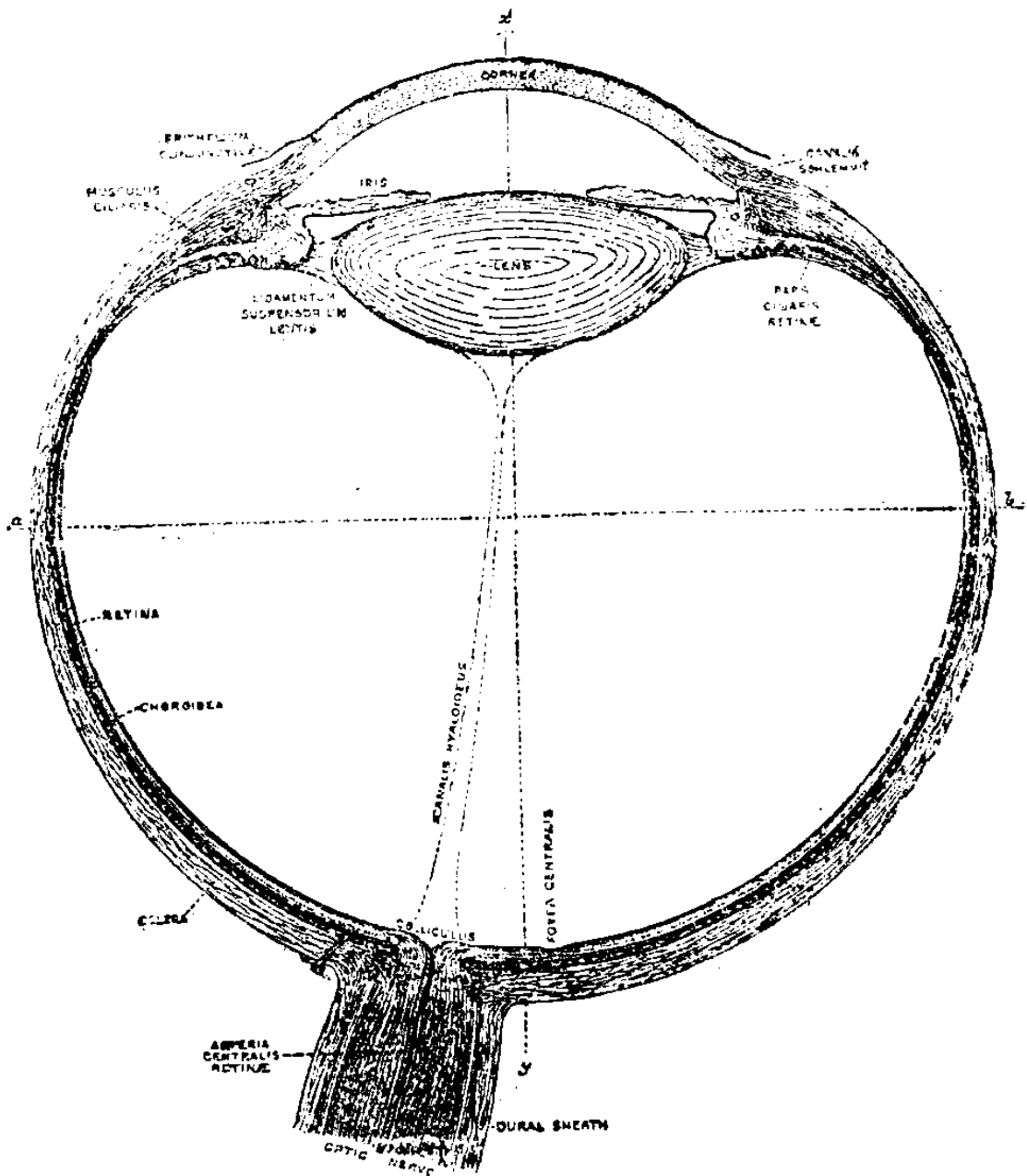
obliterated from the centre, but a few shreds may still remain and persist throughout life.

It is worth remembering that the sphincter pupillæ is innervated by the third nerve while the dilator pupillæ is innervated by means of sympathetic fibres passing from the ciliary ganglion lying behind the eyeball.

The iris is exceedingly sensitive, and when caught by iris forceps, produces sharp pain. This pain can be abolished by the injection of of novocaine around the optic nerve and ciliary nerves at the back of the eye inside Tenon's capsule.

Iritis, or inflammation of the iris, is fundamentally the same process as occurs in other connective tissues. The vessels become dilated. The capillary walls are damaged. Exudation of a highly albuminous lymph into the spaces between the tissues, and a migration of leuco or lymphocytes takes place. Hence the normal movements of the iris are greatly hindered, and due both to nerve endings being stimulated and engorgement of the vessels, the pupil tends to contract.

It might be worth while reading this last paragraph over again, and then remember the chief signs of iritis. This constricted pupil with an irregular pupillary margin reacts sluggishly. The delicate iris appears blurred and indistinct. This is sometimes known as " muddy iris." There is a change in colour so that a blue iris becomes yellowish green. Compare the affected side with the normal. The swollen vessels of the iris cannot as a rule be seen with the naked eye, but the inflammation is manifested by a ciliary congestion around the limbus of the cornea. Around the limbus the engorged vessels cannot be emptied by pressure as can the conjunctival vessels. The albuminous exudate, having escaped into the anterior chamber, the aqueous becomes cloudy, interfering with a clear view of the iris. Later, when we compare the signs of glaucoma, all the above facts should be borne in mind.

Hypopyon is sometimes found in severe cases of iritis. As the pupillary margin of the iris rests against the anterior capsule of the lens, the exudate which is sticky in character, may form adhesions, and as the whole of the edge of the iris is glued down to the anterior capsule of the lens, the aqueous cannot escape from behind the iris through its usual channel the pupil into the anterior chamber. Hence the iris is bulged forward, (iris bombé), and the tension of the eye will rise. The adhesions which form between the iris and the capsule of the lens finally become converted into firm fibrous bands which atropine cannot rupture.

When one wishes to confirm the diagnosis of iritis, a drop of homatropine is instilled into the conjunctival sac, and in a short time the irregular shape of the pupil is seen. Long pigmented adhesions

are found stretched between the iris and the anterior capsule. Some-times in twenty four hours, a complete ring of fine adhesions, (posterior synechiæ) will be found, and when the iris is forcibly dilated by atropine, the shape and size of the pupil will be left as a pigmented circle on the anterior capsule of the lens. If the adhesions have thus been early broken down, most of this pigment will become absorbed. One has often seen, through the neglect of not instilling atropine immediately at the onset of the disease, the pupil entirely filled with an exudative membrane, (occlusio pupillæ). So deceiving may this membrane appear that I have known a famous physician diagnose it as cataract with the unhappy result that, following iris bombé, second-ary glaucoma set in, so that not alone was the sight lost but, owing to the pain, the eyeball had to be removed.

Practitioners seem to find it difficult to distinguish between con-junctivitis, iritis, and acute glaucoma. It is not such a serious thing to mistake conjunctivitis for iritis. The presence of atropine in con-junctivitis, although unnecessary, will not do harm, but if the atropine were instilled when acute glaucoma is present, then a catastrophe may quickly ensue through the rapid rise of tension. You wish to dilate the pupil with atropine in iritis, but that is the worst possible treatment for glaucoma. In glaucoma you strive to reduce the size of the pupil.

I have said above that the congested iris tends to contract the pupil, whereas in glaucoma the pupil is usually enlarged slightly and somewhat oval with its long axis vertical. In iritis it is the common rule for the tension to be lowered, whereas in glaucoma, when the eyeball is gently pressed upon by the fingertips, the tension is found to be raised.

The diagnosis between the two latter conditions is often extremely difficult, and here may I say that the practitioner should not take the responsibility of making a diagnosis if the services of an ophthalmic surgeon are available. How difficult it is to explain to a patient that if they had been seen before vision was destroyed, the eye together with its vision might have been saved. The practitioner gains more kudos by recognising that both iritis and glaucoma are severe and destructive diseases. Atropine had been omitted in the cases of iritis and had been given in those of glaucoma.

The redness of the eye is more uneven in glaucoma than in iritis. In the latter there is a bright purplish pink zone around the sclero-corneal margin.

Perhaps it would be well to enumerate the chief symptoms and signs of iritis. Pain of a neuralgic character referred not only to the eyes but also to the supra orbital region, and diminished vision due to cloudiness of the aqueous and exudates in the pupillary area. If a mydriatic has not been instilled, the pupil is somewhat contracted

and slightly irregular. The iris has a muddy appearance while there is ciliary congestion around the limbus. If a drop of 2 per cent. homatropine is instilled the iris dilates with an irregular pupillary margin. One can quickly neutralize homatropine with eserine, but this cannot be done when atropine has been instilled.

The commonest cases an ophthalmic surgeon sees are simple cases of toxic iritis. Pain is a marked feature, but the exudates are not of marked amount, although given time eyesight can be greatly diminished through lack of the use of atropine. In young people one associates the condition of the naso-pharynx as a cause. In adults, teeth may be at fault, while in women, particularly young women, the disease may be associated with a pathological condition of the pelvic organs.

If one divides the various types of iritis as primary and secondary, then we may as well adopt the classification of Fuchs :—

A. Primary Iritis.

Iritis in con-	1.	Iritis syphiliticus.
sequence of	2.	Iritis gonorrhœica and focal iritis.
general dis-	3.	Iritis in acute infectious diseases (iritis metastatica.)
eases.		
	4.	Iritis in disorders of metabolism.
	5.	Iritis tuberculosa.
Iritis as a local	1.	Iritis traumatica.
affection.	2.	Iritis sympathetica.

B. Secondary Iritis.

We will dismiss secondary iritis by merely mentioning that it develops through transference of inflammation, say of the cornea or sclerotic.

Briefly taking each of the primary forms in turn :—

Syphilis is a common cause of iritis, and for the most part it is acquired syphilis that we have to do with. If yellowish red nodules of the size of a pin's head are seen on the iris, the diagnosis of syphilitic iritis is not difficult. The nodules are usually situated in the pupillary border of the iris or may be found in the ciliary border. Syphilitic iritis generally belongs to the secondary stage of syphilis, sometimes as early as the third month after infection. Usually however, it is within the first year that it is seen. The nodules therefore, are not gummata, and they never break down nor suppurate.

Iritis also occurs in congenital syphilis. I have seen it in cases that had suffered from Interstitial Keratitis twenty years previously. Such cases, needless to say, had not received specific treatment. Sometimes in these congenital cases there may be a severe iritis associated with keratitis, but there is always some degree of iritis. Hence

the necessity, as I have said in a previous chapter on Interstitial Keratitis, for atropine.   ...

Focal iritis, as I have said before, is generally associated with septic pockets at the roots of dead teeth, etc.

In English Hospitals possibly the commonest cause of iritis is the gonococcus. It occurs often years after the infection, and in one case I saw recently and where I diagnosed gonorrhoeal iritis, infection had taken place 19 years previously. By the rectal massage of the prostate, the gonococcus was found and recognised on the microscopic slide. The exudate of gonorrhoeal iritis is not so plastic as that of syphilis, but it has a peculiar gelatinous appearance. It can become completely absorbed although it may appear at first to fill the anterior chamber.

Metastatic iritis. A case of mine will illustrate this. An elderly gentleman suffering from pneumonia, the crisis of which had just been passed, was found to be suffering from pain and diminished vision in one eye. He was suffering from a true pneumococcal iritis. This is a peculiarly destructive form of iritis.

Metabolic iritis is seen in intestinal autotoxæmia, gout, arthritis deformans, sometimes in cases of diabetes.

Iritis tuberculosa. Young people may suffer from a tuberculous form of iritis. They are pathologically of the type known as scrofulous. The deposits are large and lardaceous looking.

Traumatic iritis is caused in many ways. Perforation of the eye by a foreign body, operation such as cataract extraction, blows on the eye and dislocation of the lens.

Finally iritis sympathetica. When an eye is affected with irido cyclitis in consequence of an injury symptoms of irritation or inflammation may develop in the other eye.

I need not go further into this condition. It is one for which the general practitioner should never on any account make himself responsible. The possibility of complete blindness is one of the most serious calamities the ophthalmic surgeon has to face. The responsibility of such a catastrophe is indeed great.

MEDICINE AND LAW.

by

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I.

A MURDER TRIAL.

A plea for Revision of the existing Law relating to Insanity.

On the 4th of July, 1929, at the High Court of Justice, Hong Kong, the Jury returned a verdict of "guilty" of murder, on a Chinese youth, after a very fair and long trial.

Upon the decision in this case much legislation centres and both to the medical-jurist, and barrister, the case is unusually instructive, as it opens up the wide limits of the Law, and reveals its possible narrow interpretations to a degree which is almost incredible in these enlightened days of advanced scientific medicine.

The facts are :—

1.   Murder had been committed upon two sampan girls, early this year.

2.   A certain Chinese youth was arrested.

3.   The accused's insanity was queried by Counsel for the Defence.

4.   The Attorney General made it possible for the writer to carefully examine the accused, with a view to reporting upon his mental status.

5.   The Defence was allowed by the Crown to use the medical evidence.

6.   A plea of insanity was raised by the Defending Counsel.

7.   The report of the medical jurist was to the effect that no evidence of insanity was found, and that " no facts of insanity had been communicated to me by others." . . . . but that we had evidence, which could be produced in Court of Law, to show that certain mental mechanisms were working abnormally, namely repression, and projection; and obsessional neurosis in the form of morbid impulses were revealed.

8.   The medical evidence which was necessarily of a highly scientific nature, was accepted by the Judge, who commented upon its fairness to both sides.

9. The Defence overstretched the point of insanity, which had never been made by the medical jurist, instead of pressing the point of irresistible impulse.

10. It followed that the Crown pressed the McNaghten ruling of 1843; which ruling is frankly disregarded by some judges* . . . . the Crown pointing out that it was reconsidered in 1924 and upheld by the deciding committee.

It is understood that a man who cannot plead will not stand for trial : hence justice is attained in many cases of definite insanity. If a man can plead and is considered insane, his defending counsel will endeavour to prove to the Court beyond all reasonable doubt that insanity exists, and this requires the services of a medical witness trained in Lunacy. Should an insane man be convicted, and entered as " guilty," the Home Office in England, and the Powers That Be in Hong Kong, order an independent inquiry by two medical experts unfettered by the chains of the Law into the prisoner's condition : this also applies even if the man is sane, but a defence of insanity has been raised. Borderline cases are also dealt with this way. If then considered insane, the accused is detained during His Majesty's pleasure in a Criminal Mental Hospital.   ·

Medical Evidence was to the effect that the accused was a borderline case; that is in a transitional stage between sanity and insanity, which is a curable stage.

The McNaghten ruling of 1843 states, " to establish a defence on the ground of insanity, it must be clearly proved that at the time of committing the act the party accused was labouring under such a defect of reason from disease of the mind as not to know the nature and quality of the act he was doing, or, if he did know it, that he did not know he was doing what was wrong."

The difficulty arises in cases in which, owing to absence of delusions, insanity is not obvious to the lay mind, and in cases where, though insane, prisoner's conduct or speech has shown that he was aware that he was doing wrong (the case of Ware who was indicted for murder at the Shropshire Assizes in 1885 is an excellent instance of this). Had the so-called Legal Test been applied in this case, the accused could not have been found insane, although it was common knowledge that he was.

It should be remembered that forms of mental unsoundness of certain types will give rise to difficulty in criminal courts, as they cannot be readily recognised, delusions being absent, or not easily demonstrated as in manic-depressive insanity, chronic delusional insanity, masked epilepsy, moral imbecility, and cases of early G.P.I.; and *borderline cases* or conditions of weak-mindedness, in which the

* See page 150.

individual is partially responsible for his acts, in some cases. *The test should be presence or absence of power of self-control:* i.e. volition rather than cognition. In all doubtful cases, as in this, where there is the least doubt as to a persons power of control, the most cruel of juries should, when they enter a verdict of " Guilty," and are not satisfied as to the prisoner's sanity or insanity, add a rider " with recommendation to mercy." Hence justice will be attained, which after all is the purpose of the Court.

Now to come to our borderline case, who has, through the verdict of the jury, had to pay the penalty of death. This condition is also known under the names of " impulsive insanity," " irresistible impulse " and so forth.

It is a condition in which strong morbid impulses may be present, without other signs of mental disorder. They are frequent manifestations of mania, melancholia, and other disorders and often belong to one or other of these categories in which other signs of mental impairment have not yet been clearly developed or perhaps overlooked. The question of responsibility is very difficult to determine, indeed, when a serious criminal act has been committed by a borderline case. Sometimes acts of terrible violence are committed under the influence of morbid impulses. Epilepsy is frequently at the bottom of such acts, and in other cases obsessional neuroses which are definitely borderline (see article on " Lunacy Made Lucid " *Caduceus:* February 1929 p. 22 Vol. 8 No. 1). The condition may recur after a long period of apparent sanity.

Absence of motive is a strong point in any criminal's favour, when morbid impulse is put forward as a defence to a charge of murder. Again when committed against a friend, or stranger, would also be in his favour. It should be remembered that the subject of a morbid impulse will make no attempt to conceal his act or escape arrest. Moreover, he may profess total ignorance of the crime in which case a history of epilepsy may be obtained. It is nevertheless true, that morbid impulses of the borderline obsessional neuroses are often more mild, and may even be silly and harmless acts, such as tapping every lamp-post with a stick, as these are passed when out walking. Nevertheless it is equally true that morbid impulses of the obsessional neuroses group in borderline states range from the silliest of actions, to the most serious of crimes. So much for the relation of these acts to insanity.

We shall now consider the workings of these mental mechanisms, (see " Mental Mechanisms, Dreams and their Interpretation " *Caduceus* November 1927 pp. 333-356 Vol. vi, No. 3) and ask ourselves the question, " Are they working normally, or abnormally?" Let us first consider the mental process of *repression.* Repression is a barrier which prevents some of our thoughts from reaching consciousness

. . . it is the *brain policeman,* and in so far as it acts to that extent it is a normal process, and is present in all of us. Take for example those who are literally incapable of seeing facts which contradict their cherished theory, or the mother who cannot believe that her child has a squint, which is so obvious to everyone else : all these are instances of repression, and are within reasonable normal limits. When the process exceeds this boundary it is considered abnormal, as in epilepsy where the knowledge of crime committed is so completely repressed that no known power on earth can bring the fact into consciousness. If eventually it does reach consciousness it is not recognised, as by then the process of *conversion* has come into play, whereby repressed ideas manifest themselves in consciousness, and not indeed as any form of mental activity at all, but as bodily symptoms : this is seen in conversion hysteria. After very careful investigation, it was proved that complete repression was at work in the prisoner.

The mental mechanism termed *projection* was also proved to be working abnormally, the proof of evidence being beyond all reasonable doubt. This process may be described as a compromise which certain minds can adopt between the repressed material and the repressing force. The existence of painful facts is more or less admitted but are not actually associated with themselves, and are disposed of by being fitted on to someone else. " Those girls may have been killed " says the patient in effect, " but I cannot tell you who did it, unless it was so-and-so." The deed which is associated with himself, is projected on to someone else, or even the patient may claim to have killed somebody, but assures us that it was not the girls, but the girl's father. Remember that it is the cantankerous man who reproaches every one with ill-temper, and there is no one so suspicious of others as the person who is himself deceitful. This mechanism is of extraordinary importance in connection with methods of treatment and in the formation of some of the most striking symptoms of nervous and mental disease. Hallucinations are also very often to be explained by projection, the patient projecting self-reproaches so completely that they appear to come from without as actual reproving or threatening voices.

·The prisoner suffered from the obsession that the father and the girls were going to kill him, and that he must run away to safety (and so he did to Macao); the obsession was always fixed in this direction, and he was very serious and persistent : this obsession must not be considered as of the obsessional neuroses, which consist of three types (1) indecision, (2) fear and (3) morbid impulses, which from their subdivision will be seen to be of a different nature.

The accused was shown to be of low mental grade (see " The Mentally defective Child " *Caduceus* Vol. vi, No. 2, July 1927, pp. 203-207).

Now how does the Law differ from Medicine. In the first place it is stated that medicine is the higher profession and is progressing on scientific lines daily: the Law may be likened to a rock which gets battered with rough seas and only as decade after decade passes, can any appreciable alteration be seen, and hence the Law often appears to be much out of date and lacking in many essentials, but it is even then surprising how justice, which is the aim of all law, is meted out, with few exceptions. The Law is rigid, and in many ways pig-headed, and says . . . if this man did know that what he was doing was wrong, then he cannot be considered insane: this is of course absurd. Law reports are full to overflowing with concrete exceptions to this rule of theirs, but it is only with the passing of the years, that we may hope to see the Law attempt to keep strides with the ever flowing stream of Medicine. The Law lays hold of cognition as its criterian, but Medicine stands by volition. The fact that many judges ignore the ancient McNaghten decision* shows that even the keen eyes of the Law must face the bright lime-light of up-to-date Medicine.

We must be prepared to face reality, and admit that there is a beginning to everything, and therefore a man may be neither sane nor insane. The Law should take the view that if a prisoner is neither sane nor insane, then he certainly is not sane, and they must be prepared to accept proof in terms of psychological medicine, which means that on such occasions a special jury will sit, and if necessary a medical-jurist together with the judge, to consider the value of such scientific evidence and whether or not such is in the interests of justice. In cases of murder, I hold that judges should accept any corroborative evidence which Counsel on either side may wish to quote from any recognised authority on medical jurisprudence, and not keep strictly to ordinary jurisprudence which may be considered as " the lay press " so far as Medicine is concerned.

The motive in this case was not proved to be robbery, as there were many things to show to the keen observant eye, that the incomplete " attempted " robbery was not premeditated.

And so one might go on, but my purpose in criticising the Law is in order to suggest to those in high places how easily these short-comings may be rectified, almost in the twinkling of an eye. This plea for revision of the Law may be hard criticism to swallow, but we must face the naked truth, which is powerful, and will ultimately prevail. *Magna est veritas, et prævalebit.*

* See page 150.

II.

CRIMINAL RESPONSIBILITY.

With special reference to the McNaghten Decision.

Never was there a more difficult problem to solve: in reality the problem still remains unsolved. It must be solved.

If only unanimity of opinion existed between doctors and lawyers, the solution would be close at hand, but medicine and law stand widely apart on opposite banks of this unknown river of insanity. The doctor deals with personality rather than symptoms of disorder, but to the lawyer all crime is crime: the doctor is the saviour of the individual; the lawyer the saviour of society. The difference by no means stops here: the law thinks of a mind dominated by reason and freewill, and medicine thinks in terms of functions actuated by emotion, and determined by intrinsic factors. To the legally trained mind everything is consciously known, whereas to the medical mind much is unconscious and unknown.

Do you know that 25% of criminals suffer from some degree of mental disorder or defect? Why does the Law not take this into consideration? Here comes the criminal convicted, sentenced, and released, only to reappear on similar or other charges in the course of time: how often do we see this in Hong Kong! Enough discrimination has not been used in deciding whether a plea of mental disorder should be entered; and even if so entered.

Mental disorder in relation to crime must be referred to under two distinct classes: (*a*) those of minor crime where the accused can be certified under Section XV of the Lunacy Act of 1862, and (*b*) those of murder or serious crime, in which a plea of mental unsoundness is raised. The law wrongly presumes that every person is innocent until he is proved guilty, and that every person is sane until he is proved insane. Hence the onus of proof lies with the Defence.

Criminals suffer from the same forms of illness of the mind that comes to the average member of the community.

When a plea of mental disorder is put forward, it should be clearly defined. Theories should be ignored, and only medical facts dealt with.

Mental disorder does not come as a bolt from the blue. There is usually a history extending over a variable period, of strange conduct, for which even medical advice may have been sought. When a medical man has not been consulted, it is most likely that the person's conduct has never apparently differed from normal sufficiently to raise any question of mental unsoundness in those around him. It is fair to assume that as a general rule a person committing a crime

who was looked upon by the majority of his fellow-men as an ordinary individual previous to committing this crime, is sane.

Lesser offences, such as larceny, sexual offences, etc., are frequently the result of a disordered mind, far more so than the Bench will admit, and there is little doubt that these cases of disordered mind are used as the tools of the more cunning and crafty hardened practiced criminal, as they are very easily led, and most susceptible to suggestion (this cuts both ways, and therefore the Bench might remember that advice from them will often carry more weight with such individuals, than a multitude of punishments). They are far more sinned against, than sinners, themselves.

There are cases which would be better dealt with in some other place than either prison or mental hospital, in some type of penal colony, where the Government could get good value for their money spent in keeping the law : this colony should be administered by a medical man, under prison regulations, and there is no question as to the economic success of such an institution, as the labour could be productive; and moreover society in general, prisons, and mental hospitals would be protected against a class of criminal who is unresponsive to ordinary measures. Such a system would give the prisoner a chance of readjusting himself to normal and better life. To complete the plan, an Alienist should be attached to the criminal courts so that difficult cases as well as doubtful ones, could readily be referred to him.

The position is even more difficult in cases of capital crime, as the current law on this subject was formulated as long ago as 1843 in connection with the case of McNaghten who was tried for the wilful murder of Edward Drummond, private secretary to Sir Robert Peel. The story is that for many years McNaghten had suffered from delusions of persecution, and had attempted to escape from his persecutors by leaving his home in Scotland, and going to England, and also visiting the Continent. Frequently he passed his nights in the open air away from folks, apparently for the same reason. Not infrequently he had complained to his parent and to certain public authorities of these " persecutions " but his complaints were more or less ignored. Time passed and he became much embittered and at last was determined to right his wrongs in his own way, by murdering Sir Robert, and with this purpose in view, carefully watched the movements of the Peel house. One day he saw Drummond come out, and under the belief that it was Sir Robert, he fired upon him, and killed him. The Defence entered a plea of " partial insanity " (homicidal monomania). On these grounds the accused was certified and sent to a criminal mental hospital. A great sensation followed, the press being full to overflowing with searching criticism, and so a few days after the famous trial, a discussion took place in the House of Lords and the only opinion

generally was shown in the form of diversity. Brougham and Cotten-ham both expressed antagonistic views. Lord Brougham said, " If the perpertrator knew what he was doing, if he had taken precautions to accomplish his purpose, if he knew at the time of doing the desperate act that it was forbidden by the law, that is my test of insanity; and care not what judge gives another test, I shall go to my grave in the belief that it is the real, sound and consistent test."

Lord Cottenham considered it was " wrong to listen to any doctrine which proposed the punishment of persons labouring under insane delusions. It was inconceivable that the man who was incapable of judging between right and wrong, of knowing whether an act were good or bad, ought to be made accountable for his actions; such a man had not that within him which formed the foundation of accountability, either from a moral or legal point of view. I con-sider it strange that any person should labour under a delusion and yet be aware that it was a delusion; in fact, if they were aware of their state there could be no delusion."

This discussion resulted in the House of Lords resolving to put certain questions to judges, as follows : —

1. What is the law respecting alleged crimes committed by persons afflicted with insane delusions in respect of one or more particular subjects or persons; as for instance, where at the time of the commission of the alleged crime the accused knew he was acting contrary to law, but did the act complained of, with a view, under the influence of insane delusions of redressing or revenging some supposed grievance or inquiry or of producing some supposed public benefit?

2. What are the proper questions to be submitted to the jury when a person afflicted with insane delusions respecting one or more particular subjects or persons, is charged with the commission of a crime (murder for instance) and insanity is set up as a defence?

3. In what terms ought the question to be left to the jury as to the prisoner's state of mind at the time when the act was committed?

4. If a person under an insane delusion as to existing facts commits an offence in consequence thereof, is he thereby excused?

The last and fifth question does not concern us.

The judges' replies were as follows : —

1. We are of opinion that if the accused person did the act complained of under the influence of an insane delusion, but with a view to redress or revenge some supposed grievance or injury, or to produce some public benefit, he was nevertheless punishable according

to the nature of the crime committed, if he knew at the time of committing such crime that he was acting contrary to law.

2 and 3. We hold that in order to establish a defence on the ground of insanity it must be clearly proved that at the time of the committing of the act the accused was labouring under such a defect of reason from disease of the mind as not to know the nature and quality of the act he was doing; or if he did know it, that he did not know he was doing what was wrong.

⸱ 4. We hold that a great deal depends on the nature of the delusion, but we stress the fact that if the delusion was only a partial delusion, and if otherwise the individual was not insane, that he should then be considered responsible for the act. We believe that if, under the influence of his delusion, he supposed another man to be in the act of attempting to take his life, and he killed that man, as he supposed in self-defence, he would be exempt from punishment. If his delusion was that the deceased had inflicted a serious injury to his character and fortune, and he killed him in revenge for such supposed injury, he would be liable to punishment. According to this reasoning an insane person may then kill a man with impunity if he believes he is doing it in self-defence, while he is punished by death for a homicidal act which results from the belief that the victim was ⸱ spreading slanderous stories about him.

Then followed a whole host of criticism. *Lord Bramwell laid down the striking statement that " Nobody is hardly ever really mad enough to be within the definition of madness laid down in the judges' answers."*

Lord Coleridge, who was in 1888, the Lord Chief Justice of England, said that he considered " the judicial decisions on questions of insanity were bound by an old authority which, by the light of modern science, was altogether unsound and wrong." Two years later the same Peer stated that, " it was said by a legal authority when I was a young man, that if a person was found guilty of murder he should be hanged whether he was insane or not, for if he was sane he deserved it, and if he was mad it was to him no harm. Is not that what the judicial decision really amounts to in actual fact."

Sir James Fitzjames Stephen, a well-known legal authority, wrote, that, " the man's power of controlling his actions should be the test. The proposition which I have to maintain and explain is that if it is not, it ought to be the law of England that no act is a crime if the person who does it is at the time when it is done, prevented either by defective mental power, or by any disease affecting his mind from controlling his own conduct, unless the absence of the power to control has been produced by his own default."

Lord Blackburn states. . . "You must take it that in every individual case you must look at the circumstances and do the best you can to say whether it was the disease of the mind which was the cause of the crime, or the party's criminal will."

You will see that even the highest of all legal opinion has very great difficulty at all in reconciling the answers given by the judges in the McNaghten case to the present day conditions. The McNaghten rules stink of the old decaying and ancient medical doctrine of the faculties of the mind—the mind in those days being considered in water-tight compartments, instead of as a whole, in their opinion reeking with age, thinking that cognitive faculties of the brain were one of the large subdivisions of the mind. The idea of partial insanities also flourished with this doctrine. Time waits for no judge, and it is well for the legal authorities to remember that the mill will never grind with the water that has passed. The world has changed since then; medicine has changed since then; and so has mankind; but the law is the moss-covered rock, upon which only the surgeing billows of the sea of time can make any impression at all, and then it is only very slight. The changing views of to-day have led us to believe that there is no mental disorder, however partial in outward appearance, that does not have its reverberations throughout the rest of the afflicted mind. Hence it is well for the law to mark . . . learn . . . and inwardly digest the fact that as a consequence the purely intellectual criterion of responsibility falls to the ground, for the intellect as intellect may remain unimpared, but an emotional disturbance will alter or impede or nullify its effect on conduct. There is no allowance made for the all too well known conditions of intra-psychic ataxia of schizophrenia, post-hypnotic and epileptic automatisms, and the overwhelming influence of disorder, which may for instance cause a depressed parent to murder his (or her) children whom he (or she) loves, and which act they full well know to be morally wrong.

It amounts to this, that whereas it is nominally required in trial of a person pleading lunacy in extenuation of a crime that evidence be taken bearing both on his general state of mind at the time of commission of the crime and on his particular knowledge of the moral nature of the act : it is to this later (knowledge of criminal act) that attention is almost entirely devoted by the Court, and consequently it frequently happens that one who from a general review of his mental condition was undoubtedly a lunatic at the time of the act, is now found sane in respect of the commission of the criminal act, and hence the absurd fact stares us in the face, that a person can legally be hanged for murder, and yet be considered by the very same court as totally unfit in mind, to take care of himself or his property. There is a proviso in the Criminal Lunatics Act of 1884 Sect. 11, Subsect. IV, to the effect that when the Secretary of State is informed

by any means that there is good reason to believe that a person under death sentence is insane, two or more legally qualified medical practitioners shall be appointed to examine the said prisoner and to carefully inquire into his insanity, unfettered by any legislation. If the result of the examination by the majority of them leads to the diagnosis of insanity, the Secretary of State has power to direct the detention of the prisoner during His Majesty's pleasure in a criminal mental hospital. In the case of Ronald True who was tried at the Old Bailey, in London, in May 1922, the verdict of " insane, but worthy of punishment " was provisionally entered, but the accused was eventually exempted whilst awaiting the execution of his sentence. McCardie who presided at the Trial, in summing up, pointed out that the doctors had unanimously certified True as insane now, and at the time of the crime, . . . but the duty of the jury was to consider whether he was insane at the time of committing the offence *within the meaning of the Criminal Law*. He said that the doctors view of insanity was one thing, and the outlook of Criminal Law was quite another. This resulted in the verdict finally being entered as '' wilful murder '' and the death sentence was accordingly passed. The case was brought to the Court of Criminal Appeal, and there the finding of the jury was upheld. From there the case was brought before the Home Secretary, and three doctors of Medicine were appointed by him to examine True, and the diagnosis was that True was insane, and he was accordingly certified and detained during His Majesty's pleasure at a criminal mental hospital on the ground of *irresponsibility*.

The last phase of the famous McNaghten decision, came later in the year 1923, when the Lord Chancellor appointed a *Legal Committee*, presided over by Judge Atkin, to consider and report upon what changes, if any, were desirable in the existing law, practice and procedure relating to criminal trials, in which a plea of insanity is raised by Defending Counsel. *The rules formulating the McNaghten decision were upheld, but one addition was made* and recommended that it should be recognised *that " a person charged criminally with an offence is irresponsible for his act when the act is committed under an impulse which the prisoner was by mental disease in substance deprived of any power to resist."* Hence the plea of uncontrollable impulse makes the situation still more complicated than ever. All fair minded people should bear in mind that every criminal act is an impulsive act, and the plea of impulse could therefore be set up in every criminal trial. A Council of twelve High Court judges was appointed to consider this ruling, but the ruling was not upheld, ten judges voting against it, in 1924.

What of the Future?

We need a new law based not on a legal committee, but on the findings of a committee of alienists of first rank, who have a far

better grasp of insanity in all its winding maize, than any ordinary legally qualified practitioner of medicine or of law. With whom then does the next move rest? Obviously with the Powers That Be, and it is for them to advance with the times, and to face the reality of facts that the Law is out of date, and that it is high time that it was revised by those who are best trained in this most interesting subject of insanity, upon which vast territory our knowledge has only as yet just placed its footing, with a view to exploration, mapping out its fields, its towns and cities, its hills and valleys, and all that they can teach us, including that as yet almost unknown realm of dreams, the mechanisms of which if only carefully studied can unfold to us wonders of worlds as yet unknown, and powers that are surely and inevitably guiding the world, and at this very hour are influencing you and me. The day will come when men shall laugh at the absurd ideas of our present-day law upon insanity, and experts will wonder and marvel at our ignorance on these matters. See to it that we lay not ourselves open to ridicule in the days that are to come, but that now, in this Year of Our Lord, One Thousand Nine Hundred and Twenty-Nine, we prepare for the New Era which is fast coming, and that we be not found negligent in our legislature of the Land we so dearly love.

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*   . , Lord Chief Justice Cockburn in House of Commons.
    BREND'S HANDBOOK OF MEDICAL JURISPRUDENCE AND TOXICOLOGY 4th Ed. (1922) p. 160, "Some judges frankly disregard the M'Naughten ruling, and sum up in such a way as to show their belief in the prisoner's irresponsibility."

    TAYLOR'S PRINCIPLES AND PRACTICE OF MEDICAL JURISPRUDENCE Vol. 1, 1st Ed. (1928) pp. 833—848, . . . two High Court judges in 1924 wished to accept the recommendations of the Lord Chancellor's Committee (November 1st, 1923) that, "it should be recognised that a person charged criminally with an offence is *irresponsible* for the act when the act is committed under an impulse which the prisoner is by mental disease in substance deprived of any power to resist" (italics are mine), etc., etc., etc. The plea of irresistible impulse was advised against by ten out of twelve High Court judges.

    "The legal test of a knowledge of the nature of the crime or of right and wrong, may result in inconsistent and even conflicting verdicts" (p. 837).

    STEPHEN'S HISTORY OF CRIMINAL LAW OF ENGLAND Vol. 3, Ch. XVII, p. 171 "It is as true that a man who cannot control himself does not know the nature of his acts as that a man who does not know the nature of his acts is incapable of self-control."

    MERCER'S CRIMES AND CRIMINALS (1918) states emphatically that we have and can have no knowledge of an irrestible impulse; all we can know is that it was not resisted.

    KENNY'S OUTLINES OF CRIMINAL LAW (1926) p. 54.

    R. v. Crank 12 Cr. App. R. at p. 27.

    R. v. Farmer. York Spring Ass. 1837.

    R. v. Gould. Durham Sum. Ass. 1845.

R. v. Allnutt. . . . (Rolf, however said " If it was made an excuse for a person who had committed a crime that he had been goaded to it by some impulse which medical men might choose to say *he* could *not* control, such a doctrine would be fraught with great danger to society."

R. v. True (1922) 16 Cr. App. Cas. 165.

R. v. Bond, b.m.j., 1904 1 p. 406.

R. v. Harold Jones. Monmouth Ass. November 1921 (Lancet 1921, 1, 1922).

R. v. Rodgers. Camb. Spring Ass. 1904.

Marc. (Op. Cit.) Vol. 1 p. 56. " pronounced ' not guilty ' on the ground that he was not at the time conscious of his actions."
Edin. Month. Jour. February 1863, p. 772.

R. v. Edmunds. C.C.C. January 1872.

.R. v. Dodwell. C.C.C. 1878.

R. v. McQueen (1912) 8 Cr. App. R. 89.

THE REDUCTION OF ALKALINE FERRICYANIDE BY ADRENALIN AND URIC ACID.

by

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This note is to report that alkaline ferricyanide is reduced rapidly at room temperature by adrenalin and uric acid respectively. To ascertain the reducing power of these two substances towards this reagent, a preliminary method has been worked out which depends upon (a) the isolation of the ferrocyanide produced as Prussian blue, (b) the decomposition of the latter by means of NaOH, and (c) the titration of the $Na_4Fe(CN)_6$ separated with $N/100$ $KMnO_4$ after adding H_2SO_4. By this method, it has been found that 1 mg. of uric acid (Merck's) reduces at room temperature in 10 minutes 7.94 mg. $K_3Fe(CN)_6$ in 2 per cent. Na_2CO_3 solution; and that 1 mg. of adrenalin (Parke, Davis') reduces under similar circumstances 14.12 mg. of $K_3Fe(CN)_6$. If, however, the reaction mixture were heated in a bath of boiling water for 10 minutes, there would be an increase of the reduction amounting to 27 per cent. for uric acid, and 5 per cent. for adrenalin. Apparently the alkaline ferricyanide oxidizes in the cold adrenalin more completely than uric acid.

The reducing reaction of uric acid in particular should deserve some special consideration since alkaline ferricyanide has recently come into general use for the determination of reducing sugar in blood, (1, 2, 3) and in urine (3). So far as I can search among the original references accessible to me, I find nowhere mention made regarding uric acid as a possible source of error in such sugar determination. Inferring from Folin's result (2) that the ferricyanide method gives usually a lower blood sugar than the copper method does, it seems that the last named as well may be subjected to the same error. The reduction of Fehling's solution by uric acid has long been known. The substitution of Na_2CO_3 for NaOH in the other reagents might have only remedied this defect to some extent. This being the case, it is evident that, in order to obtain an accurate estimation of blood or urinary sugar, the uric acid present should be either eliminated from the beginning or deducted at the end.

For the precipitation of uric acid and its subsequent removal by filtration or centrifugation, various reagents have been tested. Silver lactate as used in the Folin-Wu uric acid method (4) seems to be the most efficient. Mercuric sulphate as recommended by West and co-workers (5) for the determination of "true sugar in blood" is only partially effective.

Since uric acid reduces alkaline ferricyanide in the cold and glucose does so only at elevated temperature, this difference may be taken advantage of for the determination of the latter in presence of the former. In this connection, a factor must be, however, introduced to account for the increased reducing power of uric acid by heat. An investigation is being undertaken to see how well such modification may be fitted into the various ferricyanide methods for the determination of reducing sugar in blood and in urine. Pending further report, I may say now that Van Slyke's gasometric method (3) seems to promise the best. Moreover it will furnish also a very simple and convenient method for the determination of uric acid alone.

For correcting the result of sugar determination by any one of the ferricyanide methods, the uric acid present may also be separately estimated by Benedict's (6) or Folin's (7) colorimetric method and its equivalent value to ferricyanide or ferrocyanide calculated. The separate estimation of uric acid would be done as a matter of course in the systematic analysis and all we need then is to apply the correction obtained thus to the sugar figure.

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Editorial.

The article which we publish in this issue on Malaria from the pen of Dr. Wellington needs no introduction or amplification in an Editorial, but it does merit a hearty recommendation to all our members especially those resident in Hong Kong.

In this article, which we sincerely hope is but the first of a valuable series, the writer introduces to us the other host of the malarial parasite—the anopheline mosquito.

The reasons why man first came to suspect the mosquito as an agent in the spread of malaria, and how medical detectives, after years of patient work put together piece after piece of evidence, until the judges of the scientific world could not but admit the guilt of the mosquito, forms reading as thrilling as any modern detective story, and the voluntary contraction of the disease by medical research workers shows that the war against disease calls for bravery no whit less than wars between nations.

The writer very aptly states :

" Before you can eliminate anything with surety you must know something about it, and the more you know the more chance you have of succeeding."

Ridding this Colony of malaria is only one of the many difficult tasks before the medical profession, but in co-operating in one direction we help the leaders in their efforts directed elsewhere, and by becoming acquainted with the first principles of mosquitology as set out in this article, we are rendering ourselves more capable of taking an active and useful part in conquering malaria. We cannot all be experts in this branch of medicine for it is a subject whose size is unlimited and borders unknown, but we should all be capable of taking up a portion of the work if called upon, and the more we know to start with, the smaller will be the " hat full of eyes " we will spoil.

Clinical Notes.

I

THE CUNNING WAYS OF SYPHILIS.

by

Alexander Cannon.

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Physician, Colonial Medical Service.

The cunning ways of syphilis are many : a few are known, and many are still unknown. Gauchei says that " syphilis constitutes one-third of human pathology." Virchow strikes a sharper note, when he states that syphilis is the soul of pathology, and the ever prevailing " capital " from which the physician can forever draw his income, " until man's body shall crumble to dust."

A picture will tell its tale in a way that is more forceful than a multitude of words. Suffice it to say that in the cases photographed, eight plates of which are reproduced here, the diagnosis of syphilis has been confirmed by history, signs and symptoms, Wassermann reactions, and by the opinion of two eminent physicians, who have carefully studied the reports, and over one hundred photographs of the cases from which these have been selected.

With reference to treatment, a word might be said as to the special method by which all the cases are being treated. No drug, either internally or externally has been used. The sole treatment being in the form of the patients own blood, removed from the median-basilic vein, and immediately injected slowly into the buttock, every other day, in quantities of 5 c.c., with 5 c.c., of sterile water (auto-haemo-therapy). There is no reaction, no pain, and all our cases have responded to this treatment, the rashes clearing up slowly as compared with other skin diseases, and the Wassermann reaction becoming negative within three or four weeks, in the most obstinate of cases.

The *rash* can simulate any skin lesion. Fig. 1 shows the usual rash, with which all will be familiar. Fig. 2 simulates some types of tuberculosis; Fig. 3 is slightly leproid in character, whilst Fig. 4 is more so. Fig. 5 shows the individual rash appearing similar to tinea, whilst the several isolated types follow the nerve as in herpes. Fig. 6 was diagnosed as probably an isolated form of leprosy, and another seriously considered some of the rare forms of erythema multiformi : in fact it might be anything, had one not the confirmatory diagnosis. Fig. 7 was diagnosed one of leprosy, and by another as psoriasis, or may be lepra, whilst a skin specialist assures me that it is syphilitic, and that the laboratory and other tests are definitely confirmatory : in fact until a few days ago the Wassermann reacton was " strongly positive." Fig. 8 is from the same case. Note that plates 1, and 2 are from the same patient; 3, 7, and 8 from another patient; and plates 4 and 6 from still another patient. Fig. 5 is from some other patient in our series of nearly eighty cases, to date.

My motive in bringing these rashes to the notice of all, is to

call to mind some of the uncertain ways of this very certain disease, and to emphasise the cunning ways of this " one-third of human pathology " which we know by the name of syphilis.

(The notes on the skin are made by using a Chinese pen (brush) and Tinc Iodi Fortis: the brown colour appears black on the photograph.)

P.S.—Since writing this note, it has been observed that in European patients a little pain is felt after 7 or 8 c.c. of the blood and water have been injected. This has been completely overcome by using 10 c.c. of the patients blood with no addition of water, the injection being then also painless in Europeans.

Fig. 1.

Fig. 2.

The writing cards shown in Figures 1 to 8 are of
standard size 5" x 1½" and may be used for mensura-
tion purposes.

Fig. 3.

Fig. 4.
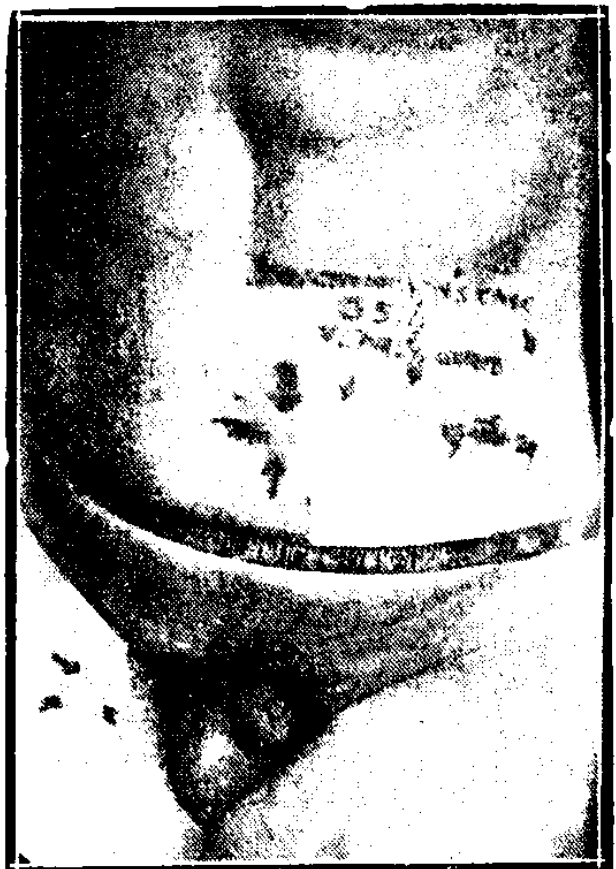
Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

2
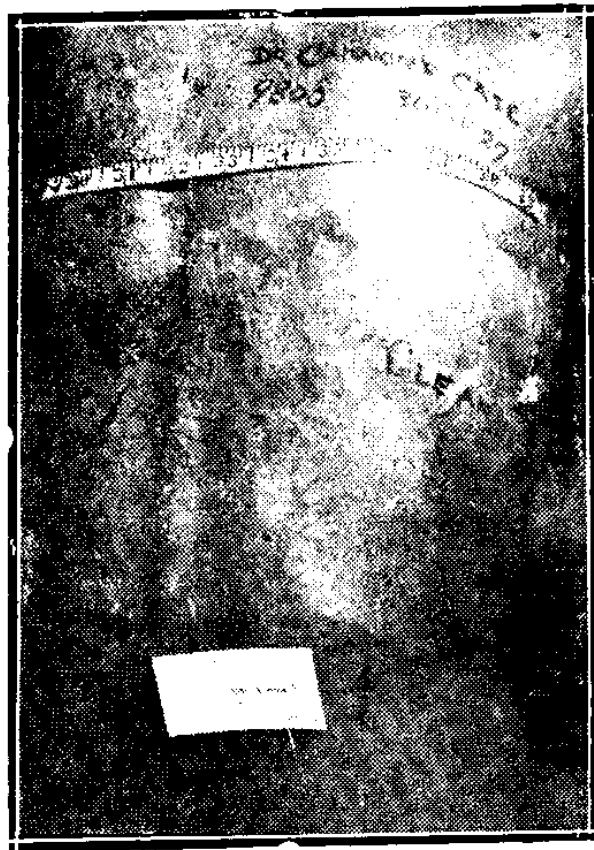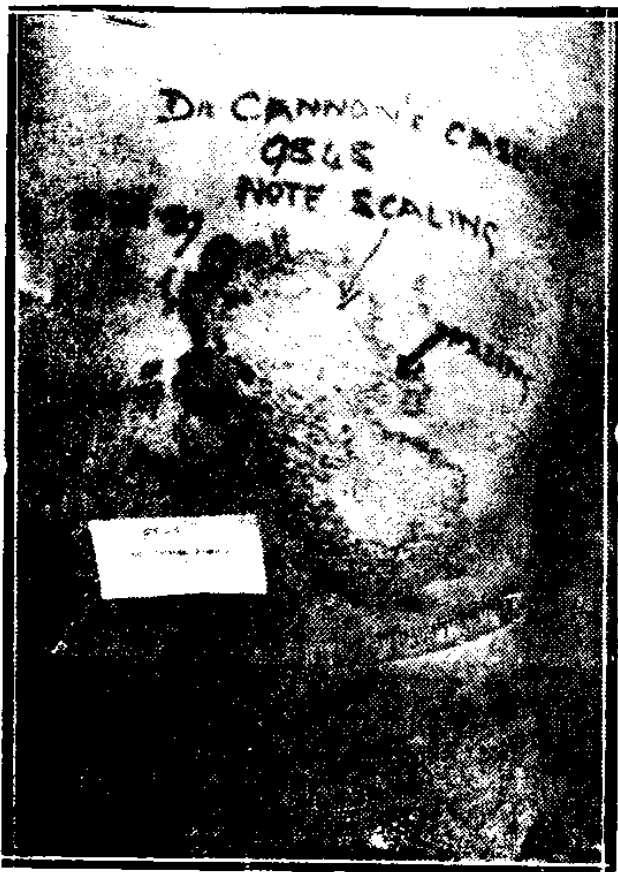
A CASE OF CARCINOMA OF THE STOMACH WITH HYPERCHLORHYDRIA.

by

Lindsay Ride.

(From the Department of Physiology, University of Hong Kong).

A Japanese male cook, H.I., aged 50, was sent to the Government Civil Hospital by his doctor on the 3rd July, 1929, and was admitted under Dr. Ware. Later, he was seen by Professor Digby in consultation, and the writer was subsequently asked to carry out a fractional test meal investigation.

The findings were so contrary to those generally expected in such cases, that they appeared to merit recording.*

Owing to language difficulties, it was not possible to obtain a clear and concise history, but the main points elicited were as follows :

The patient complained of bad appetite and indigestion for the last two months. No history of previous illnesses could be obtained with the exception that the patient had always been free from digestive trouble till the end of May of this year. Immediately after taking solid food, pain was experienced in the epigastrium, in contradistinction to the fact that after taking fluids no pain was noticed. Nothing that the patient had taken in the way of medicine had brought any relief. There was no history of hunger pains but there had been a slight loss of weight.

On inspection one saw a man of average size, rather on the thin side, a not uncommon observation amongst the coolie class. Nothing abnormal was found in any of the systems on inspection. The chest and heart on palpation, percussion, etc., revealed no abnormality, no glands being felt above the left clavicle.

On palpating the abdomen, one could elicit the abdominal reflexes which were equal, and no tenderness or hyperaesthesia or pain on deep pressure anywhere over the abdomen could be demonstrated. (Although the writer has not yet seen enough of these cases amongst the Orientals to form a definite opinion, their rather placid reaction to such things as pain seems to him to make this recognition of localised tenderness of less importance diagnostically than it is in the more introspective or responsive European).

Just below the left costal margin an irregular hardish tumour was felt, which was oval in shape, the major axis lying transversely and

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* (I wish to thank Dr. Ware and Professor Digby for their ready permission to record this case, and for their help and co-operation not only in the investigations but in the collection of clinical, operative, pathological and X-ray data.)

being about 1½ to 2 inches long. It moved up and down with respiration to a slight extent and on contraction of the recti, it could no longer be palpated. No information was obtained as to how long the tumour had been palpable; no other abnormalities were discovered during the examination of the abdomen.

The report of the X-ray examination was as follows :—
Oesophagus normal.
Stomach :—Large filling defect lesser curvature some 3 inches in
            extent.
            Delay of over 5 hours in stomach.
            Stomach fairly motile.
            Large gut normal.
Conclusion :—Neoplasm of lesser curvature.

On the 19th July, 1929, a fractional test meal was carried out, the tube being swallowed by the patient with almost incredible ease and alacrity, and without the least sign of gagging or discomfort. As soon as the tube entered the stomach typical "coffee grounds" material began to escape from the tube which had been left unclipped, hence an accurate measurement of the Resting Juice was not obtained but a close appromixation would be 15 to 20 ccs.

Owing to the unexpected results in examining this sample, the titration had to be done three times, and there was not enough of the sample left to carry out a microscopical examination. It contained free HCl as shown by Gunzberg's test, but the test for lactic acid was not applied.

The result of the analysis is shown in the accompanying graph.

On July 20th, laparotomy was performed by Professor Digby and a carcinoma involving the lesser curvature was found, with enlarged glands along the lesser and greater curvaures. The partial gastrectomy which was performed included the greater part of the lesser curvature, half the greater curvature, the pylorus and one inch of the duodenum, an anastomosis of the Polya-Mayo type being made.

On the day following the operation a rigor occurred and a week later two small biliary fistulae appeared; these however soon healed and the patient was discharged well on 19th August and returned to Japan for a holiday.

The microscopical section of the growth showed it to be a columnar celled carcinoma.

The test-meal findings:—The free HCl and total acidity were measured by the method given by Ryle[1] using Töpfer's reagent and phenolphthalein as indicators, and the total chlorides were estimated by the process described by Jocelyn Patterson[2] and are expressed as the number of ccs. of N/10 chloride in 100 ccs. of the gastric fluid.

The resting juice gave high values for free acid, and total acidity of 40 and 91 respectively, and the total chlorides were 144. These results were such as to demand verification and on repeating the determinations the average of three readings for the free acid and total acidity were 41.5 and 92.00 respectively. This high free HCl value immediately dropped in the succeeding fractions, but it is seen to be mounting again towards the end of the examination. The difference between the free HCl and total acidity is much more than normal in the resting juice as perhaps one may expect and after $\frac{3}{4}$ of an hour it begins to climb ahead of the free acid again.

From the limited reference library at our disposal, it is impossible to find out how common such a finding is, but the publication of such a case is of use if it reminds medical men, both students and practitioners that just as physiological "normals" are really only physiological averages, so a "normal" pathological finding is merely the average finding for that condition.

It further brings into question the cause of the achlorhydria usually found in such cases. If the exudate from the growth neutralises the acid why should we here find a high acid content in the resting juice, followed by $\frac{3}{4}$ hour of achlorhydria and then a return of titratable acid? A conceivable explanation is that the growth by irritation causes excessive and constant regurgitation; but in this case regurgitation is probably absent as evidenced by the absence of bile right through the series and the presence of a large amount of the meal in the stomach at the end of $2\frac{1}{2}$ hours.

Another possible explanation is that it may be a case of gastric ulcer with hyperchlorhydria, the ulcer having undergone recent malignant change, but the conversion into the stage of achlorhydria not being yet completed.

The shortness of the history is rather against this explanation unless it be that the ulcer was an acute one undergoing rapid malignant change. We must however remember that the growth was fairly large and had involved a large number of glands as well as throwing the pyloric mechanism out of gear as shown by both X-ray and test meal findings. Now if we look on the usual achlorhydria as being due to neutralisation, then in this case one is forced to the conclusion that the excretion from the growth was not as alkaline as is usually the case, perhaps owing to the very rapid growth resulting in excretion of acid metabolites which in a less rapidly growing neoplasm are capable of being completely removed by the blood stream.

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I. FRACTIONAL TEST-MEAL.
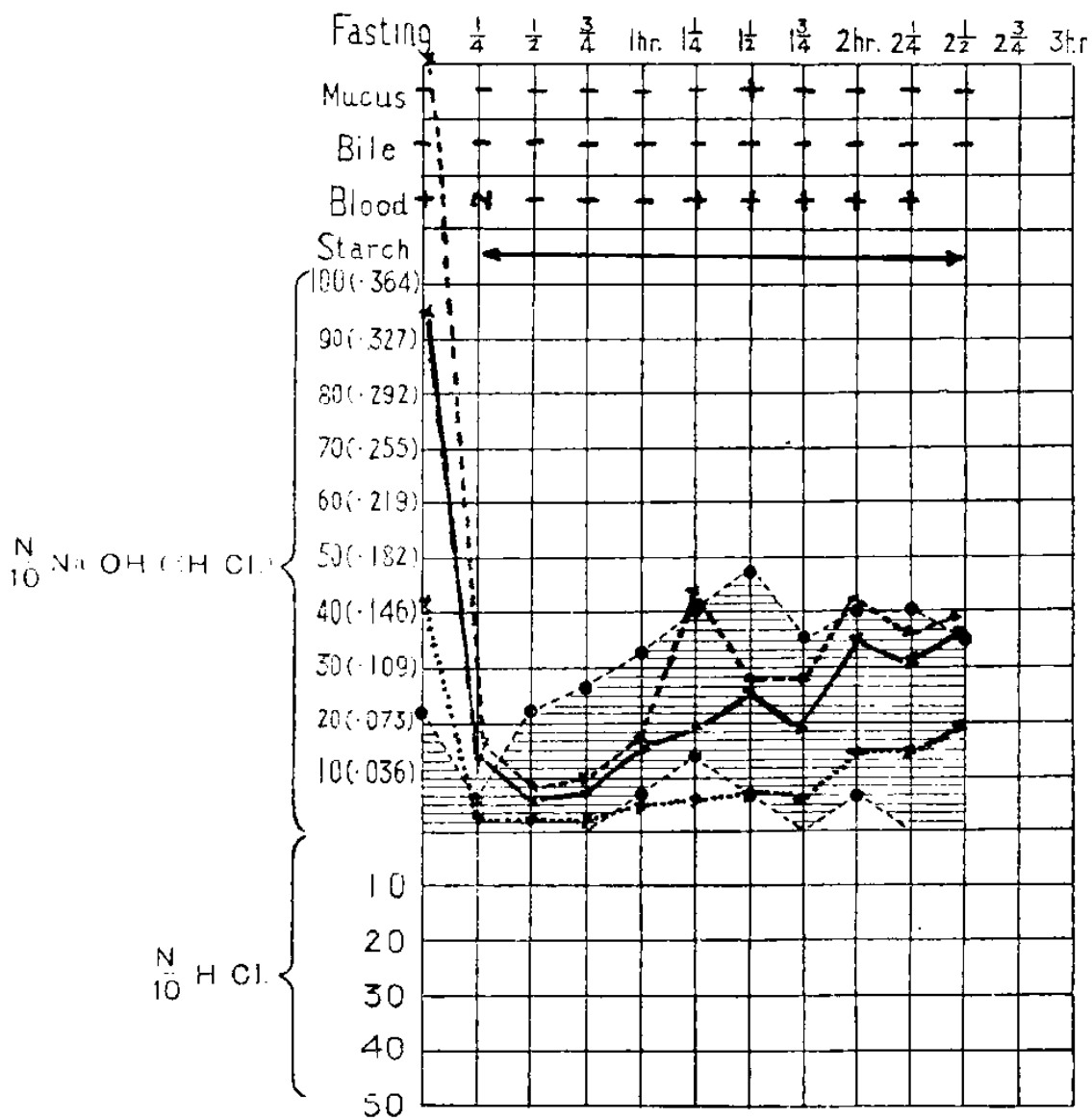
The shaded area represents the limits for free HCl. in 80% of normal people, and average rate of emptying (2-2½ hours).

.............represents free HCl.

——————represents total acidity.

- - - - - - represents total chlorides.

Review of Books.

"*Essentials of General Physiology*": Edited by Eric Ponder, M.D., D.SC. Published by Longmans Green & Co., Ltd., Price 15/-.

The author has succeeded in producing an excellent book in Physiology in which the subject matter is presented in a very readable form, a happy mean being struck between the large volumes filled with complicated formulae and the small outline loaded with unadorned facts. Those who look upon Physiology as a dry subject should read this book much as one reads a novel, and they will doubtless realise how interesting this subject can be made.

In the early chapters more attention is given to Biophysics than in most small text-books, and what is more important, the application to the working of the body of such things as Surface Action, the Colloidal State, Diffusion, and Dissociation of Electrolytes is well described.

The arrangement of the subject matter is quite logically carried out; this is well exemplified in the chapter on Secretion where after a general descripton of this process, the detailed account of the various secretions both external and internal are dealt with, the ductless glands thus falling under this classification and not as usually happens forming a chapter on their own.

It is a pity that the printing process has resulted in pages 215-230 on Muscle being omitted, and their place taken by rather an irregular repetition of pages 295-310 on Nerve and Secretion. From the medical student's point of view, the value of the chapter on Nerve would have been enhanced by a description of the tracts in the cord and brain; an index is always worth doing well, and one in a Physiology book which does not mention spleen or liver can hardly be considered complete.

The good printing, paper and binding, ample and excellent diagrams do their share towards making this book of great use to any Physiological student.

L. T. R.

Acknowledgments.