

CLIMATE AND HEALTH
IN BANGKOK

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The Climate of Bangkok.

Bangkok, the capital of Siam, is situated on both sides of the river Menam Chow Phya, some fourteen miles as the crow flies from the bar. It is only a few feet above sea-level in latitude $13^{\circ} 58'$ N. and longitude $100^{\circ} 34'$ W. With the kingdom of Siam in general, it is protected from violent changes in weather by reason of the high mountain ranges on its borders which cut off the effects of the cyclones so prevalent in adjacent countries.

The predominating influence in our climate is, of course, that of the monsoons. The North-east monsoon sets in early in November in the Gulf of Siam, but in Bangkok its influence is not usually felt until the middle of the month has been passed. The evenings are then delightfully cool and the minimum temperature may fall to 66, 64, or even to 62° F. as on the 19th November, 1904. The coolest portion of the twenty-four hours is between 5 and 6.30 a. m. By 9 a. m., however, the thermometer will be found above 70° F. and in a good cool season not higher than 75° F. Until between 3 and 4 p. m., the temperature steadily rises to a maximum even in our cool weather, of 88-90-and even 93.

The mean temperature during November, for the past four years during which I have taken observations, is 79.8, but Dr. Campbell gives 76.8 for 10 years. Rain usually falls in a few showers during the early part of the month, the mean rainfall being rather over 2 inches.

December is throughout the coolest month of the year, the average mean temperature for four years being 76.3. Although hot during the day time, the atmosphere is dry and bracing and the nights are cool, the mean of the minima being 66.1° F. The average rainfall, which consists of a shower or two about Christmas day, amounts to only about half an inch.

January is pretty much the same as December, but towards the end of the month the thermometer begins to gradually rise during the day although the nights are still cool. In the early part of February, the minimum temperature may be still below 70° , and even as late as the 14th Feb. temperatures of 56° F. may be recorded but, as the month wears out, the real hot weather commences.

During these four "cool" months—November, December, January and February—there are several important factors which make for health. These are: considerable dryness of the atmosphere, low night temperature and a very considerable daily range of temperature between the shade maximum and the shade minimum. This daily range of temperature is a most important item in climate for even although the maximum day temperature be high, provided there be a considerable fall towards the minimum, the variation gives a fillip to the system and restful nights are assured. The average range for these four months is 16° , 24.6° , 22.4° and 19.3° respectively.

March in its warmth is the precursor of April which is the hottest month of the year, the mean temperature being 86.95 as compared with 76.3 for December. The highest maxima are now recorded as for example 102 F in March 1902, 104 F in April 1905, and 104 F in May 1903. The nights are hot although as a rule there is a fairly strong breeze from the sea. It is the exception to see a perfectly dry April. Dark clouds are seen to bank up now and again especially to the North of the city and heavy showers of a short duration, preceded by an oppressive sultry hour or two and accompanied by thunder and lightning are the welcome harbingers of the coming monsoon. On the 7th April 1904 hail fell in Bangkok—a phenomenon which according to Dr. Campbell, is seen once in fifteen years. The average rainfall for the month is about $2\frac{1}{2}$ inches. May brings the South-west monsoon with the first of the real rains, the average rainfall totalling 10 inches with a mean of 14 days on which rain falls. From now on until the end of October, the rains continue, the averages for June being 5.6, for July 4.1, for August 5.9, for September 13.9 and for October 8.1. During these wet months, the mean temperature remains almost uniformly at about 85 F, the days are hot and moist and the minimum temperature rarely falls below 75 F. The daily range too, which is so extensive even during March and April, now amounts to about 15 degrees. During November, the rains cease, and the North-east Monsoon breaks in, commencing the cycle which has been just described.

To put the matter of the climate of Bangkok in a nutshell, I would draw your attention to the graphic chart plotted on Plate 1. The black lines give the result of four years personal observations, the dotted lines the mean of ten years observations made some twenty years ago by Staff-Surgeon J. Campbell R. N., a former physician to the British Legation. You will note that the mean of the maxima as well as the absolute mean figures differ throughout by about two degrees although in their uniform course they tally in a remarkable manner. The mean of Dr. Campbell's minima, however, give a higher figure than my observations do. Why is this? Has the climate of Siam undergone a change since the early readings were made with the result that during the hot weather, the thermometer now registers higher figures and during the cold weather, the temperature falls lower? My own opinion is that the difference depends upon the site of the thermometers and that Dr. Campbell fixed his instruments in the verandah of his house and not in the regulation louvered box in the open, as the location of my instruments. From experiment, I find that this makes a considerable difference in the readings, the maxima in a house never rising so high as in the open and the minima never falling so low, hence the red line now shewn. However, you will note that the lowest mean temperature occurs in December, that April is the hottest month of the year, that the highest temperature has been recorded in May *i. e.* 104° F and the lowest in December and January *i. e.* 56° F., that the wettest month is September, the driest January and that the greatest daily range of temperature is found during January while the mean temperature for the whole year is 81.6° F and the mean annual rainfall 54 inches for 4 years with me and 67 with Dr. Campbell. You will see then, that although the climate of the place is not a suitable one for European colonisation, it is not such a bad one after all as subtropical climates go. Why Bangkok has gained such an unenviable notoriety as a perfect death trap for Europeans is not due to the climate itself but to certain conditions which partly depend upon climate and partly upon the want of initiative on the part of the Siamese Government with regard to schemes of Sanitation. One of the most remarkable of the many striking results of the

Scientific study of Tropical Diseases is the recognition of the fact that Climate as a factor in disease has been robbed of many of its old terrors and that much of the sickness of Tropical countries can be lessened, if not entirely done away with, by Sanitary measures. Given a pure water supply and an efficient method of drainage, Bangkok might well develop into one of the healthiest cities in the East.

Selection of the most suitable men for such a climate as that of Bangkok.

This is naturally a most important matter not only to the intending new-comer himself but also to his employer. It has been my lot to send home several men who should never have come to this place. They have made a brave attempt to fight against their disabilities but the end has only been a disappointment to themselves and a pecuniary loss to their employers.

The best way then, to describe the proper sort of man, will be to show what diseases or bodily conditions are likely to be unfavourable in this climate.

Anaemia or poorness of blood handicaps a resident in the Tropics at once. It is a well established fact that a physiological or natural anaemia is soon established in us all in hot climates, no matter how full blooded we may be on arrival. When this does not go too far, it makes for health and comfort by lessening the chance of headaches, sunstroke and many other diseases. After prolonged stay in the tropics or as a result of many of the climatic diseases, anaemia may develop into a veritable disease. It is well therefore that persons of an anaemic type should not select the tropics as a field for a career. Another unfavourable condition is a tendency to diarrhoea, constipation or bowel complaints generally. Owing to the fact that in the tropics, the abdominal organs, in Europeans, are in a more engorged condition—that is, they are relatively fuller of blood—than in temperate climates, and further, as the chances of sudden chills due to rapid changes of atmospheric temperature, thinner clothing and a more active skin, are greater here, we naturally find that bowel complaints are very frequent amongst Europeans. A tendency to diarrhoea may predispose to

Chronic Tropical Diarrhoea or Sprue, to Dysentery and even to Cholera or Typhoid Fever.

Constipation, on the other hand, may be just as great a cause of sickness as Diarrhoea. Here in the Tropics very few Europeans enjoy an active outdoor life. The rule is rather a sedentary occupation which keeps one indoors until four or five in the afternoon when there is only left time for an hour and a half or at most two hours exercise before sundown. The consequence is that a sluggish state of the bowels arises which causes a condition of chronic poisoning of the system. The functions of the liver and kidneys become deranged, digestion suffers and one's mental faculties deteriorate. How often have I seen men of this type who were melancholy, irritable in temper and unable to concentrate their attention on their business. They are in fact a nuisance to themselves and their friends and a source of monetary loss to their employers.

The only thing to do with these men is to send them home.

Of Lung complaints contraindicating residence in Bangkok, Phthisis Pulmonalis and Asthma may be mentioned.

A strong family tendency to Pulmonary Consumption makes one very chary, while the actual presence of the disease should emphatically forbid the passing of such a person. In Bangkok, my experience is that Phthisis Pulmonalis is a very common disease amongst the Siamese and in them often runs a very rapid course, but it is nothing to what one now and again sees in Europeans, especially young adults. In them the disease can truly be called Galloping Consumption and the only chance of prolonging life is immediate change to a temperate climate.

Asthma is a disease of surprises. It may be a torture to a man in an excellent climate and yet disappear while residing under what one might consider adverse circumstances. Nevertheless, I would not counsel an asthmatic subject to come to Bangkok. The disease is common amongst the natives and I have found that Europeans subject to it, suffer badly in this low lying, damp spot.

You will all agree with me that the longer one lives in the Tropics, the more one's "nerves" seem to suffer. It will therefore

be at once apparent that any condition suggesting instability of the nervous system or any actual disease of the same, should contraindicate one coming East.

The condition of the teeth, too, is an important factor to be reckoned with.

No one should come to Bangkok with teeth in an active state of decay, or with so few sound teeth that thorough mastication of food is an impossibility. The presence of unsound teeth has been definitely proven to be the cause of pernicious anaemia in temperate climates. In Tropical climates any additional tendency to anaemia should be avoided. Further, the inability to thoroughly masticate one's food is a serious drawback in Bangkok where one has to tackle tough beef and tougher and drier fowls. If a good dentist cannot provide an efficient substitute for lost teeth and cannot at the same time arrest decay in teeth still in the patient's mouth, such a candidate for the East should not be passed.

An important point to remember but one which is too often neglected is re-vaccination. This has been brought more forcibly to one's attention during these past two years in Bangkok than any years I have spent here. Quite a large number of Europeans have suffered from Small-pox and one fatal case at least has occurred. How much trouble and even disfigurement would have been saved had all these sufferers resorted to the simple precaution of re-vaccination. In Europe where fortunately Small-pox is now so rarely seen, revaccination is advisable every seven years. In a country like this where one may often actually rub against persons in the most infectious stage of Small-pox, the neglect to have oneself frequently vaccinated is, in my opinion, little short of criminal folly.

Another precaution in the way of prevention of disease may be mentioned. I allude to inoculation against Typhoid Fever. Although the system is by no means perfected and the protection afforded is infinitely less than that obtained by vaccination against Small-pox, still the results have proved satisfactory enough to warrant one giving the inoculation a trial especially in the case of young adults.

Age at which one should come to Bangkok.

Now, what is the best age at which a man or woman should leave home for these parts ?

Well, it is a matter of proved experience that young adolescence is not a suitable time for arrival in the East.

Although one may call to mind many cases of young people who have taken kindly to this climate, it is always advisable to wait until the twenty-first year at least has been passed.

The Medical history of the British Army in India definitely proves that Typhoid Fever especially attacks our young soldiers. I shall not burden you with figures, but it may be taken as a result of experience that not only is the percentage of those attacked much greater in the younger "Tommys" but also the death rate from Typhoid Fever is much higher. The same is true of most other diseases peculiar to the Tropics.

Is there a right and is there a wrong time at which to arrive in Siam ?

Yes, there assuredly is, as you will see at a glance from Plate II. which I have plotted of the Mean Sickness Rate for Bangkok. You will see here the mean rate of admissions of sick people into the General Hospitals of Bangkok for 6 years, the figures having been kindly supplied by His Royal Highness Krom Mun Wivid Warna Preeja, Director General of Hospitals, similar figures from the Police Hospital under my own care during the past six years, and the patients seen by me, month by month, during seven years of private practice.

The total number of cases from which I have struck a mean, amounts to 30,752 an aggregate which is large enough to give a fairly true idea of the sick or Morbidity Rate for this city. Such data are more valuable than the death rate as an index of the health of any town ; besides, the true death of Bangkok is at present impossible to obtain. I am glad to say, however, that, within a very short time, an Act for the Registration of Deaths will be in force

in Bangkok. It will be invaluable to me as Medical Officer of Health as it will enable me to keep my finger, as it were, on the pulse of the city under my care. To return to the matter in hand, however, you will note from the chart that April is the unhealthiest month of the year as well as the hottest, and that February is the healthiest. If you will compare this chart with that of the temperature and the rainfall, you will see that the line of sickness closely corresponds with the range of highest mean temperature and the period of the rains. If possible, then, don't time your arrival during any of these hot, wet and most unhealthy months. Such a time of the year is hard enough upon well tried residents but it is still harder upon young and full blooded new arrivals. Not only is it very hot during March and April, but the sanitary conditions of Bangkok are then at their worst. The level of the river is at its lowest, Cholera is often epidemic and, so far as my experience goes, Typhoid Fever takes on its severest aspects at this period of the year. The nights, too, are hot and the combination of mosquitoes and sleepless nights soon tend to lower one's vitality and so predispose one to contract disease.

Towards the end of April and during May, the South-west monsoon breaks and, while this transitional period lasts, sickness is common. As I have reported elsewhere, "Fevers" in general are most prevalent during May, June and July. while Typhoid Fever is most prevalent during May and June, when the rains are setting in and again in December when they have ceased. Owing to the sudden changes of temperature incident on the squalls during these months, chills on the liver and digestive organs are frequent and more so in the persons of new arrivals who do not yet thoroughly understand how to guard against such accidents. It is better then not to arrive before the end of August, preferably not until the beginning of October. The mean atmospheric temperature for the latter month is about 82 and the nights already begin to be cool. During November, December and January, there are frequent spells of quite delightful weather, when the minimum may fall as low as 56 F. between five and six a. m. Arriving therefore in October, one gets accustomed to the heat and so undergoes somewhat of an acclimatisation before the hot weather sets in.

Clothing.

Limitation of space will not allow me to say much of clothing. During the day, the clothing should be light and loose fitting, the material being white drill, light thin flannel or one of the light Indian silks. For underwear, perhaps the best material is Indian gauze. It is a good old rule to dress with the sun, *i. e.* to wear light, thin clothing during the day but to change into somewhat warmer clothing at sun-down. For night wear, thin flannel, viyella or a mixture of silk and wool make excellent sleeping suits. The cholera belt should always be worn when asleep in order to protect the abdominal organs from chill. In the Tropics, the liver, especially, is in a continual state of engorgement and it is the general experience of medical men in this climate that chil's on the liver, stomach and bowels form a very large percentage of all sicknesses to which Europeans and even natives are liable. Take my advice and don't go in for any of the numerous fancy made-up cholera belts with their complicated ties, buckles and belts. The best and simplest protection is a broad band of flannel cut broad enough to extend from the lower end of the breast bone to just above the hips, and long enough to pass once round the body and overlap on the front of the abdomen. This can be hemmed or not as you please and can easily be kept in position by a couple of safety pins. Such a band adheres to the figure and does not ruck up or get out of place as practically every other kind of belt does, hence there is no danger of the abdomen being exposed to cold while one is asleep.

Food.

This is one thing any-how, in the East, upon which one should never exert false economy. At its best, our beef is not of the same nutritive value as meat killed in Western countries owing to the habit of bleeding the cattle in the slaughter house. The fowls, too, are poor in quality and generally very tough owing to the careless methods of preparation adopted by our Chinese cooks. If these would have the patience to properly pluck a fowl and hang it for a few hours instead of killing, removing the feathers by immersion in boiling water, cooking and serving up within an hour or two after the bird has been picking up seeds in one's garden, one would

appreciate chicken or capon nearly as much as at home. But who can make a Chinese "cookie" change his ways? As well ask a leopard to change his spots.

Being poor in quality and badly cooked, as a rule, one finds that one must make up in quantity for what one loses in quality.

One must try to ring the changes more frequently than is the general rule, in order to give a fillip to one's jaded appetite. Above all things, however, see that everything for the table is of the freshest. There is no more fruitful source of bowel complaints than tainted meat, or fish, in the tropics. Eat no meat or fish which is the least soft and avoid all such things as crab unless the animal can do one march, at least, across the kitchen floor. Fresh salads, unless made of potatoe, cucumber, beet root or the like, are to be guarded against. Owing to the filthy methods of fertilisation employed by the Chinese market gardeners, lettuces and other green salads are harbourers of all sorts of disease-bringing germs and many a case of Typhoid Fever has been traced to a tempting green salad even although the vegetables have been most carefully washed. Tinned foods are to be avoided and as a rule are not required in Bangkok where fresh food can be so easily obtained. When tinned foods have to be employed, use only the freshest and at once discard any with the slightest taint. It is a great pity that the law does not enforce the stamping upon each tin the date of canning, for then many old stocks would be destroyed in place of being sold by the keepers of large stores to the smaller traders.

In one's dietary, avoid extremes. Too much butcher's meat is to be deprecated as is also a tendency to Vegetarianism pure and simple. Excess of animal food throws too much work on the liver and kidneys, while a vegetarian diet is not nourishing enough and does not supply sufficient blood-forming matter to make up for the persistent tendency to anaemia from which all Europeans suffer in hot countries. Some few Europeans have, to my knowledge, adopted a Siamese dietary entirely and would seem to thrive upon it. As an experiment, it is interesting but the majority of European residents would, in my opinion, soon find it a mistake.

Drink.

St. Paul's advice to be temperate in all things is most applicable to the question of alcohol in the tropics. Some residents can be total abstainers for years in this climate. I have known a few and very active and healthy specimens of humanity they were. Others, however, find that without a certain amount of alcohol with meals, the appetite lessens, the digestive organs fail to perform their functions in a proper manner, and anaemia and loss of bodily weight take place. This has been specially noticed by me in people who have spent the first year or so in the tropics as total abstainers. During the first six to ten months or so, residence in hot countries sets up a state of functional excitement in the liver and digestive organs in general, and the result is an increase of appetite, an excellent digestion and general feeling of well-being. As a rule, this initial stage of excitement passes gradually into one of abeyance of function and unless great care be taken at this time, liver and stomach troubles set in.

Tonics, attention to diet and gentle exercise may tide over this period of unrest, but it is now that I have often advised my patients to take a little alcohol for their stomach's sake. It is really remarkable the benefit that one has seen to accrue from the consumption of only one small whisky and soda with meals. For any sake, however, don't go to extremes on the excuse that the doctor has ordered you to take alcohol. My own opinion is that the longer one stops in this country, the less can one stand alcohol and the better one is without it.

Of other drinks, hot tea made after the Chinese fashion is one of the best and least dangerous of all beverages in this country. Made as it is with boiling water, all germs of Cholera, Dysentery, etc., are thereby scotched and as the infusion, though weak, is a mild stimulant, it is no wonder that it is such a great favourite in Siam, China and neighbouring countries.

Water—pure and simple—is the best beverage all the world over. In Bangkok, however, one is greatly handicapped by the absence of a pure water supply. Until the Government has either itself taken in hand a Municipal Water Scheme or has placed the

matter in the hands of some private company, it is necessary for all residents in Bangkok to personally superintend their own water supply. This naturally entails the collection of rain water from the roof of our houses and its subsequent storage in tanks, which may be of brick lined with cement or of metal—the usual form being the iron 400 gallon tank. A few simple rules should guide us in this matter. In the first place, no water should be run into tanks until the roof has been washed by several heavy showers of rain. Frequent chemical analysis of rain water drawn from such tanks has proved to me that one or two heavy showers are not enough to cleanse one's roof, but that only after a good few inches of rainfall, can one expect the rain water to be free from gross impurities. Every year, one should see that the water tanks are thoroughly washed out and then flushed with two or three fills of fresh rain water. If you will only watch your coolie during this process of cleansing, you will be astounded at the amount of filth which comes from the bottom of one's tanks. After this annual cleansing, the next operation is to have the interior of the tank coated with a fairly thick layer of cement-wash. This not only lengthens the life of an iron tank by many years but it also does away with the chalybeate flavour which many of one's tanks give to the water and so it vastly improves the flavour of one's cup of tea. Of course, after this cement washing, it is advisable to once more flush one's tanks with pure rain water in order to get rid of the earthy flavour which the cement imparts. With several tanks, however, this can easily be done in rotation, but all should be ready for the final catch of water by the middle of September. It is wise to have one's tanks filled up before the end of September.

Even after all necessary precautions have been taken with regard to manner and time of collection and condition of tanks it is well to filter the water before use. The best form of filter is the Pasteur (Chamberland) system of which the filtering medium consists of candles made of compressed infusorial earth through which even the Typhoid germ fails to grow within a reasonable time. Such a filter is sufficient in itself to eliminate all noxious germs provided it be taken to pieces once a week and all the parts be boiled for half an hour.

Extra careful people boil the water as well. If this be done, boil the water *after* not *before* filtration. The loss of aeration due to boiling can be got over by shaking up the water, in a bottle, for a few minutes. A word may be said about Aerated waters which are so largely consumed in the East. I have no desire to give any special firm of manufacturers an advertisement on the cheap; all I would say is, buy the best and purest in the market and don't think that because water has been bottled and aerated under pressure, noxious germs have been destroyed.

Exercise.

One of the biggest fetishes to which the Britisher especially, bows down in the East is *Exercise*. I am not referring to the custom of having a round of golf or a set or two of tennis of an afternoon, provided one takes care to avoid chill by changing one's clothing before cooling down. Taken in moderation, such exercise is an excellent method of stirring up the liver. The "*muddled oafs*" to whom I would refer are the men who tell you that they would die without undergoing a couple of hours violent exercise every afternoon and an hour at dumb-bells, Indian clubs or the like before starting work in the morning.

They never seem to be happy unless they are in a state of profuse perspiration and absolute fatigue.

My professional experience of such athletic maniacs is that they are more frequently in the doctor's hands than even the men who take no physical exercise whatever, that the proportion of them who have to be sent home on sick leave is large, and that the end of many has been the local cemetery. It would seem that they use up all their spare energy in "*recreation*" as they call it and have nothing to fall back upon when they do happen to fall sick. If one would only remember that one is living in a country not suited to Europeans, that a hard day's work is more trying here than at home, and that, to be beneficial, exercise should mean nothing more than change of routine, open air and enough movement to produce free perspiration without going the length of fatigue. To go to the extreme of fatigue is to court sickness. Personally, I consider that after a good hard day's work, much of it spent in the open air, the best thing is to take it easy in the cool of the evening

although an hour's gentle exercise either in riding, golf, or tennis, does certainly make for health with the majority of Europeans in the Tropics.

Sleep.

Sleep, which is one of the greatest recuperative influences in temperate climates is even of greater value in the Tropics. One requires really a fool's allowance in this climate. Early to bed, and early to rise is a golden rule, for the longer one lives in the Tropics, the more one finds that late nights are a mistake.

Baths.

A word in passing may be said of cold baths. Don't overdo them as I have seen over-indulgence in cold baths bring about heart trouble, nervous prostration and liver complaints. So long as a cold bath is followed by a feeling of exhilaration and a glowing of the skin, continue the custom, but whenever a feeling of chillness or depression succeeds one's cold tub, use hot water instead. Very many old residents find that a hot shower bath is a better stimulant than a cold bath, and throws less strain on the heart and liver.

Leave.

Leave is an important and all absorbing topic of conversation amongst us sojourners in a strange land.

The question has often been asked me how long one should spend in Bangkok before one's first spell of long leave. This naturally depends upon a number of factors such as the general condition of health, the possibility of being spared from one's duties and, of course, the state of one's purse. Taking it as a general rule, however, I would say that, for a woman, three years and, for a man, five years is a long enough period for a first spell, and that the period of leave should in either case allow of no less than six months being actually spent in a temperate climate. This practically entails nine months leave from duty so as to allow of three months being spent between the home and return journey.

Further periods of work in the tropics should not extend to more than three years with six months leave at the end of such

term. Governments, Commercial Firms and in fact all employers of labour would find that such a system of work and leave would make for the health and efficiency of their staff and therefore for economy in the end. It is no economy to train a man in his work for several years and then to be forced to invalide him home for good at the very time when he is becoming a valuable servant.

The question of short leave, say for a month or two, is one which often crops up in a medical man's experience in Bangkok. Perhaps a man has had a mild attack of Malarial Fever, Typhoid Fever, congestion of the liver or the like. It may not be necessary to send him home as all that may be required is a short sea trip or a few weeks in a cool climate. Given the necessity of having to leave Bangkok for a month or two, what are then the best places to which one can send one's patient?

Siam is still, unfortunately, most grievously deficient in hill stations or other health resorts.

Srimaharacha is practically the only local sanatorium but it is not much of a change. It is wonderful, however, the benefit that may be obtained from a week or two at this pleasant, though quiet, sea-side resort. Bangkok owes a debt of gratitude to His Excellency Chow Phya Surisak for his enterprise in providing the excellent accommodation that is to be found at this place. The great inconvenience is in getting there. Were the long talked of railway pushed through to Srimaharacha, the benefit to the inhabitants of Bangkok would be incalculable as one can go there with advantage at any time of the year. Still better will be Chiengmai and the hills beyond when the present railway has been extended so far.

Further afield, we have Singapore—the return trip to which will often set one upon one's feet again. Then we have Hong-kong from October until the end of March, Japan during the Spring or Autumn. Java during July, August and September, Penang Hill during the North-East Monsoon, Candy and Nuwara Eliya in Ceylon from December to April, and Ootacamund on the Nilgiri Hills from April till October.

Special diseases to be guarded against.

As I have already said, many of the so-called climatic diseases are preventable. They are due to carelessness or ignorance as to prevention and really, unless, as Carlyle says, most of us are fools, there would be little work for the doctors.

Sunstroke would surely appear to be a frequent complaint in this climate where sun maximum temperatures amount to 140 or 150° F. However, during eight years practice in Bangkok, I have only seen one typical, though mild, case of real sunstroke. The reason for this is that people, as a rule, respect the effect of the sun's rays and wear a good sized solah topee during the day. The majority of us consider that white clothes are a sufficient protection but Dr. Woodruff of the United States Army is of opinion that, with white clothing, black underwear should be worn. The reason for this is that the actinic or chemical rays are believed to be as potent factors as the heat rays, and that black intercepts these. One has no time now to go into the matter but there is a good deal of truth in the belief that a red lining to one's topee is an additional safeguard against sunstroke. Don't forget that the earlier and later portions of the day are even more dangerous than midday; for any kind of topee will protect one's head and neck from the vertical rays about noon, but only a properly made topee will protect the back of the head and neck from the slanting rays of the morning and afternoon sun.

Cholera, Typhoid Fever and Dysentery may be taken together as the principal cause of each is contaminated water.

As I have written elsewhere—"Cholera commences as a rule late in December and attains its maximum in April, thus prevailing during the dry season of the year." Sporadic cases may occur in Bangkok throughout the year, however. In its epidemicity, it closely follows the condition of the river. Given a good rainfall, the level of the river remains comparatively high during the dry season and, therefore, the inhabitants are not deprived of a regular supply of fresh water. After a poor year of rain, the river early becomes brackish and at once Cholera breaks out. Prevention is happily easy: If a European contracts the disease, it is either due to his own or his cook's carelessness. See to your water supply at all times and, while Cholera is about, boil all your drinking water; be sparing with

fruit or saline purgatives, eat no fresh green salads and, above all things, protect all food stuff from flies. I have seen quite a number of cases of Cholera in which the only source of infection was contamination of food by flies. Finally, avoid funk during an epidemic of cholera for it is well known that fear kills a goodly percentage of those who fall in such an epidemic.

Against Typhoid Fever and Dysentery, the same precautions as against Cholera should be applied. In addition, one should be very careful of one's milk supply, to contamination of which I have traced several cases in Bangkok. Some years ago, I made an exhaustive inspection and enquiry into our milk supply here and found the conditions so bad that all dairies were removed to grazing ground supplied by the Siamese Government on the outskirts of the town at Klong Toi. Under improved sanitary conditions and with a purer water supply, one may say that the milk is now less dangerous to health, but, in all cases, it should be boiled or sterilised in one of the patent sterilisers which are on the market, before consumption.

As for Dysentery, while impurities in food and water play an important role in etiology, chills are a frequent exciting cause, therefore do not forget the value of a cholera belt.

Diarrhoea is an extremely common complaint amongst Europeans in Bangkok and is mainly due to chill, and to the ingestion of tainted food. This has been sufficiently dealt with already in speaking of food.

Malaria.

It would no doubt surprise many of you to find that I deal with this last. New-comers talk of Malaria as if it were a foregone conclusion that they would soon contract the disease and yet, if they will only make a few enquiries, they will find that it is the exception rather than the rule for Bangkok residents to suffer from Malarial Fever. My experience, after eight years practice in Bangkok, is that Malarial fever is rarely contracted by residents of this city, that those who do happen to get infected, have generally contracted the disease while on a trip into the interior and that the malaria bearing mosquito, the *Anopheles*, is not easily found even during a search for it. As you all know, the germs of Malarial fever are carried from man

to man by the *Anopheles* Mosquito. Therefore, if you wish to protect yourself against Malaria, keep a good look out that your house or compound does not harbour this dangerous species of mosquito. You may ask how can one differentiate between the harmless *Culex* and the fever-bearing *Anopheles*. A few distinctive points will suffice. When you see a mosquito land on your hand or on any plane surface and instead of decently sitting down on all fours as it were, stand on its head and dig its proboscis into your skin, that's an *Anopheles* and its acquaintance is worthy of further cultivation. Try to find its breeding place in some neighbouring pool or sluggish stream. The eggs are found in loosely connected masses—three or four together—attached to sticks, weeds, etc.

The *Culex* eggs are in little boat shaped masses which float freely on any collection of water about a house and look like little specks of soot. The larvae are the little wriggling fish-like bodies which one sees swimming about so often in one's hand basin. That of the *Anopheles* has no long trunk or breathing tube and so lies with its body parallel to the surface of the water. When disturbed, it glides away, tail first with a kind of skating movement. The *Culex* or non-dangerous larva, has a long breathing tube at his tail which rests on the surface of the water while the body hangs head downwards. When disturbed, they sink rapidly to the bottom of the water.

If you happen to find a breeding spot of *Anopheles* it is quite easy to render it innocuous by flicking a little kerosine oil once a week or so over the surface of the water by means of a rag on the end of a stick. This forms an impervious layer of oil on the surface which prevents the *anopheles* larva from breathing and so kills him. When possible, all collections of water about a house capable of harbouring mosquito larvae should be destroyed or filled up. A further precaution is always to use a mosquito curtain when asleep. In the light of modern experience, any person suffering from Malarial Fever is to be considered as suffering from a contagious disease just as much as if he had small-pox. He is to be prevented from infecting *Anopheles* mosquitoes, if about, by a strict use of the mosquito curtain and cannot be looked upon as free from danger to his neighbours until frequent examination of the blood has demonstrated the absence of the malarial parasite from his system.

The continued taking of Quinine as a preventive is quite unnecessary in Bangkok.

A word to the ladies.

Why is it that, as a rule, you ladies do not seem to stand the climate so well as the men do? My own opinion is that it is because you remain too much at home, are too much in the shade and do not get enough of knocking about in the sun.

All lower forms of life such as disease germs are hindered in growth and even killed by the powerful chemical and heat rays of the sun. In this, we have one of our greatest helps to sanitation. While destroying lower forms of life, however, plants and trees are nourished and stimulated and take on a healthy tone and colour. You know well how pale a plant becomes if kept in the dark. The same thing occurs with human beings and the less sunshine they have, the paler they become and the less healthy they are. Males in the tropics are most of them out and about a good part of the day and, on the whole, they enjoy good health. Although they put far greater strain upon their livers with slings, cocktails, stengahs and gin and bitters, they still seem to enjoy better health than the weaker vessels. I believe that this would be otherwise were ladies to court the health-giving influence of sun and fresh air more. After early breakfast, a gallop on horseback, a spin on a bicycle, a walk with a camera or an hour or two in one's garden are all healthy and interesting forms of recreation. Don't forget, however, to wear a solar topee. Many ladies think that an ordinary European hat is sufficient and find to their cost that headaches, sun fever and even sunstroke are the cost to pay. After a bath and breakfast, there is the ordinary house work, correspondence and sewing to do, and when all is done conscientiously, it is wonderful how the day passes and how well one may remain even in such a maligned place as Bangkok. It is advisable not to omit an hour's sleep after tiffin. Even if one cannot sleep, it is better for ladies to lie down and rest in bed every afternoon for an hour or so during the period of greatest heat of the day. They are then better able for the afternoon's round of calls, tennis or golf. Beware, ladies, of too many late nights. They are killing to males and much more so to you.

MAIN CLIMATIC DATA FOR BANGKOK.

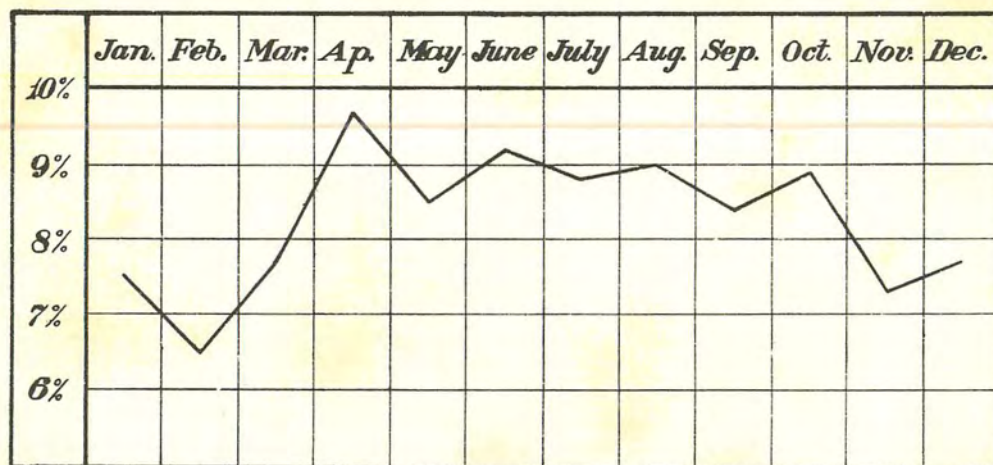
Month.	Mean Temperature.		Mean Maximum Temperature.		Mean Minimum Temperature.		Mean Daily Range.	Rainfall in inches.		Number of rainy days.	
	* C.	* H.	C.	H.	C.	H.	H.	C.	H.	C.	H.
January ...	76.1	78.1	87.7	89.7	69.4	66.	24.6	0.09	.05	2	0.7
February ...	79.1	79.6	88.6	91.4	74.1	69.1	22.4	0.56	.175	7	1.5
March ...	82.5	85.3	93.	94.7	74.5	73.8	19.3	0.83	1.23	1	1.7
April ...	83.4	86.9	94.1	96.2	79.0	76.5	19.4	2.42	2.67	10	4.7
May ...	82.3	85.0	89.7	95.3	76.8	76.5	18.1	10.54	9.56	20	14.
June ...	82.3	84.4	89.4	91.7	78.1	76.5	15.	7.72	5.617	16	15.7
July ...	81.4	84.7	88.1	91.4	76.2	76.3	15.4	8.02	4.165	26	13.7
August ...	81.4	84.0	89.0	93.6	76.2	75.7	15.2	5.65	5.95	17	16.2
September	80.3	82.8	88.6	89.8	76.7	75.3	14.2	11.30	13.9	22	21.7
October ...	80.1	82.7	87.3	89.6	75.1	75.2	14.8	7.46	8.17	14	18.
November...	76.8	79.8	83.7	87.5	70.3	71.9	16.4	2.36	2.1	6	5.2
December...	74.8	76.3	81.6	87.	63.3	66.1	20.8	0.09	0.58	2	2.
Year ...	80.1	81.6	88.4	91.49	74.1	73.2	17.9	67.04	54.16	143	115.1

* C=Dr. Campbell's Data,

* H=Dr. H. Campbell Highet's Data.

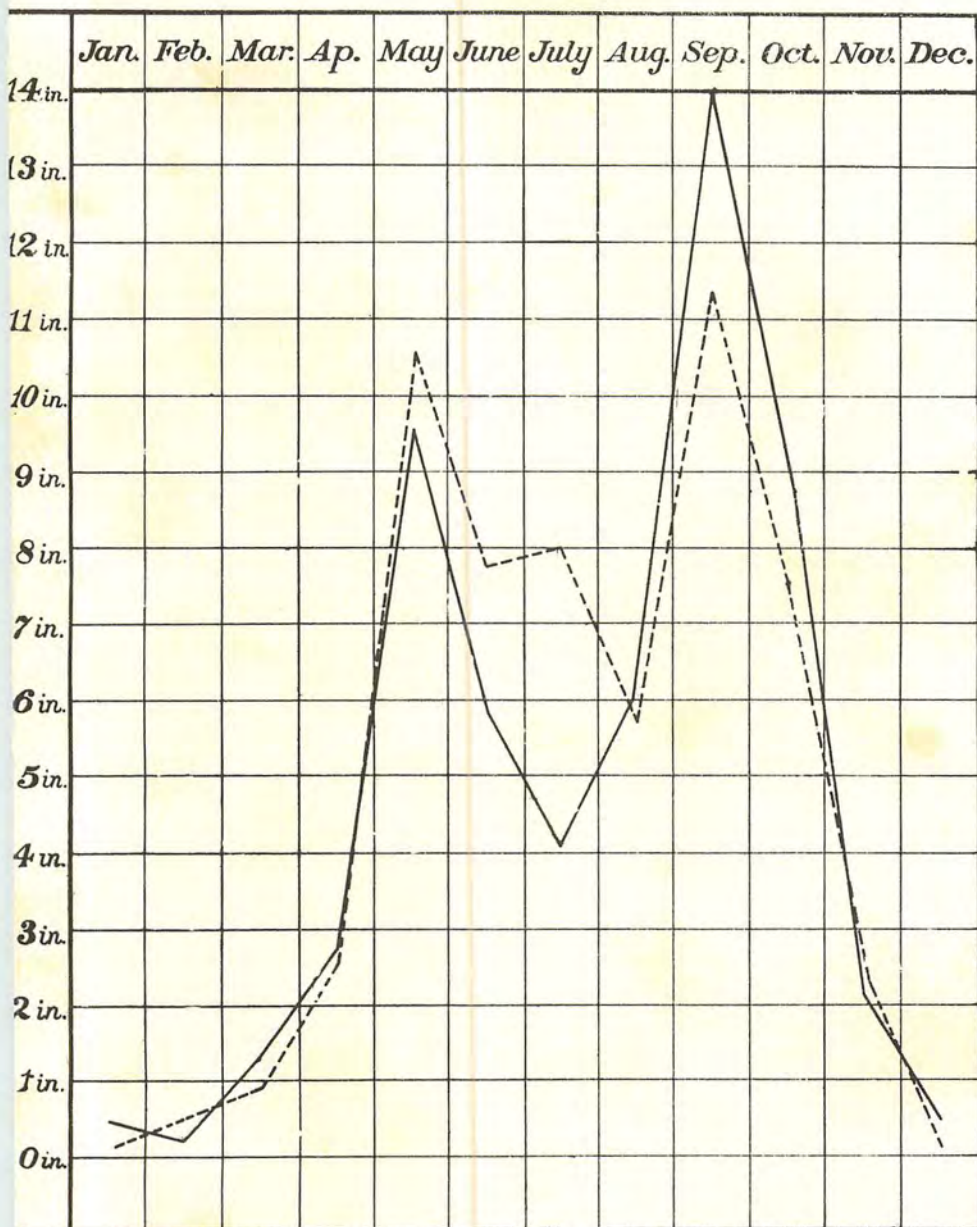
APPROXIMATE MEAN SICKNESS RATE FOR BANGKOK.

Estimated from an Analysis of 30,752 cases.



(Dr. H. Campbell Hight's paper on Climate & Health in Bangkok.)

MEAN MONTHLY RAINFALL IN BANGKOK



N.B. Dotted lines give Dr Campbell's figures for 10 Years
 Firm " " Dr Highet's " " 4 "

(Dr H. Campbell Highet's paper on Climate & Health in Bangkok.)

ORDINARY GENERAL MEETING, 6TH FEBRUARY, 1906.

DISCUSSION ON DR. HIGHET'S PAPER.

The President, Dr. O. Frankfurter, was in the chair, and the business before the meeting was a paper on Climate and Health in Bangkok, by Mr. H. Campbell Highet, C. M., M. D., D. P. H., Fellow of the Royal Institute of Public Health, and Principal Medical Officer, Ministry of Local Government. There was a much larger attendance than usual.

In opening the proceedings the President said there was no need for many words in introducing Dr. Highet. The subject he had chosen was one which necessarily interested us all, for were we not, and had we not been, all at one time or other the corpus vile on which experiments had been made. We knew very well that Bangkok could not exactly be described as a health resort, but on the other hand we did not know exactly what Bangkok is like in these respects. If we would rely on the books of the passing tourist, whose least sympathetic variety is, as Sir Ernest Satow has it, the nineteenth century globe-trotter, we should be strangely out of reckoning. We should have the globe-trotter's idiosyncracies, as affected by an experience of sometimes a couple of days, but we should not have facts. Dr. Highet would give them exact data. As far as meteorological observations were concerned Dr. Highet could rely on what some of his predecessors had done—such as Dr. Campbell, Dr. Bradley and others. With regard to health, Dr. Highet would give them the data which he had collated during an experience of some eight years in the East, and, the President added, he believed he was right in saying it would be the first definite statement about health in Siam, as whatever of value had been said before had appeared in medical and other scientific journals, not generally accessible to the layman.

Dr. Highet then read his paper, and at its conclusion the President suggested that the discussion might fitly be begun by the medical men present.

Dr. T. Heyward Hays said Dr. Highet had covered such an extensive field that he could not follow him over it all. But Dr. Highet had made one or two points with which he (Dr. Hays) entirely disagreed. He had spoken of Dr. Campbell being here 20 years ago; it was really 28 or 30

years ago. Then as to typhoid fever—the word never occurred in Bangkok until the Sanitary Department was established (laughter). He appealed to all of them who knew Dr. Gowan and Dr. Deuntzer; typhoid fever was never known here until the Sanitary Department was started. Personally he had not believed in it, but at a recent meeting of the Medical Association Dr. Highet showed them the bacillus, and now he was convinced. But typhoid fever was the result of the insanitary or half insanitary condition of Bangkok, and it would be wiped out by proper sanitary conditions. Next there was that question of drink. He had never himself tasted alcohol in his life, until he arrived in Bangkok, and he found in 20 years' experience that the men and the women who died of cholera or dysentery were teetotallers. A moderate amount of alcohol with meals would keep them straight. He did not agree with Dr. Highet's idea of cholera belts. He should say, no cholera belts! Dr. Highet gave them his eight years' experience; but he (Dr. Hays) gave them 20 years' experience. The men and the women who wear cholera belts take them off suddenly; and that constituted the danger. If anyone did wear a cholera belt he should wear it day and night, should in fact never be without it. But the true advice was, don't wear a cholera belt. He had himself been here 20 years, and he had never had a cholera belt—he would rather die of cholera (laughter). Now, about climate. Considering the insanitary conditions, and considering the life that we lead, there is no city in the East more healthy than Bangkok. But when a man was coming up from Singapore, he was generally told to make his will. Why was it? It was perhaps because General Feilding died here of cholera. He died here of cholera because he drank tea prepared with bad water. They should never drink such tea, they should never drink tea made with filthy klong water warmed up a little. They should also beware of soda made with klong water; that was also very fatal. Dr. Hays went on to give advice about the filling of water tanks, and with regard to mosquitoes said, Cover up your water jars; never have any water in or around your home without keeping it covered; fill up all small pools.

Dr. C. Beyer said:—"The question how the climate affects the European, cannot be answered perfectly by enumerating all the different tropical and other diseases of Bangkok. Even supposing that the Sanitary Department were to be so successful as to stamp out, or very greatly reduce Malaria, Typhoid fever, Cholera, Plague, and Dysentery, Bangkok, although it would be much more healthy, would nevertheless

not be a town where a European could reside for a life time.

“Bangkok is situated in the Tropics, where—the experience of centuries shows us—full acclimatisation is impossible for the Caucasian race, which has nowhere been able to populate a tropical climate, despite the supremacy of political or commercial influences. After a few years the European has to return home for the restoration of his health, and when, as rarely happens, a family does settle in the tropics, propagation after the third generation as a rule does not happen.

“Contemplating this question of the influence that the climate in Bangkok has upon the European, we have to ask further what is meant by acclimatisation in a tropical climate and whether in any respect Bangkok possesses any advantage over other tropical cities or not.

“Regarding acclimatisation—it is evident that the body must adapt itself to the greater heat and humidity of the air of the tropical climate. The human body must and can keep its own temperature, the same at the poles as at the equator by adapting its own warmth to that of its surroundings.

“Now the human body gets its warmth mainly by burning its food, and in a much less degree by the contraction of its muscles. This production of warmth is enormous being on the average 2500 calories in 24 hours. (1 Calorie is equal to that quantity of warmth which is necessary to warm 1 litre of water 0 degree C. to 1 degree Celsius). The old explanation of acclimatisation was that the body, after a long sojourn in the tropics produces less warmth, and adapts itself in this way to the temperature of its surroundings; but exact examinations—especially in Batavia—prove that the chemical production of warmth *i.e.* the number of calories produced is exactly the same here as in Europe.

“That being so, necessarily the body must throw off more warmth here than in Europe. As I said before, the body must bring its own temperature into harmony with its surroundings, otherwise the body with its continual production of warmth would resemble very much an overfed oven; *i. e.* would exceed its own normal temperature. This escape of its surplus warmth is effected by ex-spilation, and evaporation on the skin. We know that the air of ex-spilation is warm, and that we throw off by ex-spilation, which—be it noted—is slightly accelerated

in the tropics, about $20^{\circ}/_{\circ}$, and by the skin about $70^{\circ}/_{\circ}$ of the whole surplus warmth. The skin throws off the warmth by radiation, but here much more by evaporation, the body producing perspiration, the evaporation of which produces cold. This evaporation is of course much more easy in dry heat than in an atmosphere nearly saturated with moisture. In Bangkok the relative humidity, which in Europe is from 62 - 70%, is increased very highly, being on the average $85-90^{\circ}/_{\circ}$. That explains the well known fact that hard work which requires a greater effort of the body, and therefore much perspiration, cannot be done by a European here, while we frequently observe that the native may do it with impunity. It further explains why the European is well fitted for hard work in a country with dry heat; *e. g.* in the Sahara, where long marches can be made by European troops.

“ Besides the difficulty of regulating our own temperature to the great heat and humidity of Bangkok, the situation of the place close to the sea must also be taken into consideration. It has a tropical sea climate, which means an atmosphere of increased humidity compared with that of towns situated further inland. Against this must be set the sea-breezes which reach us and assist in the evaporation of perspiration: but, on the other hand, it must be remembered that the light tropical breezes do not assist in this process to the same extent as the more violent winds of Europe. Proximity to the sea therefore is of doubtful advantage.

“ Again Bangkok is far removed from any hills. In the tropics temperature rapidly decreases as altitude increases, and in the British and Dutch Indies we find numerous hill stations with sanatoria; but Bangkok possesses nothing of that kind, the hills being far away and as yet having neither sufficient railway communication nor any sanatoria.

“ The average difference in temperature between the hottest and coldest month is only about 4° Cels., while we are accustomed to much greater variations in Europe. We often see therefore, as an effect of the climate upon Europeans, palpitations of the overworked heart, loss of energy, general debility and weakness; but that everybody gets anæmic here is not true, a careful examination of the blood showing that the number of the corpuscles are the same as in Europe. Anaemia from climate does not exist.

"That most Europeans lead an unreasonable life, keep late hours, consume too much beer or whisky soda and much too much meat, is not due to the climate. More than two stings an evening as a rule should not be taken: spirits are a stimulant for the heart, but a healthy man is just as well without them.

"Cholera, Typhoid fever and Dysentery are every year rife amongst the Europeans. Add to this the climatic difficulties as shown above, and we may come to the conclusion that Bangkok is relatively an unhealthy town, for the European, certainly a town which when compared with other tropical cities with greater differences in their daily and monthly temperatures, less relative humidity and hill stations close by, is at a great disadvantage."

Dr. McFarland emphasized what had been said by Dr. Highet with regard to the care of the teeth. People should give every attention to preserving their teeth as long as possible and thereby strengthen the body for the work it has to do in standing against the climate.

Dr. Hays intervened to urge the value of an afternoon sleep, a point he had forgotten to touch on.

Dr. Mackenzie was also asked to contribute to the discussion. He agreed with Dr. Hays as regards the cholera belt. He did not think it of any service. In South Africa he had had ample opportunities of watching typhoid fever, and could say that till we got a proper water supply here there was no chance of stamping it out. It was a rather interesting fact, however, that Zanzibar has no typhoid fever. It was a very similar climate, and sanitation was of the most primitive description. Till we got a water supply we should also still have cholera. Malaria was a preventible disease, and too few precautions were taken by residents here with regard to mosquitoes. If one took a little personal trouble, one could do a great deal to eradicate mosquitoes, by the use of kerosine. Inoculation against typhoid fever had not proved much of a success as a preventive, but it certainly made an attack much lighter.

Mr. Leonowens thoroughly approved of a nap in the afternoon. A cholera belt was a thing he had never worn, and he should think it a bit of a risk. With a reasonable amount of care, and not too much drink and smokes, he thought it was a climate one could get along in.

The Rev. J. Carrington disagreed with the lecturer in saying that the first term out here before going on leave could be longer than the terms afterwards. He thought the first term should be the shortest, and then one could keep well longer after that. Stress had been laid on the importance of a sun topee, but from his own experience he preferred a felt hat and an umbrella. In 1869, when he came here, they were told that they could not tour in the rainy season, but as a matter of fact they could tour at any time of the year in this country. His advice briefly was: Take good care of yourselves; keep your feet dry; drink all the water you want to drink—it is the most natural means of quenching your thirst.

Colonel Gerini, from his experience, entirely agreed with what Dr. Highet had said about bathing. Then during the hot season, from March to September or October, he had carefully avoided fish and milk. Any serious illness he had had, could be traced to prolonged travel in the jungle.

In replying on the discussion Dr. Highet thanked the speakers for the kindly way they had taken the paper. He agreed that a nap in the afternoon is an excellent thing, also that the European did not become acclimatised, and he touched on various other points raised. His colleagues seemed to think inoculation was not of much value against typhoid fever, but if they got any method that prevents infection for three or four months that method was worthy of consideration. Dr. Beyer remarked that the results had not been very good in German South-west Africa, but as a result of the study of this question the surgeons of the German Army had given inoculation their support.

Dr. Hays said it was doubtful if Colonel Gerini would be present at another general meeting, and he therefore proposed that a vote of thanks should be passed to mark their high appreciation of Colonel Gerini's services to the Siam Society, and that this should be recorded on the minutes.

The President said that to show its appreciation of his services the Society had already appointed Colonel Gerini an honorary member, the highest honour in its power to bestow. But he agreed with every word Dr. Hays had said, and would be very glad to put once more on record their appreciation of the Colonel's services. They wished him a happy life at home in Italy, and hoped at the same time he would not forget the Siam Society, whose great support he had certainly been.

The motion was passed by all standing.

On the motion of the President, seconded by Mr. Florio, a cordial vote of thanks was accorded to Dr. Highet for his very able and interesting paper.



