SIRIASIS AND HEAT EXHAUSTION

with

RECORD OF EIGHT CASES CHOSEN FROM THOSE TREATED PERSONALLY.

by

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SIRIASIS OR SIRIOSIS AND HEAT EXHAUSTION.

With record of Eight Cases chosen from those treated personally.

The literature on this subject is, to say the least vague and unsatisfactory.

Many works on medicine do not mention the condition at all, and others devote one or at most a few pages to the two conditions.

Some authors do not even differentiate between the two conditions.

In the following pages I wish merely to dwell on the salient features of the conditions with, what seems to me, the main lines on which treatment should be carried out.

I also wish to point out how, in my experience it can best be prevented, and the causes which are chiefly responsible for its production.

The names under which the conditions are mentioned are very numerous, many of them misleading, and ambiguous. Thus we find, Coup de Soleil, Insolation, Themic Fever, Heat Apoplexy, Heat Exhaustion, Ictus Solisor, Sun Stroke, Sun Traumatism, Siriasis, Heat Asphyxia, Calenture, and others.

I wish to distinguish between Siriasis or Heat Stroke, and Heat Exhaustion.

There are, I am quite aware, other conditions brought about by exposure to high temperatures which /
which can be classed under neither of these two headings: cases with indefinite symptoms, and slight indisposition.

These I do not wish to touch on at present, but shall confine myself to the two chief conditions.

As to names, Siriasis - Siriosis would be better from ἱερός = hot: scorching - is good partly because of its antiquity and also because it takes nothing for granted, as the name Heat Apoplexy does, but is simply derived from the Greek word named, connected with ἱερός = to dry up by heat.

Heat Stroke is good, but not as accurate; as a "stroke" is commonly taken to mean, when it conveys any meaning at all to the public, the sudden bursting of a blood vessel, or the sudden breaking of the conducting power of a nerve.

Now as at present enough is not known of the pathology of the condition to say that either of these conditions arises in all cases it follows that the term Heat Stroke should not be used.

I shall confine myself to the term Siriasis or Siriosis as denoting a condition caused by excessive heat, whether solar or artificial, arising in certain well defined localities, and producing insensibility and great hyperpyrexia. I propose to confine the name Heat Exhaustion to that almost opposite condition, where a low temperature and collapse, with or without insensibility, is produced by excessive heat, whether solar or artificial on any part /
Siriasis or Siriosis. This condition is only found in certain well defined areas of the earth's surface. It does not depend entirely on excessive heat, but cannot be produced without excessive heat. As we shall see, the predisposition of the person attacked is always an important factor in the production of an attack, and when the question of prevention is considered is really greater of the two.

It is unknown in Europe, and cannot occur at high altitudes, say over 700 feet, nor does it necessarily occur when the maximum temperature for the day or year is reached.

It is common on board ship in the Red Sea and on the coasts surrounding the Red Sea: It occurs occasionally in Australia, Queensland and W. Australia most frequently; South Australia and New South Wales more seldom.

It occurs in parts of the S. American Coast.

In all these places I have myself seen cases. It also occurs in the Indian plains, in Burmah, the reaches of the Ganges, the Gulf of Mexico, the Persian Gulf, in a limited area in China and in the La Plata district.

On the high seas, i.e. when over 150 miles from land on the sea proper it does not occur, but in land locked places such as the Red Sea, Torres Strait, Persian Gulf etc., and close to the shores as /
as on the Queensland coast it is common enough.

**AETIOLOGY.**

Both sexes and all ages are liable in the prescribed areas; newcomers are more liable than old residents. Here there is a fallacy as every one living in a new place was at one time obviously a newcomer, and it may be that the person living for years in a place without an attack was simply less predisposed than the man who soon after his arrival is struck down.

Whatever is the cause newcomers are more liable, and the longer a subject has lived in the area the less liable does he or she appear to be affected with Siriasis.

I shall enter into this again under predisposing causes in the individual.

The most likely subject is the young healthy adult of good muscular development who lives what is called well, eating large and hearty meals with or without alcohol, and who goes in for violent physical exercise and copious iced drinks shortly after the meal.

Next, the most likely subject is the individual whose physique is weakened by organic disease such as syphilis, tuberculosis, heart diseases, Bright's disease etc., etc.

Predisposing causes in the individual are:—overindulgence in the pleasures of the table, overloading the stomach with food especially heavy foods such /
such as suet puddings, potatoes, pastry, pork and food generally which is difficult of digestion; drinking large quantities of iced drinks, either alcoholic or otherwise. The drinking of copious iced draughts while exposed to high temperatures, especially in the direct rays of the sun, and at the same time undergoing severe muscular exertion, cannot be overestimated as predisposing causes.

The overindulgence in alcohol is certainly dangerous, but provided the person is a small eater is in my opinion less likely to produce Siriasis than the more venial sin, in many people's estimation of overeating.

So convinced am I on this point that in choosing men for exertion under trying conditions, did the choice lie between the heavy eating teetotaller, and the frugal living alcoholic, I would unhesitatingly choose the latter.

I do not wish to make light of alcoholism as a predisposing cause, but wish to emphasise the danger of the man who habitually overeats.

Sexual excesses, late hours, prolonged exertion, constipation and anything tending to reduce the resistance of the individual are all potent factors in the precipitation of an attack.

As to the condition itself the pathology is by no means clear; it has been put down to an overheating of the blood, and increase in the solid constituents of the blood, excessive sweating, inflammation /
inflammation of the membranes of the cord and brain, paralyses of the vital nervous centres such as the nervous mechanism of the heart and lungs, and lastly to a bacteriological origin. If however I am right in thinking that over feeding (as well as over drinking) is a strong predisposing cause it is easy enough to see how this acts in producing an attack. Over heating of the blood, and increase of its solid constituents are two effects directly produced by this cause.

The function of food being to make blood while the function of blood is to nourish the body, if more food be taken into the body than is required for the purposes of its nutrition excessive oxidation or combustion of unassimilated material may easily cause overheating of the blood, and so lead to the hyper-pyrexia so characteristic of Siriasis.

Increase of the solid constituents of the blood would of course be caused in the same way and might lead on the one hand to the hyper-pyrexia seen in Siriasis or on the other hand to an opposite condition seen in heat exhaustion. In the case of heat-exhaustion the blood and tissues may be so blocked by the presence of unnecessary material that combustion cannot take place, and so the temperature may be lowered.

As in this condition the causes have generally been /
been longer in action Heat - exhaustion is more often found in older persons, and persons who have been longer in tropical climates, whereas Siriasis is more common among new comers and younger persons.

As to excessive sweating, I think this can be put out of count at once. No amount of sweating per se will ever hasten an attack.

On the contrary the individual who does not sweat is far more liable; and one of the most serious cases I ever saw was in a man who had not sweated for several days and who had drunk huge draughts of water, so that it was impossible that his blood had the solids increased by sweating.

Far more likely is it that if the solid constituents were increased in his case, it was due to lack of excretion through the pores of the skin (Vide case 1.)

A little reflection will show how excessive sweating though not a cause of Siriasis may have come to be considered to be one. One of the means by which the body rids itself of waste and unnecessary materials is by perspiration.

The skin is one of the greatest eliminators of waste from the body. Now if the blood and tissues are loaded with waste matters, uric acid, sarco - lactic acid, and other effete matters nature will set up perspiration to get rid of them.

But if this is not sufficient, if there is not sufficient /
sufficient time to get rid of them, or if through ignorance or other causes over accumulation still goes on the patient will be apt to get an attack after sweating. After sweating but not because of it, and no doubt this is the cause of this erroneous opinion in some quarters.

BACTERIOLOGY.

Whether the disease is associated with the growth of a microorganism, or microorganisms, or not is uncertain. None appear as yet to have been isolated or cultivated. The facts that cases run a more or less similar and acute course, that heat does not seem sufficient alone and of itself to cause an attack, and that some unknown factor is at work to produce the disease, lead inquiry in the direction of searching for a micro-organism or bacteriological cause.

Other unknown conditions may exist such as an alteration in the atmospheric pressure. These and others still undiscovered causes may render the body a suitable soil for the growth of microorganisms.

On the other hand the disease appears to be neither infectious nor contagious, and up to the present time contagion and infection are our chief reasons for assuming that a micro-organism is responsible for the presence of any disease.

That several cases may occur at or about the same time /
time is true, but we can more readily account for them as successive effects of a common cause than as cause and effect of one another.

But, though I do not say no micro-organism is present, or that one will never be isolated and demonstrated, in my opinion our methods of prevention and treatment will not require to be altered if it should be so.

The chief facts of the disease and the mode of their manifestation are obvious, and the presence of a micro-organism, should one be discovered will not alter either them or their treatment.

The symptoms all point to a nervous involvement, and that it is the central nervous system which is immediately at fault seems evident.

The temperature runs up anywhere between 110 F. and 114 F. and that often very suddenly.

The patient becomes unconscious quite suddenly, often the hearts action becomes disordered, the pulse much disturbed, and great disorder takes place in the bodily functions generally. The urine is much decreased, or there may be even anuria. Intestinal peristalsis is usually abolished, and the skin will not act.

The reflexes are uncertain but are usually totally abolished. Paralyses of the solar plexus is a very ominous sign and one of extreme gravity.

There is a possible clinical explanation of these /
these conditions, which although it cannot at present be demonstrated appears probable, and covers the other facts in a way which no theory appears to do.

It is also compatible with what is known as to the morbid anatomy of Siriasis, for the brain and its membranes as well as the lungs have been found congested.

My theory is that often, quite suddenly, a serous effusion occurs in the meninges of the brain or cord, or both in acute cases of Siriasis.

It seems to me difficult, if not impossible, to explain the rapid occurrence of the symptoms on any other theory. Sometimes the subject is struck down, and becomes unconscious at once; in other cases the onset of unconsciousness is a little less sudden.

A rapid serous effusion between the brain, or cord-meninges, would account for this.

It is well known that in excessive heat the cells of the body become softened, swollen, and even at times diffluent.

Leucocytes become very active and wander about the body readily, while the lymph spaces and fine endothelial membranes which usually confine them to their proper places themselves become swollen opening in chinks and gaps so as to allow the leucocytes the more readily to escape.

Under these conditions a rapid effusion into the membranes of brain and cord is very likely to occur.
11.

occur.

That this does really occur seems the more likely that after re-absorption complete recovery often takes place.

If the absorption be rapid then recovery is also rapid and this is sometimes seen.

If on the other hand there had been a true apoplexy, that is a rupture of some vessel or vessels, on, or into the cerebral substance complete recovery could hardly occur.

Of course in this as in all other conditions of the organism different degrees might occur, and a general condition of diffusion of cells might be so severe as to cause rupture of vessel coats as well. But as a rule, the effusion appears to be of a serous nature.

A similar condition, or the occurrence of diffusion among the cells of the sympathetic nerve plexuses in the abdomen (e.g. solar plexus) would account for paralyses of function in various abdominal and thoracic viscera seen in the disease.

Symptoms and Onset.

The patient may or may not have any prodromal symptoms; as a rule they are absent.

If present they consist in a feeling of restlessness, irritation, and unwillingness for any exertion.

Pains in the back and limbs sometimes occur.

These symptoms are usually present from 24 to 48 hours /
12.

hours before hand if they occur at all.

Often the men will say that though working hard he is not sweating at all. If this is the case with the other symptoms I invariably lay him up, and until the action of a good brisk purgative has resulted he is prohibited from going down below if on board ship; and I believe some cases have been prevented by this treatment.

Unfortunately these symptoms are the exception and then the course is as follows.

The patient is doing manual labour usually shortly after a full meal, feels giddy, and may or may not have time to sit down. In either case he suddenly falls over and loses consciousness with sometimes a convulsion.

When picked up, if only a few seconds later, the face is deeply suffused, first red, later purple, pulse rapid, full, and usually high tension and not easily compressed.

Skin burning hot and dry. I know of no other condition where the skin gives such a burning sensation to the touch as if it were "red hot" as the man's companions often say.

The breathing is deep and stertorous, slow, often with much working of the alae nasi.

The abdominal muscles often give a feeling of undue rigidity. The man cannot be roused by either shouting, or shaking his arm.
13.

The temperature in the axilla is almost invariably 109° or above; in the rectum it is usually a couple of degrees more.

If left untreated and the case is a severe one he will die in 15 or 20 minutes of asphyxia; if he escapes this he dies in two or three hours of heart failure.

The heart getting intermittent and irregular, the pulse becomes running and imperceptible, and death takes place.

The temperature may be quite as high at death as ever.

At first as a rule there is complete immobility, later, 30 - 60 minutes afterwards, if he lives, there may be convulsive twitching of the facial muscles, frowning of the eyebrows, grinding of the teeth, and perhaps, convulsive movements of one or both hands: jaw-clonus occasionally occurs.

Involuntary passage of urine and faeces is very rare; as a rule the bowels cannot be moved even with enemata in a case which is going to end fatally.

Spastic rigidity of the neck, arms, and lower extremities is not uncommon.

Reflexes occasionally increased; usually absent; always absent shortly before death.

Post mortem rigidity comes on very quickly. It must be remembered that these patients were as a rule undergoing hard muscular work when struck down, hence /
hence rigidity would be expected early as in those shot in a battle, but this p.m. rigidity comes on almost at once.

Decomposition also sets in very quickly in three or four hours often: Here however the external conditions must be borne in mind, as in the tropics or Red Sea where these cases occur decomposition is naturally speedy.

Treatment.

The patient must be moved to a shady place at once where the temperature is the lowest available. Immediately removal is most important.

If, on steamers for instance, a man is struck down in the stokehold or bunkers and time elapses before he can be got on deck and treatment begun, his chance of recovery is very much diminished; an interval of five or ten minutes making all the difference in the issue.

In most ships it is impossible to get a helpless man out of the stokehold or bunkers without carrying him first through the much hotter atmosphere of the engine room, and I have seen cases which I believe but for this unavoidable delay might have recovered.

Any exposure to greater heat after unconsciousness has occurred if only for a couple of minutes seems to have a most grave and severe fatal effect on these cases.

As soon as possible ice should be packed round the /
the head, which if there is sufficient assistance at hand, should be shaved; but time should not be wasted in shaving the head if more energetic treatment is thereby delayed.

The body should be drenched with cold water, iced water, which serves the double purpose of reducing the temperature and washing the pores of the skin free of dust, dirt or coal.

Turn the head on one side and wash out the mouth with cold water by means of a swab or sponge, and putting a finger into the hollow of the cheek run water all round between the jaw and gums.

This cleans out mucous and saliva which is usually found collected there.

A swab fixed to the end of a holder should be pushed down the throat and as much mucous as possible got up, there is always a large quantity collected here, and the embarrassed breathing is much relieved by this.

If the dyspnœa is severe, artificial respiration should at once be carried out and continued if necessary till recovery or death takes place.

Strong ammonia and capsules of nitrite of amyl should be broken and held under the nose, the latter invariably stimulate respiration for the time, and also relieve the embarrassed heart's action.

For the convulsions, if severe, inhalations of chloroform have been advised, but in my experience are/
are not a good thing as they have little effect, and only add to the difficulties of respiration which are already acute.

Should the heart show signs of failure hypodermic injections of aether, digitalis or strophanthus should be used: strychnine is in all cases inadmissible.

The chest, abdomen, and limbs should be rubbed with blocks of ice either on the bare skin or over a sheet only.

Should the patient show no signs of returning consciousness give an enema of soap suds, olive oil and turpentine, the latter half an ounce.

If it be possible to make him swallow which usually it is not, give a couple of drops of croton oil.

Draw off the urine with a catheter and wash out the bladder with solution of boric acid.

If the bowels are once got to act freely the chance of recovery is good.

If none of these methods avail then open a vein, (median basilic) and draw off 10-15 ounces blood and give saline transfusion of a pint and a half.

Do not transfuse without first bleeding as the arterial condition is one of high pressure and engorgement, and to put in more fluid without drawing some blood off first only makes matters worse.

Apparently there is some toxine present in the blood /
blood for it is certain that sometimes transfusion has an excellent effect, reducing the venous engorgement always present, and often setting up perspiration. By thinning the blood, more elimination of effete matter (possibly producing toxines) will be permitted from the lungs and then freer perspiration may do the rest.

Take the temperature constantly and if it falls stop the ice when it reaches 100°F. as if continued after this there is danger of collapse and very low temperature.

But beware of temperature rising again very rapidly, this frequently happens, vide case 1.

After Treatment.

Should patient recover consciousness he is pretty certain to make a good recovery. He must be kept in a cool room with electric fan or punkah going, and kept absolutely quiet. Milk diet only for the first few days should be allowed, later beat up eggs, fish etc.

The bowels should be opened every morning without fail, and strict attention paid to the general health.

A tonic such as citrate of iron and quinine often does much good during convalescence.

Do not let him resume work for at least a fortnight, preferably a month, and then only if recovery is complete.

Should he suffer from headache a mustard plaster at /
at the back of the neck gives great relief.

Should the headache persist change of climate is the only hope of a permanent cure and he should be sent home for a year.

Occasionally permanent incapacity for bearing hot climates persists.

This is the exception not the rule; and usually provided patient suffers from no chronic organic disease there is no reason why he should not continue work in a tropical climate.

Relapses within an hour or so of recovery is not very uncommon, and if he again becomes unconscious artificial respiration and ice must at once be begun over again. (Relapse may be due to a new serous effusion, and recovery again to a re-absorption.)

The safest guide is the temperature, if this begins to rise after initial fall at once begin ice again, but frequently there is very little time in which to act, the temperature running up in a few minutes from 100 to 110.

As a rule relapse after initial recovery is very serious, still it is by no means always fatal.

Prognosis.

To a large extent this depends on the rapidity with which treatment is begun, and the energy with which it is carried out.

If the patient can be at once withdrawn from the direct rays of the sun, or removed from the heat /
heat of a stokehold between 60 and 70 per cent recover.

Rapid fall of the temperature on packing in ice though a good sign does not in itself mean recovery.

I have seen the temperature fall in 20 minutes from 110 - 99 and yet the patient never even become conscious before death. Vide case 1.

As a rule a free motion of the bowels with relaxation of muscles, return of consciousness and the onset of sweating means recovery.

If return to consciousness under energetic treatment does not occur within 45 - 60 minutes the prognosis is most grave.

If two to three hours elapse with no sign of recovery it is practically hopeless. Still, treatment, especially artificial respiration and heart stimulation should be carried on as long as life of case lasts; as this is a class which should never be given up till death actually occurs.

As a rule the friends should be told after a couple of hours that the patient will probably not recover.

The great sign of recovery is the onset of sweating. Once get the skin to act and even if consciousness does not return at once the result is in all probability going to be favourable.

Convulsions are a very grave symptom, so also are twitching of the facial muscles, grinding of the teeth /
teeth and jactitation of the limbs.

The most hopeful cases are those that never have convulsions, restlessness, or any movement of the limbs, but lie quite still all the time.

Noisy delirium is extremely rare. I have never seen a single case, and men who have treated dozens in India have told me they have hardly ever seen one either.

Signs of heart failure is a grave symptom and at once diminishes the chance of recovery.

The danger of Asphyxia, and signs of asphyxia if artificial respiration is at once begun is not nearly so serious as embarrassment and weakening of the heart's action.

The missing of a beat, and irregularity of successive beats is a very dangerous sign.

There is no rule which can be laid down as to recovery or death if the temperature reaches a certain point or the pulse goes up to so much a minute.

Each case must be treated on its own merits, and the symptoms combated as they arise.

As to Prophylaxis this will be dealt with along with that of Heat Exhaustion.

**Heat Exhaustion.**

By this term is meant a condition, produced by exposure to extreme heat, natural or artificial, with markedly subnormal temperature, cold, clammy skin, and profound collapse with or without insensibility.

Unlike /
21.

Unlike Siriasis this condition can occur at any altitude, and in all latitudes.

The only essential condition is exposure to high temperature solar or artificial.

Naturally it is most frequently met with in the tropics.

Aetiology.

Both sexes and all ages are liable. Unlike Siriasis prolonged residence in hot climate, or long experience of working in artificial heat such as furnaces appears to increase rather than diminish the liability.

A damp heat is more deadly than a dry heat.

Any causes tending to debilitate the individual is a predisposing factor.

Unlike Siriasis the young athletic person is not a likely subject even if he to some extent ignores strict moderation in food and drink.

The most likely sufferer is the individual who suffers from chronic alcoholism spread out over several years, and the subject who above all others is liable is the individual who is always alcoholic but has just passed through an acute attack of drinking, in excess of what he usually takes. Vide cases 6, and 5.

It is doubtful if these cases ever occur unless in addition to heat there is considerable physical exertion either at the time or a few hours previously.

Other causes are Syphilis, Bright's disease, Tuberculosis, /
Tuberculosis, any organic disease of the heart, kidneys, or any disease reducing the stamina of the subject.

Thin people are equally liable with stout, and under equal conditions the thin person seems to be attacked more quickly.

Persons of thirty or thirty-five and over are more liable than younger adults.

Children are not often attacked; probably because children do not as a rule have to undergo severe physical exertion except at games, and when they are attacked it is almost invariably after playing for a long time in a hot sun, or after some similar muscular effort. Besides children's diseases are generally more acute than those of adults so that when they so suffer it will more probably be from Siriasis than from Heat Exhaustion.

Heat Exhaustion differs in its incidence from Siriasis chiefly in the following particulars:
1. The age of those attacked is on the average more advanced in Heat Exhaustion.
2. The alcoholic is more likely to be affected by Heat Exhaustion than Siriasis.
3. The physically exhausted, or worn out subject is more liable to Heat Exhaustion.
4. The healthy muscular adult is less likely to be attacked by Heat Exhaustion than by Siriasis.
5. Prolonged residence in hot climates tends to increase the liability to Heat Exhaustion.
6. Heat /
6. Heat irrespective of locality can produce Heat Exhaustion.

7. The course of cases differs much more widely in symptoms than is the case with those of Siriasis.

8. The mortality of Heat Exhaustion at the time is much less, but the duration of the illness is much longer, and the after effects reach a much higher percentage of those attacked than is the case in Siriasis.

9. Prodromal symptoms are the rule, not the exception in Heat Exhaustion, and the onset of the attack is much less instantaneous than in the case of Siriasis.

Pathology.

This is obscure, the attacks are not as a rule so sudden as in Siriasis, but the disease appears to affect the nerve sheaths, and probably the muscular sheaths also, and the connective tissues of the body generally.

These tissues are probably congested beforehand partly through the heart and partly through the causes already alluded to as predisposing to the disease.

This explanation appears to account for the cramps or spasms of individual muscles, and groups of muscles which so often occur.

Probably there is a deposit of sarco-lactic, and uric acid, following prolonged muscular effort in /
in persons whose skin and kidneys are generally acting sluggishly at any rate.

This explanation would also account for the severe pain in the eyes and back of the neck noticed for example during the recovery of case 5; this being due to congestion of the connective tissue of these parts.

Mode of Onset and Symptoms.

The subject usually feels tired, and irritable before the onset of an attack.

There is disinclination for mental or physical effort, and he may feel dreamy.

These symptoms are present from three to twelve hours as a rule. Sometimes, especially in persons under twenty, they do not occur at all.

Frequently the attack comes on some hours after the conditions which induced it have been removed.

Hence it frequently takes place after sunset, and after an hour or two of rest has followed on prolonged muscular exertion, Vide case 8, 9 and 4.

Hence a man working in intense artificial and natural heat may leave his work, and not be attacked for two or three hours after reaching home.

Symptoms. As a rule the patient is quite careless of his surroundings, is not unconscious, but takes no interest in anything; will only answer questions by being roared or shouted at, and again relapses into indifference on being left alone.
He is thoroughly dreamy, and wishes to be left alone.

The temperature is usually 95 or 96. The pulse weak, with very slight expansion wave irregular and slow, forty or so per minute.

The pupils are widely dilated, the skin cold and moist.

The breathing is shallow and sighing, never stertorous, often of a semi Cheyne Stokes type. Vide case 4.

At the first onset the patient usually does not complain of headache or anything else, but in a few hours suffers intense dull throbbing pain at the back of the eyeballs, the occiput and back of neck.

He may vomit, usually after the first three or four hours, not sooner as a rule, and may suffer from partial paralyses of the limbs usually the lower extremities.

Photophobia is very common and complete anorexia, amounting at times to a loathing of all food.

The tongue is usually moist, coated, and grey or white in colour.

The face is pallid, and the eyes are lustreless.

Cramp of the muscles is sometimes very severe, amounting to agony.

This is not a general convulsion, but a localized cramp, and may go from one set of muscles to another; as those of the abdomen, then the forearm, then the thigh,
thigh, calf etc.,

The face muscles, and those of the back appear to enjoy complete immunity, the muscles of the hand the upper arm, and the thorax are rarely affected.

Roughly the muscles above the diaphragm as far as the elbow are seldom affected, below the diaphragm and elbow they are affected.

The extensors of the forearm and thigh are affected more than the flexors, but the flexors of the leg and foot (plantar flexors) are affected more than the extensors.

In the forearm the extensors carpi radialis longior and brevior, and the supinater longus are specially liable, and usually the longest affected.

Treatment.

This is essentially stimulation, hot bottles to the feet, brandy and coffee, or beef tea by the mouth, or if this is not possible by the rectum.

Hypodermically ether, and strophanthus do good, digitalis is not of so much use as it tends to slow the already slow heart.

Ammonia and smelling salts to the nostrils or even a whiff of anyl nitrite often does good. The latter must be used with caution as it tends to dilate the vessels too much, and it is of more use in Siriasis than this condition.

Ninety minims Sp. Amn. Aromatic divided into two doses and given at an interval of ten minutes in /
in hot water is an excellent remedy.

The patient should be roused in the initial stage and not allowed to doze off until the heart and breathing are more regular.

A hot bath for ten minutes at a temperature of 105 - 108 F. is an excellent thing. For the cases with severe cramp it is the most effective form of treatment there is.

Friction of the extremities and abdomen with a rough towel is of much benefit.

Other symptoms are to be treated as they arise. Vomiting in itself is not an unfavourable sign; it usually ushers in the stage of reaction when the temperature is beginning to rise.

If very severe and uncontrollable £SS. brandy to four ounces of water given in table spoonful doses as hot as can be swallowed is a good remedy; and should it still continue a mustard leaf applied to the pit of the stomach frequently relieves.

Cramp.

For this massage with Linimentum Belladonnae is the most suitable treatment so also is gentle rubbing /
rubbing and squeezing of the affected group of muscles, keeping it up for several hours if necessary as the seizures come on.

If this does not give relief the hot bath must be resorted to, immerse for 10-15 minutes in water at 109 - 110 F. and rub the muscles under water; this invariably gives relief.

When taking the patient out of the bath simply wipe down with a rough towel, not spending much time in drying thoroughly; and roll him up in a blanket with a hot bottle at his feet.

So much for treatment at the time but much depends on the after treatment, which if not carefully carried out will leave the patient with permanent injury to his health.

As much sleep as can be got should be encouraged, keeping the room cool by means of an electric fan or punkah.

For the splitting headache which is often prevalent use an evaporating lotion on a cloth wrung out in ice and laid over the forehead /
forehead, if necessary put a mustard leaf at the
the back of the neck.

The bowels must be kept regular and evacuated
daily, the diet should be light and nourishing;
small quantities of food being given frequently.

An excellent mixture for keeping the bowels
regular, and for the anaemic condition very often
associated is that of:—

Ferri Sulphatis gr. iss
Magnesiae Sulphatis gr. xx
Acid. Sulphuric Aromat M. XV.
Infus. Gentianae OZ. I.

Given twice daily after meals; if the taste
induces vomiting or a feeling of nausea same
substitute should be given.

Alcohol is of the greatest possible benefit
in these cases during the first two or three days of
collapse, and during this time milk and brandy is the
best food which can be given.

Milk ozs 4. Brandy ozs SS. every two hours
or so.

Later the diet should be beef tea, milk, jellies,
fish and soups, gradually advancing to chicken etc.

The photobia and headache frequently last from
3 – 10 days, and even after this a diurnal recurrence
of headache about 2 p.m. and 8 p.m. is common.

Absolute rest and quiet with nourishing diet
and tonic are the only lines of treatment.

The patient must not be exposed to the direct
rays of the sun or other heat for at least three
weeks/
weeks after all symptoms have disappeared, and on the least recurrence of headache and lassitude he should be sent to a cool climate for a prolonged holiday.

As a rule the temperature rises during convalescence when the headache reaches its maximum daily, usually to 100 or 101, falling again a couple of hours later.

**Prognosis.**

The immediate prognosis is good, but the ultimate prognosis must be guarded, as it is impossible to say for some time whether ill effects will remain or not.

Complete recovery is the rule, but the severity of the initial attack is no criterion as to the ultimate result. Age does not appear to affect the prognosis.

The subject with no organic disease makes the best recovery, and the patient who is willing to remain absolutely quiet for some days after his symptoms have disappeared makes the most rapid recovery in the end.

Relapses if the patient begins work too soon are frequent.

The cases where cramp has been a severe symptom have in my experience recovered completely. The cases making the slowest and least satisfactory recovery are those beginning gradually, with headache as a primary condition and who have gradually got worse, the headache all the time being the chief complaint/
complaint.

These cases in many instances can never stand prolonged exposure in high temperatures again. Usually anything over 75 F. gives them headache, and a feeling of restlessness and irritability.

Thus on the whole prognosis is good, and the cases of speedy death within a few hours as in Siriasis are very rare indeed.

Prevention of Siriasis and Heat Exhaustion.

Clothing, should be light and loose, it should also be light in colour as well as texture, thin flannel or flanellette being the safest; the head should be covered with a straw hat or helmet allowing plenty of air to circulate, and the back of the neck should be protected as well as the eyes, this being very important.

Some authorities advocate the sewing of cotton wadding into the coat in a strip three inches wide down the back to protect the spine; but I do not think this is either necessary or desirable. It certainly makes the coat very hot.

Strict attention to cleanliness cannot be over estimated in its beneficial effects.

The whole surface of the body should be washed with soap and water; and a bath taken at least once every day, after which a brisk rub down with a rough towel. Nothing is worse than a skin the pores of which are choked up with dust in a hot climate.

Alcohol should be used very sparingly, and better still not at all.
If it is taken whisky seems the least harmful form provided it is good whisky, a provision which it is difficult to be sure of in many foreign places.

Food. This is certainly in Siriasis, the most important of all.

It should be light, nourishing and easy of digestion. Articles of food such as suet puddings, pastry pork etc., should not be taken at all.

Fruit if fresh should be taken freely, but tainted fruit must never be used abroad.

Avoid overloading the stomach at any time, and the chief meal of the day should never be taken before heavy work has to be undertaken, a point which is very frequently ignored.

Thirst. This can be satisfied fully, provided drink is not taken directly after food, and also that too much ice is not used.

The best drink is water with about a tablespoonful of oatmeal to the quart.

This can be cooled with ice, but must not be iced, that is it must not contain chunks of ice many of which are swallowed whole.

Small quantities of this can be safely taken at frequent intervals even while working in a stokehold without any danger. The practice common among firemen, and many workmen where the ice is available of drinking pints of ice cold water with solid lumps of ice in it at all times during their work cannot be too much condemned.
The bowels must be attended to regularly, and any tendency to constipation rectified by taking Magnesia Sulphate, or Mist Senna Co when required; A good dose once a week is an excellent preventive if even not absolutely required.

All excesses should be avoided, and sufficient rest in bed taken. Even if it be too hot to sleep it is better for the health to spend so many hours resting than sitting up half the night smoking and card playing which is very often done because it is too hot to sleep.

Any symptoms of lassitude, irritability and feeling of uneasiness should be treated by a brisk purgative and if possible a day's rest.

Persons suffering from syphilis should never be taken on for work of an arduous nature in hot countries, and, if the disease is contracted while there, should be treated with more than usual strictness, and the cases seen twice a week by some medical man.

If these simple precautions are taken the cases of Siriasis and also Heat Exhaustion will practically cease to exist.
RECORD OF CASES.

SIRIASIS AND HEAT EXHAUSTION.


This man was brought up at 2.15 p.m. in the Red Sea. The temperature of the atmosphere was 92, the coal bunkers where he was working were about 105 F. The man was unconscious, and to get him out he had to be carried through the stokehold and then through the engine room the temperature of the latter was 115 F. Hence there was five to ten minutes delay before treatment could be begun.

The history was that the man had been giddy about 12.30 p.m. had sat under a ventilator to have some fresh air, and after ten minutes had said he felt all right and had gone on with his work. About 2 p.m. he again said he was giddy, sat down, and before anything could be done with him he fell back unconscious.

He was got up as quickly as possible laid on deck, his clothing removed and ice packed round him.

His temperature was 110 F. in the Axilla, his pulse 150 full and bounding.

His skin was dry pungent and very hot to the touch, so much so that an actual feeling of having touched hot iron was produced.

The pupils were much contracted, with no light reaction or reflex present. Breathing was deep, slow and stertorous, face cyanosed, and man in danger of dying from asphyxia.

Artificial respiration was at once begun, and body/
body at same time washed free of coal dust, mouth washed out with cold water and swabs used for the throat from which much mucous was swabbed up.

Ice was packed round the head and chest, and body and limbs were rubbed over with block ice.

Strong ammonia, and capsules of amyl nitrite were applied to the nostrils, the latter always had a good effect on the breathing but there was no sign of returning consciousness.

The artificial respiration was continued and a soap, oil, and water enema were administered but without the slightest result; the abdomen was distended and tympanitic from the time he was brought up.

In about 30 minutes the temperature came down suddenly to 100 S. F. but without any change in other symptoms.

Most of ice was discontinued for fear of dangerous collapse.

In eight minutes later the temperature was again 110.5 and these sudden variations went on up to the end. The temperature fell as soon as ice had been kept up for about half an hour and again rose when discontinued. Towards the end the ice had no effect on temperature at all.

Whenever artificial respiration was stopped the breathing became worse and it had to be recommenced.

Several more enemata were administered in course of afternoon and evening but without any good result. Sometimes a little of the fluid ran out, about half of/
of that put in, but there was not the slightest movement of the bowels nor was there any passage of flatus.

No urine was passed, 0.2 were drawn off with catheter which contained albumen in small amount, and deposited urates. No more urine was secreted.

Patient was very uneasy and restless, he kept moving his right arm about and usually ended by placing right hand on abdomen with a convulsive twitching of the fingers he kept turning his head from side to side, grinding his teeth, and there was much twitching of the facial muscles.

He never had the least sign of returning consciousness, and had no delirium.

The legs and body were absolutely immobile during the whole time, the left arm was slightly moved occasionally.

About 7 p.m. the heart showed signs of failure pulse became much weaker, feebler and was thready and running.

Breathing was only kept up by means of artificial respiration.

Ether was given hypodernically for the heart which at once showed marked improvement. Very soon however heart again failed and from this time on was only kept going by ether and strophanthus injections.

At 9 p.m. there was marked change for the worse, pulse became almost imperceptible for some time, temperature rose to 111° F. where it remained and/
and no amount of ice would lower it, anyl nitrite
failed to stimulate the breathing, the pupils
became irregular at one time dilated at another
contracted, and were unequal.

No sweating could be induced at any time nor
action of the bowels.

Towards the end the cyanosis disappeared and
patient became very pale.

Eventually he died at 1.30 a.m. eleven and
a quarter hours after onset.

This patient had the following history. He
was a powerfully built and muscular man, he had
fired on boats in the western ocean trade for some
time but had never been out east nor through the
Red Sea before.

He had the reputation of having a tremendous
apetite, ate enormously of everything he could
get, and his mates said ate as much as six of them.

He drank iced water continuously while on
watch below, and had just had a very large dinner
before going down at mid-day. He was an
abstainer and did not smoke much.

Decomposition set in before 6 a.m. and was
very evident when he was sewn up about 9 a.m.
He was buried at 11 a.m. on the day he died.

Case 2. Siriasis.

W. N. Trimmer, aged 24. Patient was brought
up at 3 p.m. in the Red Sea in an unconscious
condition. Had dropped down without warning in
the stoke-hold while wheeling coal.

Temperature/
Temperature 106 F. Pulse 130 full and strong, skin hot, dry and "hard".
Breathing stertorous and slow, face cyanosed, and pupils contracted equal, no reflex present.
Was laid out on deck, skin washed, and ice applied to head and body.
Strong ammonia and nitrate of anyl applied to nostrils. Artificial respiration commenced.
Regained consciousness in about 15 minutes and temperature fell to 101.
Temperature rose again in half an hour to 104° ice reapplied, and soap and water enema given which acted well.
Temperature then fell to 100 and patient sweated copiously.
Temperature fell during evening to 99 F. and was normal next morning.
Patient suffered from headache for a couple of days, and temperature rose to 101.5 at 2 p.m. on both days, after that was normal.
Was kept in ships hospital for ten days after which he went forward to the forecastle. Eventually he was put on day work, later went back on watch.
He had no further symptoms, and came back on the ship next voyage and kept good health.
In this case artificial respiration was only kept up for 15 minutes.
Patient was not an abstainer, occasionally went on the spree ashore, but was not a heavy drinker.
Smoked about 4 ozs plug tobacco weekly.
Case 3./
Case 3.

A. C. Fireman, Aged 27. Brought up at 2 p.m. in Straits of Bab-el-Mandeb in unconscious condition. Temperature 110 in axilla. Pulse 140, face cyanosed and dusky, skin hot and pungent.

Was laid out on deck and washed and artificial respiration at once begun.

Ice applied to head and rubbed over body. Strong ammonia applied to nostrils.

After 20 minutes consciousness returned and artificial respiration ceased.

Temperature was now 103 and ice was continued. Patient was very restless groaned continually and flung his arms and legs about, before he came round he had been quite quiet.

A soap and water enema was given which worked well, and temperature fell another two degrees.

The pulse had dropped to 90 by this time (an hour after onset) and was distinctly weak.

A hypod. of ether was given which stimulated the heart markedly.

Patient now began to be drowsy and slept for several hours.

On awakening was given some strong beef tea. He complained a good deal of headache.

Temperature was 101, pulse 100.

Patient improved after this steadily, there was rise of temperature between 2-4 in the afternoon for about four days, but subsequently it became normal/
normal and remained there.

Patient had headaches periodically for a fortnight, but after that time they disappeared and he had no more.

He went back to work eventually and suffered from no ill effects.

Patient was practically a teetotaller; often went months without touching alcohol and then did not get drunk.

He smoked lightly, under oz 2 a week. He had been in the habit of taking a great deal of iced waters often on the top of a good meal.

Case 4. **Heat Exhaustion.**

**N. S. Greaser, aged 38.** This was a hard working steady man, spare and somewhat anaemic.

Was on the 8-12 watch in engine room.

I came on him by accident while attending to another sick man about 1.15 a.m. He was lying on the forward hutch cover, and something unnatural in his position attracted my attention to him.

He was in an unconscious state, and in a very collapsed condition.

Skin moist, clammy and cold, pupils widely dilated and pulse 40 per minute, and irregular.

At first I could not arouse him, but by shouting and shaking his arm he aroused sufficiently to answer me.

If left he at once dropped off again into a semiconscious state.

**Breathing/**
Breathing was very faint and shallow and of a pseudo Cheyne Stokes type, beginning very feebly and getting deeper, then stopping altogether and beginning again.

There was no steady diminution as in the true Cheyne-Stokes type i.e. [diagram]

Pupils reacted very slowly and sluggishly to light.

He was carried to a place where there was more air, and was made to swallow Min. LX of Sp. Ammon Aromatic in water. Massage of the extremities and hot bottles to feet and legs were applied.

His temperature was below 99 F. in the mouth. Massage and bottles were continued for about an hour, with a small amount of strong beef tea.

He roused himself after this and was more rational, complained of pain in the eyes, back of head and neck.

He had no paralyses, but simply a feeling of great weakness and prostration.

He was now given hot beef tea with 3/4 SS brandy to 4ozs beef tea every half hour for an hour and a half (three times) he then fell asleep, and slept for 3 hours.

He felt faint when he awoke but his pulse and colour were much better, and he had some strong coffee with brandy in it. His temperature was now 100 F.

During the morning he had beat up eggs and brandy and at lunch time soup and a little bread. After/
After this though he felt shaken and weak he made good recovery, the headaches entirely passing away.

He was put on course of iron and quinine and liq. Strych. 1 m. dose T.I.D.

Before the ship paid off he was better in health than he had been for some months previously. He made subsequent voyages in the same ship and was well when last I heard of him.

He was a teetotaller, but smoked plug tobacco heavily. He was not a heavy eater but got through a good deal of iced water which he stopped on my advice and took water and oatmeal instead during hot weather.

Case 5. Heat Exhaustion.

T.C. Occupation Trimmer, aged 39. This man was taken on at Freemantle homeward bound in place of a trimmer who deserted.

He asked to be taken and though he had never been to sea before he was accepted.

He was a strong well built healthy Australian, had been addicted to periodic outbursts of alcoholism, but not very frequent he was an abstainer in intervals.

He got on well for a week, then one afternoon when nearing Colombo about 2 degrees south of the line he was brought up on deck in a collapsed and semi unconscious condition.

Temperature 96.5, pupils dilated, skin cold and clammy, pulse slow and feeble.

He was given some Sp. Amm. Aromat. and was being massaged/
massaged and had a bottle applied to his feet when he was suddenly seized with intense cramp of abdomen and calf muscles.

He shouted with pain, and rolled over in agony and had to be held to prevent himself hurting his head or arms against the iron sides.

When this attack passed off he was quite conscious, but very weak and could only speak in gasps. He requested with difficulty that certain papers should be sent back to his wife as he was convinced he was dying.

He had another seizure of cramp, and in spite of massage of affected muscles with Ballad:liniment and oil the attacks got worse and he was in acute agony.

As no sign of improvement appeared he was lifted bodily into a bath at a temperature of 108 F. and massaged well under water.

The affected muscles went into hard balls and stood out as though undergoing violent contraction.

After the bath in which he was kept for 12 minutes the attacks very much diminished in intensity and he had no more very serious ones.

He was given an enema of water, soap, and oil which produced a very copious action of the bowels, and he felt much relieved.

He was rubbed, and had the bottles changed periodically and was given hot drinks of beef tea, soup, and milk till 4 a.m. at which time he fell asleep.

The/
The temperature was then 101, and the pulse 100 and he was sweating copiously.

He had very severe pain in the eyes and back of the head and neck, but after sleeping for four hours felt much better.

After this he made a very quick recovery, losing all pain in his head after two days, and having no more attacks of cramp.

He was kept on beef tea, eggs and milk for three days, after which he had fish for a couple of days, and then as he seemed well he was allowed ordinary diet.

He attended to his work on the 9th day and was quite well during the remainder of the voyage.

He came back in the ship to Freemantle working as a trimmer out and beyond an occasional purgative draught he had no need of treatment again.

His history was. He had a severe bout of drinking for about ten days before joining the ship and had not been used to such hard muscular work.

He worked his best though, and this with large amounts of iced water while below, on the top of the bout of drinking probably made him particularly liable to be affected with heat.

The cramp was probably due to deposit of sarco lactic acid and uric acid in the muscles particularly as he had suffered from constipation since coming on board, and had not sought any relief for it.

Case 6.

J.K. Boiler/
J. K. Boiler maker, aged 44. This man had been in the Company for years, and was a well built Scotchman, muscular to a degree.

He was at this time very alcoholic, and had been drinking at least a pint, often more, whisky daily for a good many days. At other times he would go a fortnight and three weeks without touching anything at all.

I had previously treated him for alcoholism and though he had not been laid up once, he had been pretty bad, and other surgeons on the ship had had him under them at different times for the same thing.

He was brought up on deck one afternoon in the Red Sea, the weather was intensely hot, no wind, and the thermometer on deck stood at 98 in the shade.

He was not unconscious, but was in a condition of extreme collapse.

Skin cold and moist, pulse weak and irregular, pupils widely dilated and temperature 96.5.

The breathing was shallow and irregular.

Said he had vomited several times during the morning but had stuck to his work until the time he collapsed, 3.30 p.m. and was then so bad he had to be carried out of the stoke-hold where he happened to be at the time.

He told me this at the time but disjointedly and wandered a little.

The electrician who shared his room said he had eaten nothing for 3 days and had been very "queer" on several occasions in what he said. He had been drinking/
drinking very hard during this time.

He was laid out on deck, and had ammonia applied to his nostrils and hot bottles to his feet only.

He took some coffee and hot beef tea by the mouth.

He dozed off into a semi comatose state from which he was suddenly aroused by violent cramp in his abdomen.

These were of the most severe kind and he could neither speak nor move while they continued.

The cramp now took him in the calves of the legs the thighs and the forearms.

The affected muscles were rubbed well with belladonna liniment and gradually began to relax.

This attack passed off leaving him very weak, and exhausted. Temperature still 96.5.

He dozed again for about ten minutes then was wakened up by the advent of another attack.

He would attempt to grasp the muscles where the pain was beginning then fall back unable to move.

Two of us massaged him for a couple of hours, and he had hot beef tea given him when he could swallow.

In spite of his collapsed state he was given some bromide of ammonia as the chief symptoms now were the severe cramps.

This went on for over three hours, and any attempt to move him caused him extreme agony and precipitated another attack.

As he was getting worse instead of better and the/
the seizures more violent he was lifted up and put in a hot bath of 108°F.

The bath gave him immediate relief and he was kept there for 15 minutes then just wiped down and rolled in a blanket with his bed on deck.

He now dozed for a few minutes and began to sweat, his temperature had risen to 99 after the bath, but his pulse was still feeble and the heart's action irregular.

He had slight attacks of cramp up to midnight and one fairly severe one at 2 a.m. after which they ceased altogether.

During the next day he was delirious for part of the time and suffered hallucinations, much pain in head, photobia, and great restlessness; his temperature rose to 101 and he could not sleep at all.

He was fed entirely on milk and whisky 0Z 1 to 0Z 10 of milk.

He had a purgative which acted well, and also had mustard applied to back of his neck.

He had to be watched constantly for three days and nights as he was very restless and threatened to have delirium tremens in a severe form.

He had bromidia, and small doses of chloral, but never slept at all for first three days with exception of about half an hour the first night. After this he progressed rapidly and well, had no more cramp, the whisky was gradually discontinued and he was given a light but stimulating diet.

He suffered from numbness and extreme weakness of/
of the legs, and also of forearms, the last part to recover were the supinator longus, and extensor carpi radialis longior and brevior.

He was kept in the ships hospital for 14 days and did not resume work for 26 days.

At the end of this time he was completely cured, had neither headache, nor numbness.

He came back in the ship next voyage and is still there. He has been absolutely teetotal now for fifteen months and intends to remain so. Has had no further illness of any kind since.


J. Mc., 7th Engineer, aged 20. Was working over H. P. cylinder repairing it in Colombo harbour; weather very hot and damp. The temperature in the corner where he was working was 230 F. being over the main steam pipes. All the men working there came up about every half hour for fresh air.

This engineer was a total abstainer and a good living healthy man, moderate smoker. He was working altogether 4 hours, came up feeling faint and turned in and slept.

He woke up a couple of hours later with splitting headache, and vomited.

His pulse was slow (40) irregular and weak, his eyes were dull and pupils dilated, breathing shallow and irregular, and skin cold and moist, extremities very cold, and legs powerless.

Was rubbed down with a rough towel, was put on/
on deck in breeze, given beef tea and brandy and covered with a blanket.

Pain in head very severe, especially back of eyes, and pain and tenderness at back of neck and all down spinal column.

Vomited three times after this during night, but slept between whiles, had beef tea and brandy in small quantities, and some strong smelling salts which relieved pain in head considerably.

Next morning temperature still only 97.2 but pulse was 50 and much more regular than on previous evening.

Did not vomit again and was kept on beef tea with brandy, eggs beat up, and jellies. Was not unconscious nor was he delirious but did not speak unless spoken to and was indifferent as to his surroundings. There was probably slight serous effusion in the meninges cerebri.

Improvement after 48 hours steady though slow. Temperature reached 101 on evening of second day, but became normal on third day.

Headache lasted a week then passed off completely. Pupils continued dilated for ten days then returned to normal.

Patient kept in hospital for 14 days, was then quite well and as all hot weather was over went back to work in Mediterranean Sea. Patient continued quite well next voyage, and had no recurrence of headache.

**Case 8. Heat Exhaustion.**

M. S. Steward/
M. S. Steward, aged, 19. Had been working chiefly below in steerage doing heavy carrying in the Red Sea.

Turned in one night just before reaching Gulf of Aden; had severe headache, felt sick but did not vomit, did not sleep all night, and felt worse next morning. When seen in morning he was pale, and had vomited. Pulse slow and irregular (40) temperature 97, pupils dilated, breathing shallow and irregular, and skin cold and moist.

Absence of knee jerks on both sides. Was put in hospital, headache very severe, and photophobia present. Room was darkened.

Patient was put on beef tea and brandy, but vomited shortly after, complained of intense pain in head.

Had smelling salts, evaporating lotion on head, and mustard plaster at back of neck. Purgative administered.

Patient continued like this for three days getting neither better nor worse, legs quite powerless and never passed water unless told to do so when he accomplished it without any difficulty, but if allowed to do so would lie quite passive and never move at all. Was made to pass water every six hours was pale, sp. gr. 1030, albumin present, only 0Z 10 per day for first two days.

Vomited frequently for three days, and slept hardly at all, but lay quite still. No delirium and no unconsciousness.

Pain/
Pain always relieved by mustard plaster at back of neck but only temporarily.

Pain was worse at 2 and 8 p.m. with slight increase usually at 8 a.m. but between 2 and 8 p.m. for three days pain was very severe. Bowels well opened 2nd and 3rd day by soap and water enemata.

Third night slept fairly well, and felt better in morning.

Urine only had trace of albumin on 4th day. Temperature on 4th day 98 and photobia much less.

Patient now improved daily but slowly, recovered use of limbs on tenth day, and urine free from albumin on 8th day.

Quantity increased daily and at end of 14 days was passing between 50 - 60 ozs.

Pain in head gradually subsided. Was kept on beef tea and milk diet for 14 days.

Pupils were dilated for three weeks, and headache returned about 2 p.m. every day for 25 days, but decreased daily.

Patient's appetite was very poor and would have taken nothing for days if allowed to do so.

After three weeks was got up in chair on deck and put on iron and quinine three times daily.

Patient eventually recovered, but was not well all remainder of voyage, and only did light work.

Whenever the weather was hot he was liable to severe headaches.

Bowels/
Bowels were confined and was made to take opening medicine twice weekly; he said he had always been costive.

Was much better when we reached London eleven weeks after attack.

Was advised not to come back but have a few months at home.

This is the only case where a good recovery was not made on board ship.