5

Malarial Fevers with reference to some types on the West Coast of Africa.

I certify that this Thesis has been composed entirely by myself.

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Be the importance of a thorough grasp of the clinical aspects of this disease and of its not unfrequently far reaching after-effects there is no need to lay stress. For a disease which has been known from the earliest times and which is so widely recognised must necessarily be of general interest to every practitioner. Few indeed will be able to say opportunities have not been afforded them of studying it in some one or other of its' aspects. It may truly be said that the real importance of any disease, or group of diseases, is best judged of from the relative frequency with which they are met with, taken together with their influence both immediate and remote on the well-being of the individual. I would submit that the effects of malarial fevers are of the greatest importance to those who have

to reside in foreign countries, or even to those visiting these for short periods. It has been said that no worldly advantage can be set off against the miserable condition of a man subject to periodic ague, and it is a matter of some consideration before placing oneself within the influence of a malarious atmosphere. In reference to the same the following may be quoted 'when we consider that in many regions of the globe two-thirds of the mortality is caused by the fevers & their sequels we can understand why all that relates to malaria is important to the Statesman, the Soldier, the Sanitarian and physician.' also the late Dr. Parkes has well said when 'a climate is called "unhealthy" it is simply meant that it is malarious', this being especially true of tropical climates. (v. Quain's Dictionary of Medicine, Vol. II. pp. 3-6 - Maclean.)

Again 'there is probably no part of the torrid or temperate zones in

which greater or smaller areas of country may not be found where malaria is endemic, and where it prevails every year to a greater or less extent". (v. Cyclopaedia of the Practice of Medicine, Zimmsen. Vol. II. pp. 559.) From the wide distribution of regions where this disease is prevalent, together with its subtle influence on health noticeable often long after removal from districts where contracted, should we not pronounce it as of more than ordinary interest. Not only is it found in distant lands but also much nearer home for in England even formerly it was not by any means rare. The prevalence of malaria on the West Coast of Africa and the frequent virulence of types found there are only too well known. Along the western coast of Africa (Cyclopaedia of the Practice of Medicine. Zimmsen, Vol II. p.p. 559-560) "malarial fevers flourish to an extent

and with a malignity scarcely equalled anywhere else. So too prevalent perhaps to less extent is it on the Eastern coasts of Africa. in the island of Madagascar and the Comoro islands of Anjouan & Mohilla. In Southern Nubia, the upper Nile delta, on the banks of the White Nile, and in Egypt is it present. In Algiers it is widely diffused, and noticed extending along the coasts of the Mediterranean. In America may be mentioned its occurrence in Brazil & Peru. its frequency in the states which surround the Gulf of Mexico - Gulf states of Texas, Mississippi, Alabama & Louisiana. Very rife is it in some of the West Indian islands also. In Asia how often is it seen in India. in the rice districts of the Indus and Ganges which are annually overflowed by these streams - & many other parts. Very bad is it in Ceylon, & in Sumatra. Along

4.

the Southern & South-western coasts in China and the the banks of the lagoon streams it is very bad. In Arabia, in Syria, on the shores of the Red Sea & the Persian Gulf it is found - on the banks of the Tigris, & the Shores of the Caspian Sea. On the Elevated plateau of Teheran is its said to be severe. In Europe the disease is noted in the Great plain of North Germany, with some of the Baltic provinces of Russia - in Holland with the adjacent parts of Germany & Belgium - in the Southern provinces of France, the western side of Spain and Portugal, almost the whole western side of Italy, a great part of Greece and Turkey, the plains of Hungary, and the Shores of the Black Sea. Especially severe is it in Italy, in the Maremma of Tuscany, the Campagna of Rome and the Pontine Marshes. Coming nearer home the chief seats of its occurrence in England have been Romney Marsh

in Kent, the Estuary of the Thames in Kent & Essex, along the Eastern Coasts of England, the fens of Cambridge-shire and Lincolnshire, and the marshy lands of East Riding in Yorkshire. Cases of cases having occurred in London may be found. The disease is said to be unknown in the Sandwich Islands and the Samoan Islands. also in New Zealand and Tasmania, while in Australia only mild forms of it are found. It does not exist in Norway, Iceland & Faroe Islands, and Switzerland is free from it except on the margin of some of its lakes. Nor does it exist in Scotland & Ireland. (v. Principles and Practice of Medicine. Taggart Pyr. Smith. Vol 1. p 347. Cyclopaedia of the Practice of Medicine, Zimssen. Vol. II. p. 559.)

The clinical aspects of West African malarial fevers would appear to be essentially the same as those met with elsewhere, perhaps somewhat modified by locale and complications, &c. as to exact type. To this fevers the fol-

lowing among other names have been applied, African fever, Mark of the fever, Pahudal, Roman, Bengal and jungle fever. Malarial, miasmatic, periodic, Remittent and Intermittent fever and ague. This last term is used by some writers as denoting the whole group of malarial fevers occurring, and by others as synonymous with the term Intermittent. As now most usually employed the term malarial fever is undoubtedly best used to include all the types found, and the term ague or intermittent fever being restricted to the intermittent type, while the term remittent is applied to the truly remittent and more continued forms. The course of the temperature however in African fevers may often be found very irregular, one type tending to change into another. An intermittent fever may be described as one where the morning temperature falls to normal, or perhaps below it, the evening temperature being two degrees

or more above it. A remittent fever may be said to be one where the temperature is constantly above normal but may fall two or more degrees even in the morning but still not reaching normal. A continuous type of fever is one where the temperature although constantly above the normal has not a very marked difference between the morning and evening temperatures, perhaps half a degree to a degree and a half. A numerous variety of forms of intermittent types of fever have been described as, quotidian, tertian, quartan, double tertian, etc. The characters of these different forms of intermittent fever are so well set forth in all the text books on the subject (V. Principles and Practice of Medicine, Vol. 1. Tagge & Pye-Smith. Theory & Practice of Medicine, Buchanan. Practice of Medicine, Taylor, etc.) that it is unnecessary to dwell on them. So too are the stages in

an attack of malarial fever in the typical forms, viz. the premonitory signs, the cold stage, the hot stage, the sweating stage with ensuing intermissions or remissions. It is in the intermittent type of this fever that the stages are perhaps most typically demonstrable. The premonitory symptoms may be well defined as weariness, malaise, and languid feeling with sensation of chilliness. Tendency to dull headache and aching of limbs and in the back. The temperature is normal but when this begins to rise the patient feels decidedly cold, and the cold stage has then begun. The pains in back & limbs are complained of much, the temperature has risen to 103° or 104° & sometimes higher, shivering or rigors are marked. The skin has a dusky appearance & the headache is severe. The patient is generally very sensitive to noises which

Intermittent

annoy or irritate him. The tongue is furred & bowels constipated as a rule. The urine is passed frequently & increased in amounts. The shiverings become less severe & less frequent, and the hot stage comes on gradually. The face becomes flushed and as the warmth increases the patients feels easier. The temperature remains high or even increases. The skin is dry & burning, headache severe and patients most uncomfortable. Cooling drinks are craved for. The pulse & respiration are quick. The patients is at times more or less delirious. The vomiting may now become severe and nothing be kept down, vomited matters being bilious in colour. This hot stage is more prolonged in some cases than others, but gives way to the sweating stage. The sooner this takes place the more favourable it is for the case. Moist condition is first noticed on the forehead & cheeks fol-

lowered by general perspiration. The temperature falls and the patient has much relief. The headache diminishes and vomiting ceases and intense thirst passes off. Medicine and some little nourishment can now be retained. The pulse & respiration fall. The urine is often scanty and high coloured. During the period of intermission the patient feels almost well, but feeling of weakness comes. During the stages of sweating & intermission the patient often is able to fall asleep a boy soothing to him is this. There may be a recurrence of the fever with reproduction of the same sets of symptoms. This may come on earlier with severity of symptoms marked in some cases and assume more the character of the remittent variety. In other cases return of fever may be less severe & more favourable. Seldom will there be no recurrence, or exceptionally is this so.

Remittent

the Remittent variety of this fever is most usually met with on the West Coast of Africa. In this the course of the paroxysm resembles closely that of the intermittent variety but the stages may be, so to say, masked or absent, or on the other hand we may find some of them intensified. The premonitory stages may be prolonged or the cold stage unobserved. Again the premonitory signs may not be present and the patient as it were suddenly taken ill. The end of the paroxysm in this fever is shown by a remission, there being no period of true apyrexia as in the intermittent form. How the cold stage is usually short it soon passes into the hot stage. Now is it marked sometimes beyond some chilliness, but occasionally it is severe. The cold stage however may occur at all Sometimes.

the cold stage is very common. by replaced within an hour by the following one. The period of duration of the hot stage is usually prolonged. There is always marked headache with very often distressing vomiting and retching. The vomited matters are bilious in character, and neither medicine nor nourishment can be retained. The tongue is dry and much thirst is complained of. Pains are complained of in the back & limbs, over the kidneys. the spleen, and the liver, also, not unfrequently. In very bad cases sordes may form on the teeth, the mouth becomes parched, delirium be pronounced, and a typhoid state ensue with drowsiness and even coma. Jaundice is frequently present to a slight extent. If this become very marked it is an unfavourable symptom. The urine has to be examined

keeping in mind the occurrence of Haemoglobinuria. The freer the perspiration is during the first stage the more favourable is the case likely to be as a rule. Following the sweating the temperature falls but the remission may be only small in degree. The more marked the remission and the longer its duration undoubtedly more favourable is the prognosis. The general symptoms and distress have now much abated with relief to the patient. In my experience the recurrences of the pyrexia decidedly diminish in severity, not only as regards the height of the temperature but also as to the general symptoms as headache & vomiting, as the treatment is exhibited. The remissions may be said to occur invariably in the morning and are usually quotidian. In an average the duration of remittent fever under treatment

in my experience has been between five and six days. There are cases in which however in spite of treatment the fever tends to persist for a considerably longer time. As a rule a patient will feel much easier in the morning and worse at night. In reference to malarial fevers even on the West coast of Africa I would lay stress on the severe and distressing cephalalgia in most cases; also the distressing vomiting and retching, with the nausea and aching in the back and limbs during the hot stage. The not infrequent tendency to delirium which is found in the severer types of such fevers contracted on the West coast. The remissions of temperature during which there is a good deal of relief to the patient, and which are so important as to the period when most benefit would seem to result from administration of

gimen, the watching of the case for these remissions in each individual, the use of Antipyretics in delirium with high temperature (thus relieving headache, and favouring to induce perspiration & soothing patient generally) are to be kept in mind relative to these cases. I would point out the occurrence of a truly remittent type or variety of fever, and a truly intermittent variety. Also a form taking a more or less mixed type of pyrexia, at one time remittent, at another intermittent, or tending to be continuous in same patient. The course of pyrexia in typhoid fever is frequently irregular, perhaps modified by drugs, the condition of the patient, etc. Again in others it will be found that the fever runs a continuous course, a low form of continued fever, truly malarial in nature. The elevation of temperature may be only half to one degree or so above nor-

mal but tends persistently to remain so, the patients gradually but steadily losing ground in spite of all treatment. There are cases which cannot be removed too early to a healthy climate. A syncopal form may be mentioned, the patients sinking with flagging pulse and heart's action notwithstanding remedies, perhaps struck down as it were after prolonged fatigue and exertion in the sun. A case in point was that of a Kroomen or native carrier after arduous march and considerable fatigue in traversing arid sandy country on the coast. Various other forms have been described, especially of the pernicious intermittent type of fever. A comatose form where patients becomes unconscious with stertorous breathing, &c. Cases where maniacal attacks have occurred with delirium. Cases in which patients' condition simulates death with

arrested respiration & imperceptible pulse. Cases with convulsions. Cases in which the conditions of cholera are produced. Cases with dysenteric attacks &c. (Pr. Practice of Medicine, Taylor. Principles & Practice of Medicine, Tagge - Pye-Smith. Theory & Practice of Medicine, Bristowe.) Again there is a so called Haematuric form, commonly termed Blackwater fever from the appearance of the Urine. This form of the fever is seen on the West Coasts of Africa sometimes, especially in those who have become debilitated from former attacks of malarial fever. This is really a severe form of malarial fever usually of the remittent type in which the red-blood cells break down in such numbers that the Haemoglobin cannot all be absorbed and therefore a large part of it has to be excreted by the kidneys. This blood pigment also produces jaundice. In true Blackwater fever there is haemoglobinuria

and not haematurea. If haematurea is present no doubt it may be regarded as the result of some existing nephritis. Thus Blackwater fever is 'a malarious remittent fever to which is added another malarious manifestation viz. Haemoglobinurea' is the view expressed by Dr. Eyles (V. Malarial Fever as met with on the Gold Coast. C. W. Eyles. p.11.). In this there is besides the symptoms of malarial fever a yellow tinging of the skin and the urine has a characteristic porter-like or port wine-like appearance. This appearance of the urine is due to the presence of haemoglobin, and the presence of albumen is also marked. There is very frequently in severe cases great bilious vomiting, pain or aching over the kidneys probably due to congestion, and acute nephritis may be developed from the irritating effects of the passage of haemoglobin. Enlargement

of the Spleen & liver with pain over them may be noticed. This condition is preceded by jaundice in every case. The onset is seldom sudden and it is said not to come on till the fever has lasted two or three days. The cause of the disintegration of blood cells is of interest and would appear to be the plasmodium malariae. Inflammation of the kidneys with suppression of urine and anaemia have to be kept in mind. also collapse resulting from the disintegration of large numbers of red cells. Those who are anaemic and debilitated by malarial poisoning are likely to suffer from blackwater fever on exposure to causes predisposing to its' occurrence. These are viz. Chills from cool draughts, exposure in heat of the Sun. Excessive fatigue. neglect of treatment in former attacks of fever & the use of quinine.

(v. Climate & Fevers of India. p. 95. Sir Jos. Fayrer.) in reference to neglected fevers finds "if not now checked, succeeding paroxysms may become more severe with scarcely any remission". Etc. causes, alcoholic & otherwise. These causes specially act at the time of suffering from an attack of malarial fever. An ordinarily severe form of remittent fever under treatment as stated runs a course of about six days. The opinion of many is that it is not safe to withdraw the remedy to continue the use of drugs, especially quinine and arsenic, for some days after the fever leaves, as in this way it would seem that the liability to recurrent attacks is best diminished. With respect as to whether it is possible to escape the recurrence if the quinine be continued for several days, at p. 172-3 of "The Parasites of Malarial Fever". Marchiafava and Bignami. New Sydenham Society, we find

this not affected. recurrences was not prevented although drug given for '4 or 5 days'. In my experience it seemed to have proved very beneficial to have given quinine in this way for a week or ten days according to each individual case. So too in the administration of arsenic, in cases which were more chronic or prolonged. The actual height of the thermometric reading varied a good deal, but temperatures of from 104° to 105°.4 Fahrenheit were not uncommon. Specially in patients with pitch attacks of remittent fever. An intercating transient hyperpyrexia has been observed in some cases, undoubtedly malarial in origin. A case in point was recorded by myself in a man where the thermometric reading was 110° F. The constitutional disturbance did not correspond to what would be expected with such pyrexia. On the temperature being taken again

in the minutes or so with another thermometer it was found to be 104° F. The first thermometer was used for other temperatures afterwards and checked by a second one & found to be correct. Malingering naturally is present in one's mind in such cases but in this case that was very carefully investigated & excluded. The similar rise was again observed. Whether may this be explained by a peculiar instability of the heat centres caused by the malarial poison, and its transiency accounting for no very marked constitutional disturbance!! In reference to such cases of hyperpyrexia may be noted cases reported by Dr. Stephen Mackenzie in British Medical Journal, Feby. 13. 1892. p. 336., where transient temperatures as high as 113°.8 F. were observed. Having suffered from an attack of malarial fever it would seem that

Unintelligible Style.

a person is very liable to re-
currences of the attack. Not only
is this so, but on exposure to the
poison with existing causes acting
one would seem to me to be more
readily susceptible to its in-
fluence. Thus I have not ob-
served any protective effects when
having once suffered from an at-
tack of fever. In my practice
while on the West Coast of Africa
I have occurred cases in which
there were five, six or more attacks
in the same person. Similar instances
have been noted by others - five re-
currences in same person (v. Statistical re-
ports of the 'Health of the Navy', 1892. p. 70.) - Six
recurrences (v. 'Health of the Navy, 1893. p. 67).
five attacks (v. idem, 1893. p. 69). With the
latter attacks one may notice less
intense headache, nausea or tendency
to vomiting, and perhaps a lower
elevation of temperature during the
exacerbations than in first attacks.
All these may however be just as

marked where there has been exposure to malarial infection a second time. So is in these recurrent attacks that some of the stages of the fever are wanting or pass unnoticed, specially so where an irregular course is run. The first attacks of fever are not as a rule, if ever so, of an intermittent type. Writing on this subject may be noted also p. 68. Health of Navy, 1893, "first attacks never occur in the form of ague", later intermittent character becomes more marked (by Surgeon of Hunt "Adventure") -

For a full account of all the diseases caused by malaria a careful study will repay one of the writings of Laveran, Metz, Maclean, Taylor, Fagge & Pye-Smith, Sir Bristowe, and Marchiafava & Bignami - Mannaberg. Much has been written as regards the Etiology of Malaria. We cannot do better than study in details the excellent works of Laveran (Paludisme,

a. Laveran, New Sydenham Society / - and of Marchiafava & Bignami / Two Monographs on Malaria and the Parasites of Malarial Fevers, / Marchiafava and Bignami. // Mannaberg. New Sydenham Society / these with their excellent plates of the plasmodium malariae are of the very greatest assistance in acquiring a clear and accurate knowledge of this disease and its Etiology. Numerous observers have put forward one form of organism or other as the cause of the disease. Lancisi about 1717 A.D. supposed that malaria was due to parasitic animalcules which found their way into the blood. Referring to the writings of Hertz on Malarial diseases may be mentioned reference to this disease by Protagoras. descriptions of Celsus. Archigenes. Rhazes the Arabian. Ebn Sina & Valescus of Saranta. Rumbert Dodoens. Dioscedes Cornarius. the introduction of Cinchona from Peru into Spain in the year 1640 when

more attention was given to the study of intermittent fever. Larger doses of this drug introduced by R. Talbor of Cambridge with more reliable results. So also when Sydenham introduced its administration for purpose of forestalling the paroxysm by giving it immediately after the first attack. The classical work of Torti in which the true nature of pernicious intermittent fevers is recognised & treatment given. The work of Lancisi valuable specially from an etiological point of view. The labours of Guisman Galeazzi and of Werlhof on the same lines as those of Torti. (Cf. Cyclopaedia of the Practice of Medicine. Tunissen, Vol. II. pp. 557-559). Now two of Laths years are the investigations of Laveran in 1880, with his discovery of the malarial parasite or plasmodium malariae, the various stages of development of this being shewn in the plates in his work. So also the recent investigations in this

respects of Manchuria and Allen are important, as well as those of Allen, Dr. Vandyke Carter and others. The examination of the blood for the plasmodium malariae should be impressed on all who may have opportunities for studying these cases. The pale amoeboid-like refractive bodies lying inside blood corpuscles, containing dots or clusters of black pigment, and varying in size from a mere speck to perhaps that nearly of the corpuscle, are fully described and need only be mentioned. Nevertheless a very careful search for these bodies will repay one for the trouble taken. A very thin layer of blood rapidly taken is necessary in order that the red blood cells may be seen lying as it were flat & not edge-on or in roulleaux. In this way it is that the amoeboid-like bodies inside the corpuscles are to be

seen. According to Marchiafava & Celli the plasmodia are said to appear at the onset of the fever — to be more numerous as the fever increases and to disappear with the fever (v. Quain's Dictionary of Medicine. Vol. II. p. 3.). After a time the plasmodium is described as dividing up by a process of segmentation into a number of spores which are set free and develop into amoeboid bodies which again undergo the same cycle of changes. The plasmodia are often found free in the plasma, probably at a different phase of existence, although generally found in the body of the red corpuscle. Crescents forms & other phases in their appearance are described (Laveran). No definite results would appear to have been obtained in attempts to cultivate the plasmodium malariae.

Doubtful whether writer has ever personally investigated the subject.

As regards the conditions favouring the development of the organism those commonly recognised

are an undrained soil, a non-
porous subsoil, a tropical or sub-
tropical climate with a heavy rain-
fall, decomposing vegetable mat-
ter & possibly animal matter, low
lying grounds with rank vegeta-
tion. The periods of the year when
swamps are drying up in the hot
season after the rains, so also when
rivers and inland lakes are
falling. Conditions such as prevail
along the estuaries of rivers, the al-
ternate wetting and drying in the
beds of the rivers of mud banks
with decomposing vegetable matters.
The chief probably are stagnant wa-
ter, porous surface soil, a warm
temperature and saturation of the soil
to certain extent, these being necessary
for the development of the plasmodium
malariae. The most severe forms of ma-
ocur in the tropics, and malarial dis-
eases are said to be confined between
63° north latitude and 57° south latitude
(v. Practice of Medicine, Taylor. p. 73.) In marsh

lands is (?) malaria rife but not only so for Hutz speaks of damp-bottom lands (v. Cyclopaedia of Medicine. p 555. vol. II.), and apparently dry regions with stratum of loose sand or soil on the surface and a deeper floor of clay or impermeable soil beneath favouring the development of malaria, water percolating through is being retained (v. idem. p 567). It is well known that development takes place of the disease in the Summer months & disappears in the winter (v. idem. p. 568). The disease increases materially in the hot dry still months that have been preceded by moisture (v. idem. p. 572). Again malaria is stated to be developed not in the wet season of the year when the ground is entirely flooded with water but rather during the seasons at which larger parts of it are exposed to the air and become more or less dry (v. Principles & Practice of Medicine, vol. I. p.p. 347-348). In this re-

latvia the influence of the sun's heat in cracking of the soil and allowing Emanations to escape from beneath from the moist layers there is to be noted (Cf. Cyclopaedia of Practical Medicine, Tennyson. Vol. II. p. 567). So too is the Forming of crisis soil well recognised as a factor whereby malaria is spread. According to Madras the disturbance of soil that has long been fallow is often followed, both in hot and temperate climates, by the evolution of malaria (Cf. Quain's Dictionary of Medicine. Vol. II. p 41). In this respect the soils from which organic Emanations are largest according to Parkes's Practical Hygiene are - 1. alluvial soils, old Estuaries, deltas - Peaty soils are much less malarious. 2. Sands if there is an impermeable clay or marly subsoil. 3. the lower parts of the chalk where there is a subsoil of gault or clay. 4. Weathered Granite or trap rocks if vegetable matter has been intermixed. Such soils absorb both heat and water. 5. Rich vegetable soils as the foots

of hills. The influence of wind has been recognised as a factor in spreading malaria. Malaria is said to be drifted a considerable distance from its source by winds (v. Cyclopaedia of Medicine, Ziemssen. Vol. II. p. 571.) Wind sometimes carries the ague-poison to considerable distances from its source even up slope of range of hills (v. Principles & Practice of Medicine. Tagge. Pye-Smith. p. 349.)

A circumstance which has been the means of spreading, so to say, malaria is coal. In malarious districts where coal is stored exposed to wetting in heavy tropical rains and then to process of drying in sun's heat there are produced conditions precisely analogous to those of the soil which favours the development of malaria. A not unimportant means of propagation or infection is produced through this to those who have to work with it, as the stokers on board-ship. Similarly would this act as in the case of Hum-

ing virgin soil on those so employed. Further coal being very porous would readily absorb noxious emanations, & by giving these up infect those employed using it, burning it while stoking. It has been found that malarial fever has occurred on board ships after coaling at such places, as Sierra Leone, where the above conditions exist. Those affected have been the engine-room staff or stokers who have to do with the manipulation of the coal. The disease was almost entirely confined to men who did not land and to the engine-room departments in particular, the ships' company being only affected in the persons of those who were actually employed in coaling the ships at Sierra Leone, and the disease is attributed to the coal. Probably the deeper layers would be less highly saturated with the malarious poison than the more superficial ones of the coal. This is the opin-

ion of several medical Officers (v. Health of the Navy, Statistical report of. 1890. p. 67.). When malarial fever appears on board ships returning from an unhealthy climate the causes may be, that the system has been charged with the malarial poison before embarkation. that the water used was drawn from a malarious locality. the source may be in the ship from decayed vegetable matter mingling with the bilge water combined with defective sanitary conditions. Lastly may be added infection through the coal.

The manner of infection in the majority of cases of malarial fevers is by the air breathed. Instances have been adduced of infection through the water, as in the case recorded by Bondini where of a party of Soldiers all except nine were attacked by ague. these few having taken the precaution of getting pure water on board a French transport, the rest having impure water supplied them (v. Principles & Practice of Medicine Vol. 1. Tagge & Sye-Smith p. 350.).

this being so would not it be pos-
sible that infection might occur
through improper or uncooked food. Ac-
cording to Metz the reception of the
poison is through the respiratory tracts.
as to foul drinking-water doubt exists
whether it is the direct or immediate cause,
or whether it is so injurious, but with specific
ingredients, it has only served as an
occasion for the outbreak of the disease,
in a person already affected with ma-
laria' (v. Cyclopaedia of the Practice
of Medicine. Zimmssen. Vol. 4. p. 586).
The poison of malaria is special-
ly to be feared at nights and
for a short time after sunrise
when it is said to be most
active. It is well known that
actively growing vegetation is ad-
verse to the development of malaria.
The interposition of a belt of trees
between a marsh and an encamp-
ment is believed to be protection
from malaria. So too is a surface
of water as a lake. (v. Principles and

Practice of Medicine Vol. 1. Tagge + Pye-Smith.
p. 349. Quain's Dictionary of Medicine Vol. II. p.p.
3-6. Maclean. J. the blue-gum tree of Aus-
tralia, Eucalyptus globulus, is mentioned
in this respect as being very efficacious.
These points have to be taken
into consideration in choosing ground
for the site of a camp in a ma-
larious region - preferring rising
grounds and with a belt of trees
or stretch of water between the
marsh and encampment. So also
may the direction of the pre-
vailing winds be kept in mind
relative to camping out in order
that they should not blow
directly from a marsh over the
camp. Some races have been
regarded as having an immunity
from malaria. Negroes being
proof against ague is mentioned in
Principles + Practice of Medicine, Tagge.
+ Pye-Smith. p. 351. The immunity of
blacks is mentioned by Laveran (v.
Paludisme. a. Laveran. p 102. New Sydn. Society).

again reference to this as 'less liable' to
it' being 'less intense' is founds also
p. 135. Idem. In my experience both
native Kroomen carriers and native
troops of the West India Regiments
were found susceptible to ma-
laria, especially so after fatigue
and when predisposing causes
came into play, while employed
on Expeditions on the West
Coast of Africa. There they com-
monly suffered from the intermittent forms of the fever. ac-
cording to Eyles natives suffer large-
ly chiefly from the regular quo-
tidian variety (v. Malarial Fever as
met with on the Gold Coast. p. 4.
C. H. Eyles J. No race or nationality
enjoys immunity (v. Cyclopaedia of
the Practice of Medicine. Tuniessen. Vol II.
p. 573. J. No race appears to be
insusceptible though negroes are much
less liable than white men (v. Prac-
tice of Medicine, Taylor. p. 73. J.
It is well known that Malarial

diseases tends to disappear before cultivation & agriculture and drainage of the soil. These measures viz. Subsoil drainage & agriculture, thus spreading a fresh layer of soil over the ground after draining it thoroughly, preventing the exhalation of malaria, & even paving the ground in villages & inhabitated places, &c. Cyclopaedia of the Practice of Medicine, Tiemssen. Vol. II. p. 657. Principles & Practice of Medicine, Tagge - Pye-Smith Vol. I. p. 348). It is evident that as certain conditions of soil such, as swamps, subsoil water especially if stagnant, successive wetting & drying in sun's heat of soil, together with high temperature, heavy rainfall, decomposing vegetable matters, &c. so is the prevalence of malaria found. as such conditions are modified or exaggerated so is the prevalence of the disease both as to its frequency and virulency according to locality, &c. Most of these condi-

tions exists on the West Coast of Africa to a large extent with the great prevalence of malarial fevers there. This would thus appear to be an emanation of the poison, or malarial effluvia, much more intense in some places than in others, determining the type or severity of an attack. 'The concentration of the poison determines the severity of the disease' (v. Cyclopaedia of Practice of Medicine, Tuson. vol. II. p. 583).

Many are the causes which predispose to malarial fever. The exposure to the poison of malaria and its absorption into the system would seem to me to be the most important predisposing causes, while residing in a malarious district. Previous ill-health, or anything tending to lower the resistance of the tissues generally to diseases, will act in this way. Such as anaemia, dysentery, previous attacks of fever, bad sanitary surroundings & unhygienic

conditions of life. I would class as among the causes tending to excite the disease under these circumstances the following, excessive fatigue or overexertion, all excesses alcoholic, sexual or otherwise - exposure to the heat of the sun's rays during the heat of the day. exposure to wet and rain - sudden changes of temperature - The occurrence of cases of fever has frequently been observed on board ships at sea on encountering a cool wind in passage, or entering a cold zone or belt of the atmosphere. This too is seen in cases where men have been employed up creeks, the temperature there high with sultry heat, on returning to mouth of rivers where cool sea breezes were felt with a considerable fall in temperature. Again chills are a very potent causes in exciting an attack of the fever. Chills at nights and cool draughts on the bared abdomen, on the bared feet and shins, on the side of the

heads or on the back of the neck, are potents in Exciting an attack of Ague & remittent fever. Exposure between Sunset & Sunrise - fatigue in the Early morning especially before Sunrise and before some meal is taken. As mentioned malaria is especially to be feared at night and for a short time after Sunrise in damp districts the poison probably being harboured by the Stagnant mists near the surface of the ground till dispersed by Sun's rays. Improper dietary and insufficiency of food is a cause which may acts in predisposing to occurrence of the malady.

Incubation. Some writers give this as from three to six weeks and as being seldom more than three months. The minimum is from '6 to 10 days' (v. Pathogenesis - A. Laveran. p. 105.) In 'Hygiene of Warm climates', Davidson. p. 145 this is given as 7 to 21 days. In Tagge's 'Principles & Practice of Medicine' p. 339. vol. 1. 6 to 20 days is given. According to Hutchinson (Cyclopaedia of the Practice of Medicine -

Lancet - Vol. II. p. 587.) incubation is said to be from a few hours to many days. An instance of 148 days is mentioned with the occurrence of intermittent fever. It seems that an intermittent type of malarial fever may occur after an indefinite number of days of latency but I am inclined to believe that most true remittent forms have an incubation which varies from 1 to 20 days. Quoting from 'Health of the Navy', 1892. p. 69. 'The Medical Officer (Surgeon W. H. S. Stalkartt) after a large number of observations gives the period of incubation as from one to twenty days'. These observations were made during and after punitive expeditions in 1892 on the West coast of Africa up the Pantang Creek, Gambia river, and the Sierra Leone River & the Great Skarcies river. Bluejackets and marines, comprising the expeditionary force together with troops of the West India regiments,

were landed from H. M. Ships up the Vintang Creek, &c. Of those who proceeded up the Creek on 2d Jany. 92. and returned to Bathurst at the mouth of the river on Jany. 4th there occurred two cases of fever fatally on the 18th Jan., one on 21st Jan. &c. After Stay at Kaleng Camp, Vintang Creek, &c. and return again, the periods from Jan. 20th to Feb. 5th, three cases of fever were entered on Feb. 7th, one on 9th, 2 on 11th, 5 on 12th, one on 13th Feb., &c. &c. After the Expedition up the river Gambia to Soniatabe (April 27th to 30th), three cases of fever were entered on 6th May, &c. allowing for the periods of exposure to the malarial poison incubation may be taken as above. The topography of these Creeks is very characteristic. Their banks consist of mangrove swamps, varying in their width from 300 yds. or so to less than half that as one proceeds up. Foul fetid smelling mud is left exposed to Sun's heat at low tide. The sultry heat oppressive with

sickening odours. Twenty one days is given as incubation period by Surgeon of the "Adventure" in these fevers, employed on the Shiré and Zambesi rivers (v. Health of Navy, 1893. p. 681). Surgeon Swatek (v. idem. 1893. p. 691) gives the average incubation at 10 to 14 days. When an attack of fever occurs only after a lengthened residence in malarious climate it seems probable that it arises not from a single exposure to the poison. In Cases where for example sailors have fallen ill upon the sea weeks or months after leaving a port infected with malaria may it not be explained by that it is the poison absorbed into the system making itself manifest on some of the exciting causes coming into play, causing the poison to more than counterbalance the natural antagonistic tendency of the healthy body to disease - to had this cause not been exhibited would the illness not have been developed. Or is it not reasonable to suppose as of other poisons small amounts

Incubation 8 to 14 days - Mannaberg - Parasites of Malarial Fevers p. 394.

have no toxic effects so too of malaria may there not be a limit below which the toxic (so to say) effects of it cannot be produced, being antagonised by the natural tendency of normal structures to resist disease - and until this latter is counterbalanced by depressed health or a longer exposure to the effects of malarial poison, or perhaps that in system has further developed in the blood, fever is kept in abeyance - Would this too account for the different susceptibility of individuals to take fevers, as their idiosyncrasies differ, on being exposed to infection under the same circumstances. Hutchinson speaks of the latency of the poison which would seem to bear on this (Cyclopaedia of the Practice of Medicine. Tunisian Vol. II. p. 577) - which "accounts for relapses on the supposition that they are merely a new development or outbreak of the disease germs that have been slumbering within the system and are now awakened to life". Possibly the poison lies latent in the system as the

has been observed that a person may be a short time in an ague district, leave it without having an attack, & afterwards in a perfectly healthy climate develop the disease (v. Practice of Medicine, Taylor. p. 73.). Again, at p. 394 Malarial Fevers, the Parasites of. Marchia-fava & Bignami. Mannaberg speaks of the spontaneous cure of malaria ascribed to factors which strengthen the organism in its struggle against the enemy that has broken in. The attacks of ague to which those who have resided in malarious districts are subject. The neuralgias not only facial but also of other nerves as the sciatic, pectoral, popliteal, &c. The alterations of temperature curves in other diseases. The peculiarly modified night cough (J. G. Stewart), are some of the more remote manifestations in similar patients of the effects of malaria. The amenability of these conditions to treatment by Quinine tends to prove an altered

States of fevers (caused by the malarial poison) modifying the States of departure from health.

Prophylaxis. As regards the administration of Quinine from a prophylactic point of view there is much diversity of opinion. In Davidson's 'Hygiene and diseases of warm Climates' we find, 'Quinine is not an absolute preventative of fever but its use undoubtedly diminishes the liability to malarial infection. It should therefore be given as a prophylactic to persons who have to traverse or to reside for a short time in a malarious country'. In Manchia-fava's and Bignami's work on Parasites of Malarial Fever (New Sydenham Society) p. 109, we find it "is employed with success in many malarious districts'. 'In Pola this prophylactic treatment by Quinine was introduced some years ago . . & I have heard from Naval Surgeons that it has done very good service'. 'Similar results obtained

from English and French Writers'. As regards treatment in Laveran's work on 'Paludism' p. 120 (New Sydenham Society) we find 'fortunately we possess a remedy really and truly specific, marvellously efficacious in paludism. quinine' - From the same at pp. 137, 138, 139 - Numerous facts prove that cinchona and quinine which cure Paludism can also prevent it. 'American military doctors are almost all favourable to this mode of treatment', quoted from the Medical and Surgical history of the War of the Rebellion, 1858. Vol. 1. pp. 111-166. Under treatment in Tagge's 'Principles and Practice of Medicine' Vol. 1. p. 354 with reference to quinine is 'work Signal instance of a specific' - 'does occupy a unique position in one respect namely as being the only medicine of which the efficacy has never, in our time, been challenged by anyone, however rash and mischievous'. 'Even as a preventative of ague quinine has been found very ef-

precautions for sailors exposed to malaria when sent ashore for a day, for travellers passing through, or for soldiers bivouacking in a marshy district. As regards permanent residents in an aguish region it is less desirable to place them constantly under the influence of quinine since the organism appears to become habituated to its action in course of time, but at those seasons at least when the disease is most prevalent they may take it. In the report of the Indian Medical Congress in British Medical Journal of 2nd Feby. 95., under the Prophylaxis of Malarial Fevers, may be quoted note by Surgeon-Major R. Duncan M.D. - 'He concluded that arsenic had no prophylactic virtue as against malaria, but that both Quinine and Cinchona febrifuge were decidedly beneficial, diminishing the liability to fevers by more than one-half. He urged that in all campaigns involving a sojourn in a malarious district prophylactic doses of

either of these drugs should be ordered.
In the 'Health of the Navy', Statistical
report of 1892, at p. 69 is quoted my
opinion 'benefit seems to accrue from
the use of quinine as a prophylactic
in a highly malarious region'. The
results of observations with the Naval
Brigade landed during operations on
the West Coast of Africa in expeditions
up the Tintang Creek and the river
Gambia. Also with men employed on
detached duty up the Great Skarcies
river, Sierra Leone. At breakfast 6 grains
of Sulphate of quinine was given to
the men for the first week while in
camp and afterwards continued to those
specially exposed to fatigue & weather-
ing &c. as after long march, field
work, & liable to chill in the cool even-
ing air. After some fatiguing field
duties the grains of quinine was given
to those of the Naval Brigade who took
part during the day in them or return-
ing on board ships up the Creek. Also
six grains of quinine given to the men em-

ployed on detached duty in a Steam cutter, ascending the rivers. He has also administered for a couple of days to the men prior to landing for the Expedition up the river Gambia at Tomiataba. In Tanner's 'Cyclopaedia of the practice of Medicine' vol. II. pp. 557-558, we find 'the prophylactic action of quinine has of late received ample confirmation on the part of various writers'. and Hutchinson says 'my own observations leave no doubt as to the efficacy of the daily preventative dose (v. idem p 658) - however there is mentioned Cohin's failure to confirm the favourable influence of this treatment. Now I would mention that there are Medical Officers of not a little Experience with regard to West African fevers who assert the uselessness of quinine in any way as a prophylactic. This is not only in reference to Medical men practising ashore but also is the Opinion of many Naval

Surgeons who have been stationed on the West Coasts of Africa. I quote the following from the Statistical report of the 'Health of the Navy', 1889. pp. 64-65. 'There appears to be an almost general concensus of opinion both reference to the uselessness of quinine as a prophylactic'. . . . . 'the statement of five medical Officers may be thus epitomised that quinine, in their experience, is utterly useless in preventing the occurrence of fever; that residents in the Oil Rivers, including principally medical men of long experience, have no faith in its prophylactic powers, and moreover believe that if used constantly as a preventative it loses its efficacy when required in the treatment of the disease: although unanimous in condemning it as a true prophylactic there is a difference of opinion as to whether it does or does not, in remittent fever, assist in mitigating the severity of the attack when such does occur'. This is further

Quinine." Idem, 1891. pp. 68-69. Also Idem, 1892, p. 67. And again that this drug exerts no favorable influence as a preventative of fever, Idem 1892. p. 69. Can this diversity of opinion be explained! Is there anything in the life-phases of the malarial parasite and the effects of the action of Quinine on these that can to a small extent tend to explain it! Now turning to the work on 'Malaria and the Parasites of Malarial Fever' by Marchiafava & Bignami. Mannaberg. The interesting facts of the effects of quinine on the different phases of existence of the malarial parasite are well set forth. p. 153-173. The more powerful effect on some of the forms or stages of life of the parasite, and its powerlessness to effect it in other stages. In certain stages the parasite being much more resistant to quinine than in others. It is in this distinctive action of quinine that the specific activity of the remedy lies p. 154. It would seem that quinine has no appre-

cable effects on those parasitic forms which keep up the infection in a latent condition.' 'In this the crescent-shaped phase in the life of the amoeba, the salts of quinine even when liberally employed exert no appreciable influence.' p. 166. . . 'The maximum and most rapid action of the remedy is exerted on that phase of the parasite's extraglobular existence which is subsequent to the completion of the spore-formation' p. 169. . . 'Quinine acts on the amoeba of malaria in those phases of it's life which are occupied in nutrition and development; when however the transformation of haemoglobin into black pigment is arrested, and in consequence the nutritive activity ceases and the reproductive phase begins, then against this latter process quinine is of no avail' 'This resistance of the adult forms which in spite of the action of the remedy completes the phase of fission or sporulation, explains the powerlessness of the drug in so many cases

of fatal malignancy. The fusion of the adults forms takes place whatever be the quantity of quinine employed, or however it be administered. p. 169-170. 'The action of quinine can be defined with more precision than it has yet been possible to do with almost any other remedy or in any internal disease: it has now become possible to control exactly the results of our therapeutic measures, by examining the blood at short intervals during the administration of quinine, and by deducing therefrom the most favourable conditions for their success' p. 250. The action of quinine on the parasites of malarial fevers having been so definitely shown, should we not conclude that a sufficiency of this drug in the blood would have a deterrent, preventative or prophylactic effect, at least as far as those forms in the life-phase of the amoeba malariae are concerned, which are so marked by affected by it. 'a sufficiency of

quinine is thus required to be in the circulation at the time when it is expected the organism will develop - a sufficiency of quinine to destroy the crop' (v. Malarial Fever as met with on the Gold Coast - C. H. Eyles. p. 48).

In the conditions where the exciting causes may come into play as after heavy work or exposure to wetting and chills, when weariness is complained of, or the prodromal symptoms as headache, nausea and malaises, quinine given will often be beneficial in warding off an attack of fever. How far drugs administered in this way are of real value seems uncertain. The difficulty of carrying out accurate observations under circumstances of discomfort, arduous work and in a climate inimical to one's well-being has to be kept in consideration and is perhaps best appreciated by those only who may have endeavoured to work under such conditions. Marches over sandy tracts of country with heat and dust,

marshes and through bush, with a limited supply of water on the march of necessity, broken rest and at best not too palatable food are somewhat conducive to discomfort. As regards the period when quinine should be administered the best times are during the premonitory stages, and after the paroxysm before the next paroxysm develops. It may however be given at any time, as laid down by Maclean even without waiting for remissions. He says practitioners who relax in their efforts to stop the exacerbation, who pause in the use of quinine while they apply routine remedies for this or that symptom . . will have little success in the worst forms of Indian remittents.' (Maclean quoted by Eyles. v. Malarial fevers as met with on the Gold Coast. C.R. Eyles p 49-50).

'Now seeing that these fevers are in the best majority of cases dangerous, and moreover that the drug is not without a useful effect at whatever time it be employed, it is clear that recourse to

its ought not to be put off until some hours after a paroxysm begins'. it will be well to administer it as soon as possible, & repeat the dose from 4 to 6 hours, no matter what may be the particular points in the course of the fever at which the remedy is commenced' (v. 'The Parasites of Malarial Fever' - Marchiafava & Bignami - Mannaberg - p. 172.). Golgi expresses the opinion with regard to quartan ague that the most rational mode of treatment is to employ the remedy some hours before the paroxysm begins so that its maximum action may be spent on the young forms resulting from fission while they are still in the blood-plasma - for this is the period of their life on which the influence of the drug has the greatest effect'. (v. idem - p. 171.). Quinine is best administered a few hours before the attack - the greatest effect (v. idem - p. 408). that forms of the parasite persist for shorter or longer periods in the blood is shewn, for the forms of the crescent-shaped phase of the plasmodia frequently persist in the blood

from one to two weeks during the period of pyrexia from fevers subsequent to a series of paroxysms' - (Cf. idem. p. 166.) May not these conditions explain the apparently baneful results in the administration of quinine in malarial fevers. Quinine is said to alter the blood plasma and make the oxygen of the haemoglobin combine more closely with the colouring matter whereby it does not allow it to pass so readily into other substances (but unaffecting the haemoglobin as a conductor of oxygen.) - 'Thus the action of the remedy not only extends directly to the parasite but also alters the red blood corpuscle as to render it less fit or unfit for the amoeba to live in' (Cf. idem. p. 170.) - This being so would not the drug given as a prophylactic, circulating in the blood, render the media in which the parasite thrives antagonistic to its reception? In reference to other prophylactic drugs Arsenic and Opium may be mentioned. Instances of the beneficial effects

of Arsenic have been described. It is however much more beneficial administered rather as a remedy in the more persistent forms of malarial fevers. As improving an anaemic condition it is useful in improving health and thus rendering an individual less susceptible to fevers. Arsenic acting as a prophylactic does so 'in preventing relapses of the Chronic infection, not in warding off the primary attack' (C. Hygiene and diseases of warm Climates, Davidson. p 205.).

Opium has been extolled by many as a prophylactic to malaria, and it is undoubtedly of much service. Further they are beneficial is it when the patient is suffering from insomnia, much restlessness or vomiting.

Now with reference to treatment I would put on record the very beneficial effects which I have found from the use of Antipyrin. In many cases where the temperature was high, the patients distressed with headache

and sickness, with tendency to delirium has this drug been given with good results - 15 grains administered three times a day - or four times a day - Very serviceable is it during the exacerbations - Very satisfactory was it found in reducing temperature, lessening the headache, causing perspiration and in soothing the patients generally - This drug seemed to me preferable to antifebrin - During the intermissions and the remissions quinine is to be exhibited - In my practice 15 grs. of Sulphate of quinine given three or four times a day seemed the most satisfactory dose - Thirty grains at a time is recommended at visits by some - As a routine the administration of some cathartic at the onset of the fever is almost essential - Calomel has been employed from time immemorial - a few strong salines seemed to me as beneficial as anything else - The

bowels tend to constipation. The use of hydrochloric acid with Strychnine was found beneficial in counteracting the tendency to torpidity of the intestines - also being a Chologogue and the acid soothing to a thirsty patient. As a rule the administration of quinine for a week or ten days after the fever was carried out - ten grains twice or thrice in the day. Where the fever was more of continued type Arsenic was beneficial - Sometimes this was combined with alternate doses of quinine. An Iron tonic is necessary in many cases after an attack of malarial fever. During the cold stage the usual remedies are employed - warm drinks - blankets - hot bottles - thin hot buttered tea is good - In the hot stage effervescing cool drinks with sucking ice give relief - evaporating lotions to head - occasionally may be necessary Tepid Sponging of body where this stage is prolonged - During

plaster over Stomach for vomiting will sometimes relieve this - General attention to relief of Symptoms while antipyretics or drugs as indicated are exhibited. Chill has to be avoided from damp clothes in the sweating stage. Medicines and nourishing foods are to be given during the intermissions and the remissions. In Malarial fever the early administration of a good purgative is necessary. The treatment described is the same as that of a severe form of malarial fever. attention has to be given to keeping up patients strength by nourishment & stimulants as indicated. with more general relief of Symptoms, vomiting, &c.

Among the Sequelae of malarial poisoning are to be mentioned. Malarial Cachexia. The Sallow pale complexion. The debility and emaciation. loss of energy or inclination for exertion. The inability for sustained efforts either physical or

mentals. the cold clammy condition of the skin, the clamminess most well seen in the palms of the hands. the tendency to dyspnoea on exertion. sometimes a feeling of giddiness. defective memory or loss of memory. instability in loss of temper. anaemia, are all conditions which characterise this. Again the 'blow ague or neuralgia. neuralgic affections of other nerves as Sciatic thoracic, etc. Ague cake or enlargement of the Spleen. Boils and carbuncles are not uncommon. Many other sequelae are described (v. Cyclopaedia of the Practice of medicine. Zeimssen vol. II. 1. Anaesthesia along the course of nerves (p. 600). Herpes (p. 636). Syphilis. and dropsy (p. 641). Diffuse syphilis leading to enlarged kidney, amyloid degeneration of the kidneys and also of the liver and Spleen. cirrhosis of the liver. haemorrhagic diathesis. Scurvy. tuberculosis. Nervous affections, paraeses,

psychical disturbances, insanity with the cessation of periodicity, Chronic mental diseases (v. idem. pp. 649-650).
In all cases of tendency to malarial cachexia there is need of early removing or removal to a healthy climate. Lastly in reference to precautionary measures on visiting malarious regions a good deal may be done. Avoidance of sleeping ashore, and perhaps returning on board ship before nightfall. Avoidance of exposures to heat of sun or to rain and wetting. Exposures to night dews and chills. Night marches or work in early morning before some meal. Excessive Eating of animal food or drinking. Avoid habitual constipation. Attention to drinking water & perhaps boiling it. Attention to sanitary surroundings or those. dwellings houses constructed on suitable sites away from swamps, &c. Personal hygiene is of importance. The antagonistic effects

on the growth of malaria in a district of cultivation and drainage of the soil has to be kept in mind. after fatigue and heavy work a dose of quinine may go a long way towards warding off an attack of fever. Much as has been written on this subject there yet remains much for investigation relative to these fevers. So with regards to many other diseases, and may we not then use the words of the late Laureate. little flower in the crannied wall . .

. . . . . .

. . but could I understand
What you are, root and all and all in all,
I should know what God and man is .