Dewees (W. B.)

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# MALARIAL AFFECTIONS.[1]

BY WILLIAM B. DEWEES, A.M., M.D.,
OF SALINA, KANSAS.

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# MALARIAL AFFECTIONS.[1]

BY WILLIAM B. DEWEES, A.M., M.D.,
OF SALINA, KANSAS.

THE title malarial affections is here employed to denote conditions produced by the poisonous effects of *bad air*, in preference to the word *malaria*, the use of which is calculated to substitute a cause for an effect.

There is a widespread belief among the public that malaria—paludal miasm—is decidedly on the increase in many parts of the United States. A half century ago Staten Island was a healthful place to spend the Summer; but within the last fifteen years portions of it have become notorious for the severe agues prevalent. Chills were next to unheard of along the Sound in Connecticut as late as thirty years ago; but of late years they prevail with increasing frequency every Autumn. Many valleys in New York, New Jersey, Delaware, Maryland, Pennsylvania, Virginia, Ohio, and throughout the States of the great West and South have for the first time witnessed cases of malarial poisoning, of local origin, within a decade or two. These facts add much to the interest with which the questions relating to malarial affections will continue to be studied.

Malarial poisoning presents itself under protean forms, and often is the active cause of disease where it is not suspected. There are various lesions of the stomach, duodenum, liver, spleen, etc., which arise from this cause, not

[1] Read before the South Kansas Medical Society, at the Thirtieth Semi-Annual Meeting, held in Wichita, Kansas, May 6th, 1890.

amenable to treatment unless their true origin is recognized. The influence of this poison may unfavorably modify the progress of surgical diseases, by arresting or delaying the healing of wounds, and giving rise to various complications which render the prognosis more than usually unfavorable. Traumatism may react upon malaria and bring it out in individuals in whom it would otherwise have been dormant. Malaria, when it does exist in a latent or masked form in the human body, will excite and complicate any disease to which the body, from any peculiar temperament, may be disposed.

As for the investigations into the efficient cause of malarial poison, we find the history of this study to be recent. Theoretical hints are found to have been scattered for many years, but no practical work was done until Klebs and Tommasi-Crudelli discovered in the mud of the Italian swamps, in 1879, a certain bacterium which they named the *bacillus malariæ*. The investigations of Sternberg, in our own country, have not only failed to confirm, but have rather denied, the deductions of the Roman pathologists. The question naturally arises: Is this *bacillus malariæ* to be found in some of the arid soils in the tropics, and elsewhere, notoriously fertile in malarial fever?

This much seems certain: Up to the present time it has been searched for in vain in the malaria-producing soil of lower Bengal. We know that the fever-producing rotten granite of Hong Kong and other places is permeated by a fungus, but that it is the *bacillus malariæ* has not been determined.

The well-known theory of Dr. Salisbury, of Ohio, who maintained that agues are not produced by any poison of telluric origin, but by the introduction into the system of cells and spores, emanating from certain plants called *Palmellæ*, has long since been exploded.

The doctrine of to-day is that of Laveran, who, in 1881, described a pigment in the blood corpuscles which he claimed was due to the action of an organism which he termed *Plasmodium malariæ*. These observations of Laveran passed practically unnoticed until Marchiafava and Celli, in 1886, acknowledged their accuracy.

Camillo Golgi, in the same year, wrote an excellent monograph describing a similar appearance, and giving a detailed history of its action that is in entire accord with the present teachings on this subject. This doctrine, briefly stated, is as follows: It is taught that the *Plasmodium malariæ* is the cause of malarial poisoning, that it enters the blood, taking up its abode in the red corpuscles, and gradually growing therein. At first it is very small, one-fifth the size of the corpuscle, but as it grows it takes up pigment, which is deposited in small granules in its periphery. It grows until it completely fills the corpuscle, and then it divides into a number of daughter cells that repeat the same process, and at the division the pigment granules are set free in the blood, causing the well known *melanosis malariæ*. They are also more numerous just before the chill, and immediately afterward are hard to find, for the division has taken place, and the small cells escape observation far more easily. The use of quinine diminishes the number of the organisms very markedly, and in case of cure they can no longer be found. This organism, differing from the bacteria,

belongs to the lowest order of animals, the protozoa, and might be termed protozoon or hæmatozoon malariæ.

Whatever be the etiological factor of malaria, the discovery of microörganisms, and the establishment of the relation which they sustain to pathological states, led the way to the successful study of specific influences, and the results tend to show that it is a specific factor, a *materies morbi* of regular aspect, of given demeanor, and of ascertainable character; in fact, that the malarial poison is due to an organism which multiplies in the soil. Anyone who has studied this difficult subject knows the great variety of conditions and soils where this poison manifests itself.

In reference to the increasing distribution of malaria, it is worth noting that water is often the vehicle by which the malarial poison reaches the system, and that it is often charged with malaria at points distant from the places where it comes to the surface and is used. Thus, it happens that soils are often reputed malarious when, in reality, the unhealthfulness is due to the fact just stated. There is no less doubt that the poison may also be carried by the wind, various observations having shown this; persons living on the lee side of a marsh (with reference to the prevailing winds), suffering more than those to windward of it. Again, it is erroneous to suppose that all soils containing this organism poison the superjacent atmosphere, for it is known that outbreaks of fever occur when soil, malarious in ancient times, is stirred up by cultivation or excavation. From this it has been argued that the poison can remain in a latent state, or a state of inertia, for centuries, similar to the long time during which the seeds of plants may lie dormant. The conditions necessary for the development of the poison, as given by Tommasi-Crudelli, are as follows:

I. A temperature not less than 20° C.

II. A moderate amount of permanent moisture in the soil.

III. Ready access of oxygen to the strata which contain the poison-ferment.

Natural causes tend to diminish or suspend the activity of the poison-ferment.

In Winter Condition No. 1 is wanting, though a few very hot days have often been known to be followed by outbreaks of fever even in Winter.

In Summer Condition No. 2 fails if the heat be sufficiently prolonged. This, he says, occurred in the Agro Romano in 1881–82, though a single heavy shower of rain caused the reappearance of the disease with even greater force.

Condition No. 3 is affected favorably for man when

1. The malarious soil is covered by natural top-dressing (*colinate*) formed by alluvial deposits; or,

2. By the felting together of the roots of the grass on strong pasture. Both these circumstances prevent the access of oxygen to the soil which contains the poison-ferment.

Regardless of all theories, it must be admitted that some soils—be they marshy or not—seem to possess the properties necessary for the propagation and development of the malarial poison, while others do not, even though apparently under very similar conditions.

In reference to prophylaxis, science has given us but very limited scope. Up to the present time we scarce can recommend anything aside from:

1. Change of climate to a higher elevation and dryer locality.

2. The internal use of arsenic, as the best means whereby the system can be rendered insusceptible to the influence of the malarial poison.

3. The use of top dressings (*colinate*) combined with subsoil drainage as being probably of service in reclaiming the malarious regions.

The proposed cultivation of the soil has failed in this, that the time for cultivation is also the period of the greatest activity of the malarial poison, and the laborers are rendered unfit for work by its influence. In reference to the prophylactic power of eucalyptus plantations, we can only say that they have brought disappointment, both in draining the soil and in proving destructive to microörganisms by their exhalations.

TREATMENT.—Whatever theory be accepted as to the cause and nature of the malarial poison, we know that quinine and arsenic destroy its influence in the system. Whether the effect of these remedies is due to their action as protoplasm poisons remains to be answered. It is, however, worthy of note, that the same saturation necessary to produce a fatal effect in these low organisms in fluids without the body, is necessary also in the blood, to be most effectual in the treatment of malarial poisoning. It has been observed, more especially as to the use of quinine, that the saturation of the blood to this degree very greatly interferes also with the development and migration of the white corpuscles. This probably explains the increase of anæmia that is so frequently (if not always) present in malarial affections, when the quinine treatment is used, while the body weight of those treated with arsenic usually increases, and the anæmia, when it exists, diminishes.

This is a clinical fact, often and repeatedly observed by me, and for which I can offer no rational scientific explanation, but from which I have deduced the following treatment, modified according to the nature of each case. The patient is placed in a bed, covered with woolen blankets, in a well-ventilated and lighted room, the temperature of which is 70° to 76° F., in charge of a competent nurse. I then order a purge of calomel (10 to 20 grains) followed in one to two hours by half an ounce of Rochelle salts, a Seidlitz powder, or liquor magnesii citratis (½ bottle), given at such an hour that the bowels will be moved before night-fall of the same day. At bed-time, 15 to 20 grains of quinine are given, and the following morning 10 to 15 grains of the same drug are administered; during the day the following is mainly relied upon:

| | | | |
|---|---|---|---|
| ℞ | Quininæ bisulphatis, | ʒss | |
| | Euonymin, | | |
| | Extracti colocynthidis compositi, | āā gr. x | |
| | Extracti belladonnæ, | gr. ij | |
| | Fiant capsulæ No. XX. | | M. |

Sig.—One capsule every two hours during the day.

This usually suffices to bring the patient safely to a stage of convalescence in from one to three days. Thereafter the capsules are ordered three to four times daily, together with:

| | | | |
|---|---|---|---|
| ℞ | Liquoris potassii arsenitis, | fl ℥ss | |
| | Elixir ferri quininæ et strychninæ phosphatis, | fl ℥ vijss. | M. |

Sig.—Teaspoonful before meals, three times daily.

Dewees Wm B.
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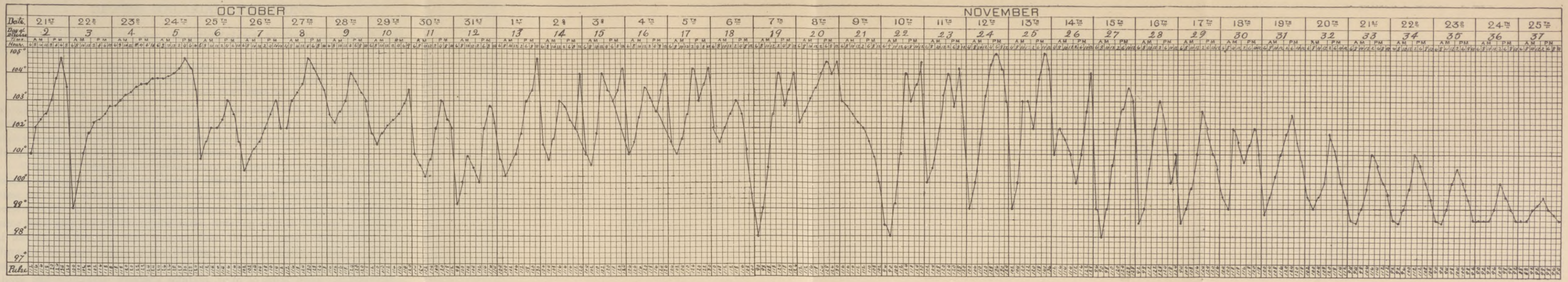
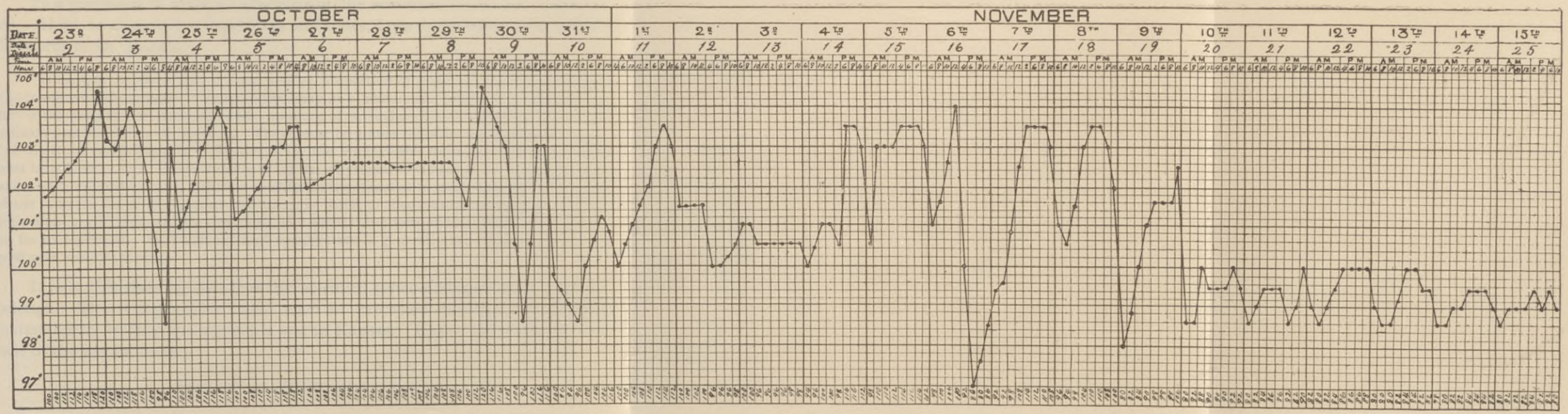
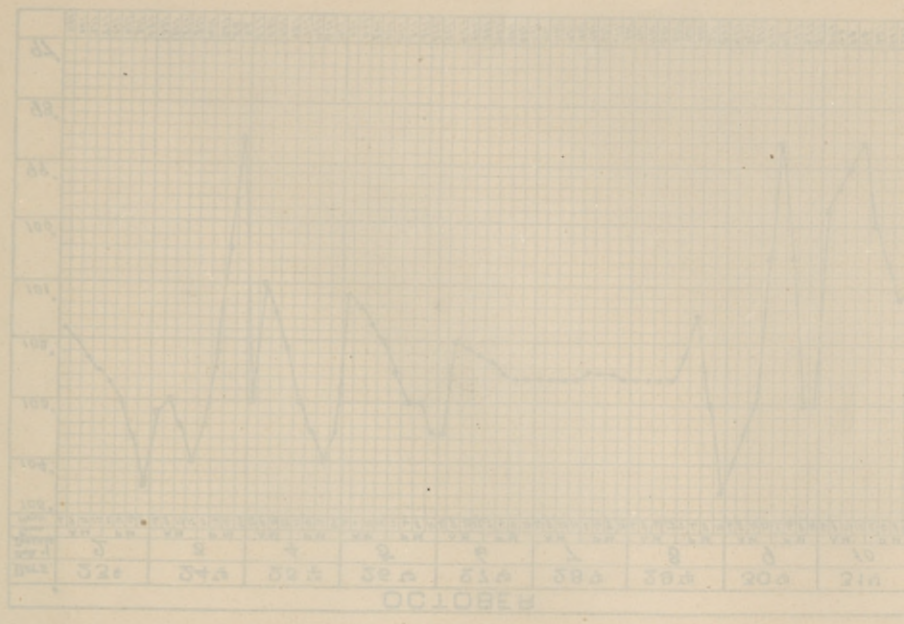



CASE I.—Chart showing the variation of temperature every two hours.




CASE II.—Chart showing the variation of temperature every two hours,



or if, as has often been the case, the patient objects to the bitter taste, I order with good effect:

℞ Liquoris potassii arsenitis, fl ℥ss
Syrupi hypophosphit. compositi, fl ℥vijss. M.
Sig.—Teaspoonful before meals, three times daily.

To counteract the evil effects of quinine on the head, ears, etc., I have found nothing to act so happily as hydrate of chloral given in like doses half an hour after the large dose of quinine in the evening. My preferable mode is to give the quinine and chloral in five-grain capsules.

While this treatment has proved very successful in the major portion of cases under my care, it has not been so effectual in a certain line of cases which came under my notice here in Kansas during the past five years. These cases presented the same typical train of symptoms, history, etc., and occurred at the same time with the regular typical cases, differing only in this one particular—of having unnaturally clean tongues from the very onset, and continuing so through the entire course of the disease, even in protracted cases. In those cases the best results were obtained by beginning with the same treatment given above, and combining Fowler's solution, 10 to 20 drops given an hour before the first dose of quinine in the evening, and 10 to 15 drops an hour before the second dose of quinine in the following morning, fasting. Thereafter the quinine and arsenic were given in one-half to one-fourth these quantities, until the stage of convalescence was reached—which seldom required more than three days—when the above-described convalescent treatment was resorted to with equally good results as in the cases with furred tongues. This, together with hot water sponging and friction of the entire surface of the body, and good clean, cheerful surroundings, gave the best results in the treatment of malarial affections of the *intermittent type.*

This treatment in malarial affections of the *remittent form* is not so favorable. Here, to express my experience and views, I can do no better than endorse the words of Dr. Bemiss:[1]

"It must be admitted that in quite a large proportion of cases of remittent fever specific treatment fails to cure. I suppose that may be a reasonable proposition which holds that in the majority of these cases the presence of secondary blood-impurities annuls the ordinary specific effects of cinchona. These must be gotten rid of by depurative medicines. The intestinal canal, the skin and kidneys are the emunctories through which elimination must be effected. It is, therefore, proper for the physician to endeavor to recognize cases where such impurities exist, and to so modify his treatment as to remove them. If the first efforts to break the febrile paroxysms fail, it is better to discontinue the quinia and place the patient under symptomatic treatment, and await conditions of the system more favorable for its repetition. Of course the high temperature is generally the symptom requiring most care and attention."

It is to this class of cases that the so-called typho-malarial fever properly belongs. This is my opinion based upon an extensive experience in treating malarial fever both in Pennsylvania and in Kansas. I have yet to see my first case of the hybrid form.

[1] Pepper's System of Medicine, Vol. I, page 604.

The following cases have been of special interest to me, as illustrating rather rare types of the intermittent and remittent fevers, as well as demonstrating the fact that malarial poison presents itself under protean forms, and that all types may arise from the same local cause, and all occur at the same time in places where malaria was never known to have existed, though the ground had been occupied and cultivated for upwards of thirty years.

REPORT OF CASES.

On Sunday evening, October 13th, 1889, I was summoned to the house of Mr. J. G., to see two of his sons who were ill. Upon my arrival I obtained the following history: Clarence, aged 9 years, returned home on the afternoon of October 10th complaining of weakness, nausea, vomiting and diarrhœa, anorexia, headache, backache, and a great desire to lie down and rest. He slept well during the night, and on the following morning arose feeling refreshed; partook of a little breakfast, and several hours later began to feel a return of the symptoms of the day before, together with a decided coldness of the entire body, which continued till about noon, when it was succeeded by fever, which continued without any perspiration until the evening.

Saturday morning he arose feeling comparatively well, until about 9 o'clock, when he, and also his brother Clark, aged 6 years, began to experience a similar train of symptoms to those just described. Sunday morning both boys were weak and restless. This restlessness began to increase at about 10 o'clock with very decided coldness of body, nausea, diarrhœa, headache, backache, and occasional bleeding from the nose. The coldness was much more marked in degree than on the preceding mornings, and lasted till 12 o'clock, when again fever became the order of events, the coldness leaving with a marked subsidence of all other symptoms. The fever continued increasing without any perspiration until evening, when I was summoned and found the boys in the following condition: Temperature, 104½° and 103½° F.; pulse, 132 and 124 respectively; skin hot, dry, tense and of a dusky hue; tongues coated with a greyish-white fur along the edges and of a dark-yellowish color along the central portion; anorexia, slight nausea, headache and backache, with a restless disposition in bed. I deemed the cases to be malarial fever.

The diarrhœa having evacuated the bowels freely, I did not give any calomel. As the nausea threatened a non-retention of quinine, I concluded to reduce the fever by the aid of antipyrine, and gave eight grains to Clark and ten grains to Clarence, with good effect. Next morning (Monday), I reached the home at about 9 o'clock, and found them already suffering from the coldness of body, with headache, backache, and less nausea than they had experienced the days preceding, and both having bled a little from the nose. Temperature, 97½° and 97⅔°; pulse, 86 and 84 respectively. There was an unnatural pallor of the entire surface of their bodies, which were also colder to the touch than normal. I now prescribed

| | | |
|---|---|---|
| ℞ | Quininæ bisulphatis, | ℥j |
| | Extracti opii, | gr. iij |
| | Capsici (pulveris), | gr. xij |
| | Glycerini q. s. ft. mass. | |
| | Fiant capsulæ No. XIJ. | M. |

Sig.—Give three capsules to Clarence and two capsules to Clark immediately, thereafter one capsule to each every four hours.

Also,

| | | |
|---|---|---|
| ℞ | Potassii acetatis, | ℥j |
| | Liquoris ammonii acetatis, | fl ℥j |
| | Spiritus ætheris nitrosi, | fl ℥ss |
| | Syrupi simplicis, | fl ℥jss |
| | Aquæ camphoræ, | ad ℥iv. M. |

Sig.—Two teaspoonfuls to each every four hours, alternating this with the capsules every two hours.

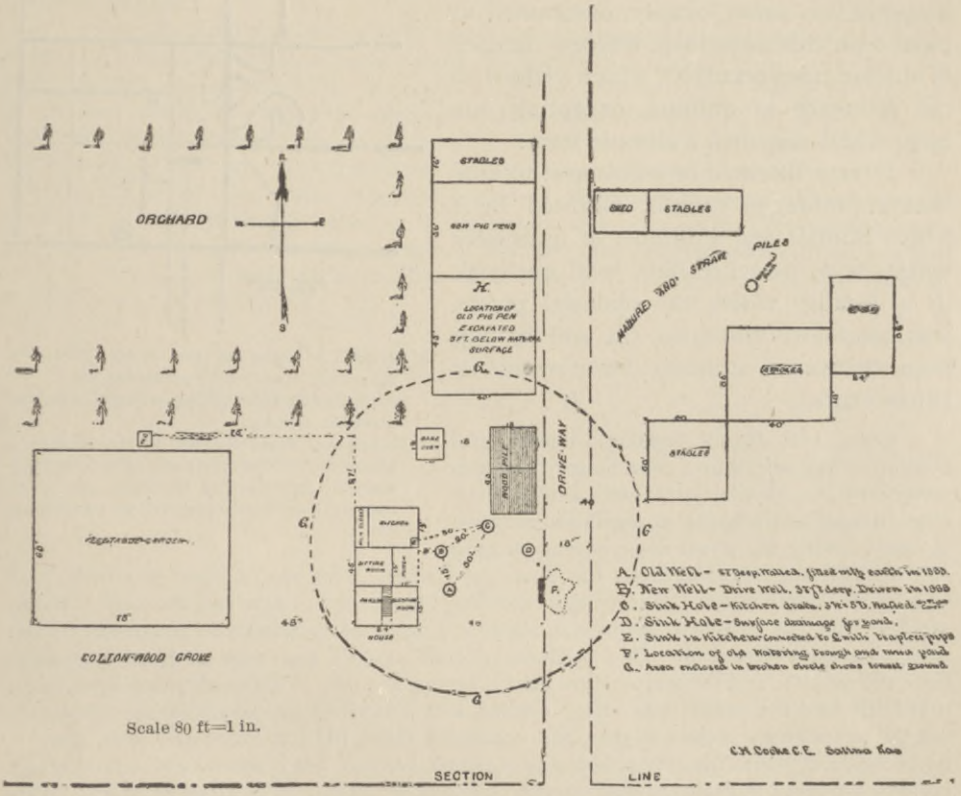
At 1 o'clock, P. M., of the same day, I was notified that the boys were very much worse. I found them both very restless, rolling their heads from side to side, moaning and groaning, in a semi-comatose state, faces pallid and inexpressive, skin cold and moist, pulse small and very feeble and irregular, tongues large and moist, with coating less thick, pupils dilated and eyes rolling around in their sockets with apparently no possible control by the patients to fix them on any object. Upon inquiry, the mother informed me that they both continued growing worse since my first visit at 9 o'clock that morning; that they had had a decided chill at about noon; that the medicine which I had prescribed in the morning was not brought till about 11.30 o'clock, when she gave each one the capsules as directed, but that they vomited in about a half hour later and probably had thrown off part of the medicine; that none of the medicine in the bottle had yet been given, as no two hours had elapsed since giving the capsules.

I felt satisfied in my mind that here were two cases of pernicious malarial fever, of the algid or congestive type, threatening the lives of my patients. Having nothing with me to stimulate the heart's action but solution of nitro-glycerine, 1 per cent., I gave one drop on sugar to each patient, repeating the dose every ten minutes, till three doses were taken, placed hot-water bottles to their feet and alongside of their limbs and bodies, and administered hot milk with lime water. In the meantime a messenger was despatched for ether and aromatic spirits of ammonia; he arrived at 2 o'clock. The patients instead of improving had by this time approached a stage of complete collapse. Temperature had fallen to 96° in both. I now injected one drachm of purified sulphuric ether hypodermically in each patient, and within ten minutes there became manifest a decided improvement in their condition. In fifteen minutes I again gave a hypodermic injection of one drachm of ether to each boy, repeating this same quantity three times in forty-five minutes, with the most encouraging result, for the time being. In an hour's time from giving the ether consciousness was restored, heart's action invigorated, and I had become hopeful of my patients. Ten drops of aromatic spirits of ammonia were now ordered to be taken with two tablespoonfuls of hot milk every fifteen minutes. At 7 o'clock I saw my patients again, and found that they had continued doing well until about 6 o'clock, when a return of unfavorable symptoms was observed. Dr. W. F. Houser was called in consultation. He concurred in the diagnosis and treatment. The patients, in spite of all efforts, grew weaker until finally large, liquid, very offensive involuntary evacuations occurred. Clark died at 10 o'clock that evening, and Clarence at 7.30 o'clock next morning, October 14th. On October 17th, the father, two sons and one daughter were all attacked in a similar manner, manifesting an analogous but more severe train of symptoms. I gave all four a purge of ten grains of calomel and one-half ounce of potassii et sodii tartratis, followed by large doses of quinine. Cure was rapid and complete. Two more cases in this family were likewise treated with the most gratifying results. Thus there were eight similar cases treated in this one family within one week, with two deaths which occurred before any impression with quinine could be made, while six were saved by the heroic administration of this drug. (See accompanying table of these eight cases.)

| AGE. | NAME. | PULSE AND TEMPERATURE | TIME OF DAY. | OCTOBER, 1889. Sun. 13 | Mon. 14 | Tues. 15 | Wed. 16 | Thurs. 17 | Fri. 18 | Sat. 19 | Sun. 20 | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | CLARK. | Temperature. | Morning. | | 97⅓ | | | | | | | Died 10 P. M., October 13. |
| | | | 2 P. M. | | 96 | | | | | | | |
| | | | Evening. | 104½ | 97⅔ | | | | | | | |
| | | Pulse. | Morning. | | 86 | | | | | | | Temperature fell to 95° and pulse to 60 one hour before death. |
| | | | 2 P. M. | | 74 | | | | | | | |
| | | | Evening. | 132 | 76 | | | | | | | |
| 9 | CLARENCE. | Temperature. | Morning. | | 97⅔ | 96 | | | | | | Died 7.30 A. M., October 14. |
| | | | 2 P. M. | | 96 | | | | | | | |
| | | | Evening. | 103½ | 97½ | | | | | | | |
| | | Pulse. | Morning. | | 84 | 70 | | | | | | Temperature fell to 95°, and pulse to 54 one hour before death. |
| | | | 2 P. M. | | 76 | | | | | | | |
| | | | Evening. | 124 | 78 | | | | | | | |
| 52 | JACOB (Father). | Temperature. | Morning. | | | | | 97¼ | 98 | 98½ | 98½ | |
| | | | 2 P. M. | | | | | 98 | | | | |
| | | | Evening. | | | | | 99 | 98¾ | 98¾ | 98¾ | |
| | | Pulse. | Morning. | | | | | 68 | 70 | 72 | 72 | |
| | | | 2 P. M. | | | | | 84 | | | | |
| | | | Evening. | | | | | 108 | 72 | 72 | 72 | |
| 27 | JOSEPH. | Temperature. | Morning. | | | | | 97 | 98 | 98¼ | 98½ | |
| | | | 2 P. M. | | | | | 97¾ | | | | |
| | | | Evening. | | | | | 99¼ | 98¾ | 98¾ | 98½ | JACOB, JOSEPH, JOHN and ESTELLA. |
| | | Pulse. | Morning. | | | | | 64 | 72 | 72 | 75 | Each one took 90 grains of quinine the first 24 hours in 10-grain doses. |
| | | | 2 P. M. | | | | | 78 | | | | |
| | | | Evening. | | | | | 99 | 74 | 74 | 72 | Each one took 40 grains of quinine the second 24 hours in 5-grain doses. |
| 25 | JOHN. | Temperature. | Morning. | | | | | 97¼ | 98½ | 98½ | 98½ | Each one took 25 grains of quinine the third 24 hours in 5-grain doses. |
| | | | 2 P. M. | | | | | 98 | | | | |
| | | | Evening. | | | | | 99 | 98¾ | 98¾ | 98¾ | Each one took 15 grains of quinine the fourth 24 hours in 5-grain doses. |
| | | Pulse. | Morning. | | | | | 70 | 74 | 74 | 74 | |
| | | | 2 P. M. | | | | | 84 | | | | Each one took 170 grains of quinine in four days. |
| | | | Evening. | | | | | 96 | 76 | 74 | 74 | |
| 19 | ESTELLA. | Temperature. | Morning. | | | | | 97 | 98½ | 98½ | 98½ | |
| | | | 2 P. M. | | | | | 97¾ | | | | |
| | | | Evening. | | | | | 99½ | 99 | 98¾ | 98¾ | |
| | | Pulse. | Morning. | | | | | 66 | 76 | 76 | 76 | |
| | | | 2 P. M. | | | | | 76 | | | | |
| | | | Evening. | | | | | 86 | 80 | 78 | 78 | |
| 15 | HERBEN. | Temperature. | Morning. | | | | | | 97 | 98½ | 98½ | HERBEN took 75 grains of quinine the first 24 hours in 10-grain doses. |
| | | | Evening. | | | | | | 99½ | 98¾ | 98¾ | 40 grains second 24 hours, 5-grain doses. |
| | | Pulse. | Morning. | | | | | | 64 | 76 | 76 | 20 grains third 24 hours, 5-grain doses. |
| | | | Evening. | | | | | | 88 | 76 | 76 | 135 grains of quinine in four days. |
| 11 | LEOLA. | Temperature. | Morning. | | | | | | | 97½ | 98½ | LEOLA took 60 grains of quinine the first 24 hours in 10-grain doses. |
| | | | Evening. | | | | | | | 99 | 98¾ | 30 grains second 24 hours in 15-grain doses. |
| | | Pulse. | Morning. | | | | | | | 66 | 80 | 120 grains of quinine in four days. |
| | | | Evening. | | | | | | | 94 | 80 | |

Immediately succeeding these cases, there occurred an outbreak of thirteen cases of malarial fever within a fortnight, all in the same building—a four-story brick structure, with high ceilings, heated by steam and well ventilated, with all modern improvements from a sanitary standpoint. It was erected about one year before on artificially elevated ground, and sheltered some seventy occupants.

The first cases manifested themselves on Sunday, October 20th, 1889. They all presented the same symptoms in general in the onset, differing only from those of the eight cases just enumerated in this, that they were seized with a decided chill, followed by a hot stage and free perspiration on the same day that nausea, vomiting and diarrhœa set in—the nausea and diarrhœa being present in all cases, while vomiting was experienced in but five, the characteristic headache and backache which marked the other cases being likewise present, together with epistaxis in six instances.



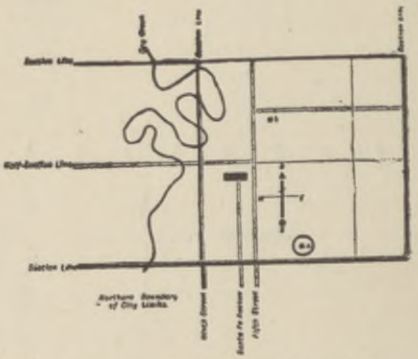

This map illustrates the location of the house and the surroundings of the farm of Mr. J. G———, near the city of Salina (10,000 inhabitants), Saline County, Kansas, where the preceding tabulated cases occurred.

Of these thirteen cases all promptly yielded to the same treatment excepting two, which I shall endeavor to note more at length, since, to me, they proved of much interest, especially in connection with the series. I would have you carefully notice the temperature charts of these two cases and the map illustrating the distance and relative location of these two outbreaks of malarial fever.

I subjected the water and milk, together with some blood drawn from the patients, to experts for examination.

Dr. Tiffany reports: "I have made several examinations of the water, blood and milk you sent. I have not arrived at any definite conclusion as to the germs being those of typhoid fever. In the blood there were numerous spirillæ and small bacilli." Dr. Kiefer writes: "We have made various cultures of the bacteria found in the different samples of water, etc., but as far as microscopical investigation is concerned, have found nothing to indicate the origin of the disease in the water of the various wells. I have also made a chemical examination of the different waters, and find nothing in them that warrants the opinion that they are deleterious to health."

There were no other cases of malarial affection in this section of the country at this time, save in one other farm-house in this same locality, designated at point *b* on this same map, where a number of similar cases occurred, which yielded to the influence of quinine, excepting one case, which assumed a chronic form.



*a*. Location of home on farm of Mr. J. G.—— more fully described by preceding map.
*c*. Location of college building, wherein occurred cases No. 1 and 2.
*b*. Location of home on farm of Mr. R. M——, where occurred several cases of well-marked malarial fever during the same period of time as those herein reported at localities *a* and *c*.

It may likewise be of interest to note that a prolonged drouth, followed by a heavy rainfall and a number of unusually warm days, preceded this local outbreak in a locality where the malarial poison was heretofore unknown, the soil having been cultivated annually for upwards of thirty years.

CASE I.—R. W., of Topeka, Kansas, a student attending said school, was taken ill on Saturday morning, October 20th, with nausea, diarrhœa, headache, backache, anorexia and coldness of body, lasting till about noon, when vomiting and a chill, with bleeding from the nose, gave relief. This was followed by a fever, and later by free perspiration. On Tuesday morning, October 23d, I first saw this case. Being satisfied that the causative factor was malaria, I resolved to establish cinchonism by the method already described. This produced a good night's rest, with no head symptoms from the quinine, and the temperature next morning was 99°. This result was so gratifying that I felt sure the poison was under control, so I prescribed the convalescing treatment; but the temperature became higher, and continued rising till 4 P. M. on the 24th, when it had become apparent that the poison was not subdued, and, lest it should get control of my patient, I ordered 15 grains of quinine and 15 grains of chloral, to be given as before. This dose was not well borne. Next morning the temperature was 100 4-5°, the tongue more thickly coated, sordes forming on teeth, and there was a tendency to adynamia.

On October 27th, at 4 P. M., the temperature rose to 104 3-5°. I gave 15 grains of antipyrine. This reduced the temperature very rapidly, but proved much more weakening than the quinine.

I now felt convinced that here was a case of the remittent type, not curable by specific medication. The patient was ordered judicious feeding, hot-water sponging of the surface, champagne and brandy. Quinine was used only to reduce the temperature, and was given in 15-grain doses on November 1st, 6th, 8th and 10th (see chart). His bowels were more or less loose during the entire sickness, with slight tympanitis and borborygmus for some days during the lowest stage. The first dose of quinine and chloral was followed by a peculiar eruption, which was similar to quinine eruption, seen before, and which continued

throughout the course of the disease. Sordes continued on his teeth; his condition was *very* decidedly adynamic or typhoid. The temperature did not return to normal till the fortieth day of the disease. He was removed to his home in Topeka as soon as possible, where, I learn, his temperature again rose to 103°, and continued high for several weeks, under what was considered a relapse. He, however, made a good recovery in three months.

CASE II.—H. Z., of Wichita, Kansas, student attending school, was taken ill, with similar symptoms to Case I. On the morning of October 23d I first saw him, and gave 20 grains of quinine and 15 grains of chloral preceded by a purge. The following morning I found the temperature reduced from 104½° to 98 3-5°, and an eruption from the medicine similar to that which marked the preceding case. This, likewise, remained visible during the entire illness. I prescribed the same convalescing treatment as in the other cases, but on the 25th the remittent type was manifest, and I placed him under the same treatment as described in Case I.

On the 29th the temperature rose to 104½°, and 15 grains of quinine were again administered. The temperature continued falling gradually till 2 o'clock P. M. next day. On November 6th, by 12 o'clock M., the temperature had risen to 104°. I now gave 20 grains of quinine, and by six o'clock the same evening the temperature had fallen to 97°. Thereafter the case progressed satisfactorily under ordinary convalescing treatment, making a rapid and good recovery. The temperature in this case reached its normal standard on the twenty-sixth day of the disease. The symptoms and physical signs were all analogous in these two cases, save that in Case No. II the bowels were constipated after the third day of the disease throughout the entire course of the fever, and the typhoid condition was less marked. Dr. F. B. Browne, of Salina, Kansas, and Dr. A. H. Fabrique, of Wichita, Kansas, saw these two cases with me.