Malaria - its relationship to pregnancy and its treatment

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In discussing the relationship of malaria to Pregnancy, I intend to consider the subject from a purely clinical aspect, and to illustrate any statements made in the paper with cases which I have personally observed.

In the tropics one must be constantly on the look out for malaria during pregnancy. It attacks women equally in the pregnant and non-pregnant conditions. It is a complication of pregnancy that is not devoid of anxiety or danger, firstly to the mother, and secondly to the child.

Malarial Fever can of itself produce abortion, but this I am certain is a rare condition. What is more frequently observed, however, is that malaria, by repeated attacks, produces an anemic and weak condition which greatly predisposes to abortion. Again, malarial fever will sometimes cause death of the fetus which may be expelled immediately, or be retained...
for a month or so and then be expelled. Further, should abortion not occur the great destruction of blood which occurs from repeated attacks of malaria will render labour at term much more dangerous than usual and should she be fortunate to escape the immediate danger at labour the placenta will certainly be very long and tedious.

Malarial fever causes, in some cases, enormous enlargement of the spleen—spleen—agriculture—and liver and may thus in—directly mechanically—as well as indirectly prevent the possibility of a woman carrying to full term. This is well illustrated by the following case. MRS. E., a well-to-do mohamedan lady aged 27 has been under my care on three occasions for abortion. Each time the abortion occurring between the 4th and 5th months. She has an enormous spleen reaching on the right side nearly to the anterior superior iliac spine and on the mid line to about 1/2 inch beyond the umbilicus. The liver also is enlarged to about one inch beyond the costal
margm. I believe these abortions to have been caused by the Environo- 
omeno spleen interfering with the normal 

development of the uterus as there 

was no syphilitic taint nor was there 
any morbid condition of the 

uterus, so far as I could make 

out.

As compared with plague malaria 

has not a marked tendency to 

cause abortion. With plague pregnant 

women abort almost without exception. 

with malaria, however, abortion is 

exceptional.

It is generally stated that abortion 

is more common among European 

women resident in the tropics and 

malaria is usually said to be the 

cause of this. I believe that abortion 

is more frequent in European women 

resident in the tropics than in 

the same class of women in Europe. 

But there are many causes other than 
malaria at work to account for this. 

Thus, in many women, there is a more 

severe nervous strain associated with
a prospective illness in a foreign country and this, if itself, often produces a degree of ill-health in women who become pregnant. Then again European women seem to stand the hot weather very badly—the long-continued hot, muggy weather having a very depressingly influence on them and a large proportion of them suffer from leucorrhoea which may, in many cases be termed climatic. Moreover life is "gay" than the life the same class of woman has been used to in her own country. These influences all tend to make women anaemic and "touchee" and so predispose to abortion.

The points I especially wish to discuss are
1. Can Malaria by itself cause abortion?
2. Can the administration of Quinine during pregnancy cause abortion?
3. The treatment of malarial fever during pregnancy
Can malarial fever, itself, cause abortion? Personally it has never been my experience to attain a case of abortion due to malarial fever, still, I believe, that in some cases an attack of malarial fever will, of itself, cause abortion. This, however, I hold to be quite the exception. Do not here refer to abortion occurring in women the subjects of chronic malaria, who are weak and anaemic and to probably predisposed to abortion, but to abortion occurring in more or less healthy women from, primarily, an acute attack of malaria. When it does occur the danger to the life of the mother would appear to be increased manifold. It may in some cases have a fatal end as occurred in the case I will report. In such cases so far as I have been able to gather, from hospital records, the end is always with a very high temperature, varying from 103°F to 107°F. There is always a sudden and marked rise of temperature.
within 24 hours after the abortion, accompanied with delirium if the temperature does not come down quickly. The lochia will remain sweet and traces of albumen will be found in the urine. The following case is quoted—almost verbatim—from the private notes of my colleague Dr. Jordan of Hong Kong, and is illustrative of the above statements.

Mrs. W. B., Malarial Fever (Double Typhoid) & Abortion.

Mrs. W. B., aged 32, residing at Kimberley Villas Kouloon—a one-time very pronounced malarial district—had fever for 3 days before seeking advice.
Patient was a strong healthy woman and had not suffered much with fever. She was 3 months pregnant and has had 3 children, all living. Temperature when seen for the first time was 105° F. Had not taken any quinine and declined positively to do so in case abortion should be brought on by the quinine. She was treated with a blistering mixture with however little benefit. The temperature for the first four days was that of a typical double tertian infection, registering between 104° and 105° Every afternoon. On the 5th day after she had been seen severe pains occurred in the lower part of the abdomen, accompanied by a gush of blood from the vagina. Abortion took place within 24 hours, fetus with placenta coming away almost entire. Placenta was carefully washed with 1-3000 Perchloride. The evening of the day on which abortion occurred she had a rigor and the temperature rose to 105.4° F. The drugs Antisyphine were
Given followed by Eumine Bicarbonate Sr T. Every four hours. Next morning the temperature was 102°, patient weak and restless. At 4 p.m. the temperature was 106°; there was slight delirium. A wet pack was given and the temperature dropped to 101.6° F.

On the 2nd morning following the abortion the temperature was 102° F., pulse 120 and regular. Lochia free and no offensive odour. Bowels not opened since abortion. Enema given with good result. Eumine Sr T. continued 2 hourly.

Vomited at noon and at 4 p.m. had another rigor; temperature rising to 106.2° F. Ice pack ordered and the temperature dropped to just below 103° F. Stopped the Eumine v. ordered Lumburg's tincture to doses every two hours. Slight albumen in the urine.

During the next two days the temperature did not rise quite so high but the general condition of the patient was worse. Pulse very rapid, irregular, intermittent. Lochia still sweet. She died on the 10th day after she had
been seen the temperature registering 107.4° F half an hour after death.
Remarks: Here is I think an example of abortion due to malaria— an acute attack. The patient was in good condition when the attack began and I am inclined to think that had 
quinine been given early the mother would certainly have been saved & possibly the child also. The quinine came too late to save the patient. 
It will be noted that the chills remained present throughout the illness.

The character of the temperature is interesting and instructive— viz the regular intermittent character of the double tertian before the abortion and the remittent character of the temperature following the abortion. Such is the usual temperature in these cases.

Saladin (Manual of Midwifery) says “Malarial fever not infrequently leads to abortion or premature labour.” I believe as I have stated that in a few cases malarial fever may
cause abortion but I hold that it is quite the exception and should on no account be put down as a recognized cause of such.

Can quinine cause abortion?

Prof. R. C. Wood (University Pennsylvania) writes as follows on the action of quinine on the uterus:

"In 1871 Montevideo announced that quinine is an active uterine stimulant but in so doing brought forward nothing that was novel. As long ago as 1835 John O. Hulson called attention to the uterine action of quinine and in 1860 reasserted his belief, which in the meanwhile had been confirmed by Dr. Rich and in 1858 J. J. Drugg wrote "many regard the use of quinine as dangerous in any disease in pregnant women. The belief of these persons is that this substance exercises a direct influence upon the uterus causing powerful contractions and expulsion of the fœtus and to support this notion they are ready to bring forward innumerable instances of..."
abortion after its use — of cases of sudden suppression relieved by prompt use of the same remedy. He then goes on to say that these abortions were due to intermittent fever and not to the drug. Surely this is enough to show that the obstetric action of the drug was believed in many years ago by Southern practitioners.

The answer to the question, Has Quinine Debilic qualities? Should be made out in three different ways. First, Do there any evidence of Quinine producing abortion in healthy females or in females of the lower animals? Second — How strong is the evidence of its producing abortion in women suffering from ague? Third — What is the evidence in regard to the action of Quinine during labour.

In regard to the first of these and Questions the only affirmative evidence we have met with is the experiments of Ranzella who says:
abortion in two bitches follow the administration of 6-9 grains of quinine, as the pups in one case were already dead before the administration of the drug it would seem that this investigation was not on such a scale as to be at all conclusive. Moreover we have given quinine to two pregnant cats, in one case, in sufficient quantity to cause death, without disturbing the products of conception. Furthermore, we have met with no evidence that quinine is capable of inducing abortion in healthy pregnant women. Sayre's case is certainly no proof whatever that quinine will originate labour, as labour had commenced under the influence of the hot and cold douche and other means employed before the quinine was given. Cheara of Milan has furnished very strong evidence that quinine is incapable of originating uterine contractions in healthy pregnant women. In
His public service two doses of a gramme (15.43 grains) each were given without effect, daily for two successive days to eight women all in the eighth month of pregnancy. It being necessary to cause abortion one gramme was given daily to one woman for seven days and to another for three days without, in either instance, any effect, so that labour had to be brought on in the usual way.

On the whole we believe the first question must be answered—quinine is incapable of producing abortion during quiet pregnancy. In answer to the second sub-

question viz. How strong is the evidence of its producing abortion in women suffering from ague—some evidence has already been adduced to indicate that abortion may be so caused but it is opposed by much stronger facts. To evidence already quoted may be added the assertion of Walraven that he has
frequently seen the exhibition of quinine followed by abortion, the record of two cases of such character by Burt, and no doubt the affirmations of others which we have not seen. Opposed to this, however, is the overwhelming fact that the great body of the profession have for centuries been giving quinine in one form or other to pregnant women indiscriminately and if abortion had been produced it must have been noted long ago. Further direct testimony is not wanting. Malaria often induces abortion and Dr. James C. Harris and Dr. Russell—testify from personal experience that quinine will arrest abortion from such a cause. J.A. Ashford, Beauchamp, Rooker J.H., May, and A. L'Acrevuld, have given quinine to hundreds of pregnant women suffering from malaria, in large doses without disturbing the uterus. Other testimony might be adduced, but it is
Incredible as it seems, the largest therapeutic doses of quinine are abortifacient in malarial fevers or in health.

In regard to the third and question arising: what is the evidence in regard to the action of quinine during labour? It seems that quinine in full doses—10 to 20 grains—is a stimulant to the uterine contractions during labour. The pains it produces so exactly resemble the natural ones as to indicate that they are not so much caused by a specific action of the drug as by its energizing the general nervous forces of the system. Be this as it may most of the leading accoucheurs of Philadelphia and of New York are accustomed to rely upon quinine in cases of uterine inertia from exhaustion. Hale White (Text Book of Pharmacology and Therapeutics) says: "The action of quinine on this organ (uterus) is uncertain. It often brings on labour pains in pregnancy but it equally
often fails and its value as an oxytocic agent is still debated. By some it is regarded as more valuable than ergot by others as practically useless.

There can be little doubt that in certain persons and under certain conditions quinine has a decided action in almost any stage of pregnancy. This has been proved by numerous observations. In malaria, for example, it has been shown that in certain cases labour pains invariably come on after the administration of quinine, and not when this was not given. Towards full term the pains are more easily induced and labour is more readily completed. The pains are intermittent and like normal labour pains. They come on in from one to several hours after administration and apparently produce no ill effects. The women workers in quinine factories are said to frequently abort and become sterile and during malaria occurring in pregnancy, many physicians refuse
to administer quinine on account of its tendency to induce abortion. Experimentally there is also complete
evidence. Out of seven pregnant
animals to which quinine was given only three were delivered; four were not, and to one of these—a cat—
sufficient was given to produce death.

Various explanations of the deleterious action of quinine have been given, but into these it is unnecessary to
delve. What action it has is probably
upon the uterine muscular tissue itself, but there is some undetermined factor, not improbably a nervous one
which complicates the issue. Atkinson,
in an admirable summary of the subject
terms it an idiopathy. He also states
that there is some evidence that the
action is only exerted under large
dooses or in debilitated subjects.

In non-pregnant females menstruation is sometimes brought on by quinine. Metrorrhagia is also an
occasional symptome although,
when given after labour, by contracting the uterine, quinine often restores haemostasis."

Dr. Albert Smith (1875) in the Trans. Coll. Phys. Philad. page 183 says that from his careful study of forty-two cases, quinine has no power of itself to excite uterine contractions, but simply acts as a general stimulant, and promoter of vital energy, and functional activity. Cushny (Pharmacology and Therapeutics) says "There can be no doubt that contraction of the uterus producing abortion occasionally occurs after the use of quinine, but the proportion of cases in which this action is produced is too small to encourage the use of the drug as an abortifacient. The uterine movements are rather to be looked upon as comparatively rare effects of quinine due to some peculiarity in the Constitution of a small proportion of women treated with it."

Murrell (Pharmacology and Therapeutics)...
says, "It is oft said that quinine is an emollient and is capable of producing abortion. I must have given it hundreds of times, in fairly large doses, to pregnant women suffering from neuralgic and I have never known it exert an action on the uterus."

Sir T. Chandler Brunton in his "Actions of medicines" says, "It has been stated that large doses of quinine cause the pregnant uterus to contract and so to produce abortion. There are many pregnant women who suffer from ague, and the question will be almost sure to come before you. "Am I to give this woman quinine to stop the fever, or shall I run the risk of bringing on abortion by giving it and get myself into hot water thereby?" The way one generally manages to get out of it is to try other drugs in place of quinine. For example, stop the rise of temperature by antipyre or by phenacetin and give arsenic or some of the other
antiperiodics; but if the woman is
really suffering very much from
the ague, I think the risk from quinine
is much less than from the ague. You
do not give very large doses of
quinine unless the patient is very
bad indeed, and likely to die from
the ague, and then she had better
run the risk of abortion than die
of ague, because it is only in very
bad cases of pernicious malaria that
such large doses of quinine are
required as would be likely to
bring on premature labour or
abortion."

Saladin (Manual of Midwifery)
says "That among the drugs most
efficacious in decelerating uterine
contraction and so leading to
abortion are Brucet and quinine
in large doses (10 grains or more)
Such then are the rather conflicting
opinions which I have been able to
 glean from the leading writers on
this subject. In Furnivall's opinion
quinine possesses no power at all
as an emetic and he does not say whether he believes it to have any stimulant or power on the uterine muscle.

Prof. Wood disregards entirely any eclamptic action of quinine but recognizes that it will greatly increase the power of contractions of the uterus, should labour have begun, and this appears to be the opinion held by Dr. Albert Smith of the same city.

Cushing on the other hand states that it does possess the power of initiating uterine contractions, but that this power is, in all cases, so slight that it may be disregarded. Hale White seems to consider the eclamptic action of quinine as considerable as also does Lander Brunton, but the latter would consider but its action as of secondary importance in the treatment of malaria during pregnancy.

Falabi if he is to be considered an authority on these matters, evidently
is of opinion that its action as an Echollic is considerable. My personal experience leads me to the opinion that quinine is not an Echollic. This is I believe the general opinion held also by practitioners in the tropics, but undoubtedly, every now and then, one does meet a case where it would appear to have some Echollic power.

In support of my opinion that it is not an Echollic I'll quote the following case. Mrs. G., a healthy married woman, age 21, had her last period on the 23rd of 1903, missed January, when she noticed morning sickness. Her last child is 9 months old and she did not wish another "just yet." She was told by a lady friend to take quinine which would be sure to bring her courses on. She took 10 grains thrice daily for two days and the next two days she took 20 grains night and morning with 10 grains at mid-day making 50 grains per day. This being of no
avail she took 20 grains three daily, and kept this up for three days, when she became so ill that she was frightened, and had to desist from taking any more. Thus in 7 days this good woman consumed the enormous quantity of 340 grains of quinine, and surely had the drug possessed any debilitative action it should have manifested itself in her case. The pregnancy continued, however, and she was confined at term.

I have other cases in my notes where quinine was tried, but in none of them was the dosing so enormous as in this one.

The following is a case where large doses of quinine did on one occasion empty the uterine but on another occasion it proved of no avail. Mr. X. P. called me to attend her for uterine hemorrhage. She told me that she had on three successive nights taken 30 grains of quinine to bring on her courses as she was a fortnight over her time. The case
Eventually proved to be one of abortion. On another occasion the same lady took four doses of 30 grains and the only effect it had was to make her so ill that she got fright
ed and decided from taking any more. This pregnancy went to full term.

The following are notes on an authentic case where a woman did, on two occasions, procure abortion by large doses of quinine. MRS. A young married woman with two children came to me stating that she had missed her period, and was sick in the morning and was "afraid" she was pregnant. I was of the opinion that she was pregnant, although she was very thin and "anemic." The second period, had she not been pregnant, was due three days after I had seen her at my rooms, and seven days after I had seen her, I was called to attend her same abortion. Shortly after recovery she confided to me that she had
taking a "desert-spoonful" dose of sulphate of Quinine, and that that was what had brought on the abortion. Four months later I attended the same woman for the same condition, brought on by the same drug.

This case would help to bear out Atkinson's opinion that it is only "under large doses and in debilitated subjects" that its Ecbolic action comes in to play. (Atkinson is quoted by the writer.)

Then again one of my patients tells me she is not afraid of becoming pregnant as, if she misses her period, she has simply to take 30 grains of Quinine and the period is sure to come on.

Quinine taken in large doses in the early stages of pregnancy, say up to about the 3rd or 4th month, does in some few cases produce an Ecbolic action, and empty the utero of its contents. After this period its action, in this respect, gets much weaker and after the 6th or 7th month I
believe its action to be almost nil,
in producing uterine action sufficient
to empty the uterus. This it may be
noted is contrary to what Hale
white states viz that “Towards full
term the pains are more easily induced.”
The reason why the drug is so fre-
quently tried in the tropics is the fact
that it forms part of the household
dispensary of every family in hot
climates and also it is extremely harm-
less. As even with very large doses, the
worst that happens is vomiting,
giddiness and fainting accompanied
with ringing in the ears and deafness.
The belief in its Debolic action exists
amongst the Chinese as well as the
European women and they (the Chinese)
are always very adverse to taking it
while “carrying.”
Why quinine should produce
Debolic action in a few women in the
Early stages of pregnancy, and once,
in one case and jails at another time
in the same case, is very difficult to
explanation. The assumption is
that as two pregnancies vary in their essential symptoms, such as vomiting, there is probably an additional element present in one case and not in another and, that, that helps the delusive action of Quinine. At present it seems impossible to say what that additional element may be. It probably is a general relaxed condition of the whole system in which the uterus participates. The analogy may be taken from cases in which a slight accident such as a fall or slip on the stairs will produce abortion in one woman but have no effect what ever in another person.

That the only scientific treatment of malaria during pregnancy is the judicious administration of Quinine. This statement I hold to be good for malarial fever occurring during pregnancy whether it be during the 1st month or during the 9th month. I have never seen any untoward result from the judicious administration of Quinine during pregnancy.
In support of the above statements I will cite the following series of cases.

Case 7, Mrs. E. aged 32 married 2½ months pregnant, was, in August 1907, confined to bed with an attack of Dengue Fever which ran its usual course, as shown in the following chart.

While convalescing from the Dengue, her temperature went up, with a chill to 103° F. and I suspected malaria as she was living in a house which had a "feverish" reputation. Examination of the blood revealed the malariac parasite. Quinine was ordered, but she positively refused to take it, as she said she would abort if she took quinine, and as it was her first pregnancy she was exceedingly anxious to carry to term.

The temperature went up again the following day so I removed her to a hospital situated 1200 feet above the sea level. For two days following the removal, the temperature kept down, but returned on the third day. On the evening of
Third day she was given a hypo-
chonine by Simeone Hillyer, chlorate
of gold. She thought this was morphia
and, as she was very restless, she
slept very well on the night
following the injection. The injections
were continued on the three follow-
ing nights and the fever subsided.
She recovered completely and was
confined in February 1902 of a
healthy child.

The chart is interesting as showing the
typical character of the temperature in
Dengue Fever viz. two days continued
fever, two days free from fever and again
two day fever followed by crisis.
The second part of the chart shows
the regular intermittent temperature of malarial fever, absence of fever for two days after the patient was removed from the unhealthy locality, and again occurrence of the same character in the temperature, followed by recovery, under the use of quinine.

Case II Lena Fincher, aged 27, married, admitted to hospital for fever. Patient lives in a new "German" part of the town, and has had many attacks of fever. She has been ill with fever for the past week, and for the past two days she has had persistent vomiting. Says she is three months pregnant.

Blood examined and malignant tertian parasites found - Ring forms.

Lena Fincher. Malaria - Tertian - + Pregnant.

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Dosage: Quinine 5 gr. four hourly. Calomel 1/4 gr.
As will be seen by the chart, she was kept on Quinine Granules every four hours for three days, and after that three daily for three days. She was dismissed after a week's residence in hospital, the temperature having been normal for four days. She returned to hospital in June 1902, and was confined of a healthy child, and passed through an uneventful puerperium.

Case III. A lady, residing in hospital to look after her sick baby, complained of feeling cold, and had a distinct rigidity of the thermometer registering 103.8°C. Examination of the blood revealed the malarial parasites. She says she is
four months pregnant. Quinine, grains ½,
hourly was given with the
result as seen in the accompanying
chart.

Case IV. Mrs. Mui, age 27, married,
was admitted to hospital October 22nd
1902 suffering from fever. Says she has
had fever every other day for the past
seven days, and severe pains in the bones.
States she is five months pregnant and is
still suckling a child three years old.

Examination of the blood reveals the
malarial parasite.

She was put on Quinine ½ grain hourly
for the first four days and after that
thrice daily for three days. She was
discharged after 9 days residence in
hospital, quite recovered from the attack. 
In February 11th 1903 she was admitted to the maternity, and was confined of a healthy male child. Labour was precipitate, and there was some postpartum haemorrhage which was easily checked. She was given saline stomach four times a day for the first four days, and passed through her puerperium without any rise of temperature.

Case of Mabel Mason, art. 26, unmarried, was admitted to hospital vice 23rd 1903.

She had a fall about 10 days ago, and has suffered from severe pain in the right side of the abdomen, since the fall. Fever began six days ago, and she has been unable to retain any good for a week. Has had no sleep for a week. Say she is 6 months pregnant, and that for the past 3 days she has had a vaginal discharge. Yesterday flushed with blood.

Has had several attacks of fever before.
Examination for vaginismus was made and the os found quite patulous except admitting the finger. Vaginal discharge
Of a dirty yellow colour.

Blood examined — crescents and malignant tertian parasites found.

| Melba Mason: Malignant Malaria + Pernicious Anæmia |
|---|---|---|---|---|---|---|
| 24 | 26 | 28 | 26 | 27 | 28 |
| 7 | 8 | 9 | 10 | 11 | 12 |

In admission she was immediately put on Quinine 0.05 grm. four hourly, and kept on that for three days. The vaginal discharge disappeared, and she was discharged from hospital at the end of a week cured of the attack. On the 15/3/03 Mrs Mason was confined in hospital of a healthy male child, and there was no fever following the confinement, the reason probably being because she was put on Quinine 0.05 four times daily for the three days following it. This custom of giving Quinine for a few days following...
parturition is very common, as will appear in the latter part of this paper.

Case 17. Mrs. Thomas, aged 27, married, no children, called me to see her during November 1902 for an attack of fever. She suspected to be confined in December, at Zigan. She tells me that she has aborted three times owing to a malarial fever. I cannot much for this, but the woman has lived upcountry a great deal, and she is very pale and anemic.

When I saw her she was sweating freely, so I ordered a diaphoretic mixture, and told her to take Cinchona Grains to Every Four Hours.

Next day the temperature went up to 103° F. and she told me she had not taken the quinine as she was afraid it would bring on labour. She blamed the quinine for her three abortions. I gave her a hypodermic of the Biphloridatum 50 with Morphine Hydro Gys. This was repeated on the three following
days. She recovered from the attack and was confined of a healthy child on Dec. 23rd 1902.

This I have given a series of cases from 3/2 to 8 months, all of which have been treated with Quinine and all with good results.

It will be easy to gather from a perusal of the foregoing cases what my treatment of malarial during pregnancy is.

The method of administration of the drug seems to me to call for a short discussion.

Formerly I used to give all my patients who suffered from malaria, Quinine by the month, but of late my practice has inclined more to the hypodermic method, more especially in private. The reasons for this are that firstly you always are quite certain that the patient has got the Quinine and secondly the dose can be regulated exactly and it is so easy to add a little Thorpophin if there be much vomiting and fretfulness.

Quinine is "put up" in many different
forms but there can be no doubt that none of the pill or tablet forms are nearly so efficacious as the solution. It is not necessary to give such large doses, whengiven in solution, as when given either in the pill or powder form. Of all the methods of administration probably the "popular" sugar-coated pill or Tabloid is the worst. These I have seen passed in the stools quite undissolved, in cases where there was diarrhea. The ordinary non-coated Tabloid is fairly good, and probably the casket or powder are better. There is no doubt, however, but that the best method of administering Quinine by the mouth is in solution.

Quinine, administered by the mouth, has with many people, a great tendency to cause vomiting, and, during pregnancy, severe and constant vomiting is often an anxious condition. The hypodermic method of administration obviates this tendency, and should vomiting, due to the fever, be present, as it often is, it may be easily controlled by the addition
Of a little morphia to the injection. My method for hypodermic administration is as follows: Put 3 to 5 grains of morphine hydrochlorate in a clean teaspoon, and if necessary add 1/8 to 1/6 of a morphine hydrochlorate, and add about 15 cm. water, and dissolve by heating over the gas or other flame. The solution is then boiled for a minute, and is thus rendered fairly sterile. The solution is allowed to cool, and it will now fill a 20 cm. hypodermic syringe. The skin having been cleansed the injection is made, either in the gluteal, deltoid, or subcutaneous region. The solution can be dissolved in much less water, say 8-10 cm., but I think the patient will complain more of subsequent pain if a minimum of water be used. This I attribute to the acid nature of the solution. Care must be taken not to inject the solution into the muscle, otherwise a painful condition results, which will take weeks to be recovered from. The ideal place to inject the solution is in to the fascia covering
the muscle. It is necessary to go fairly deep so that injury to the skin may be avoided. Of course all care should be exercised to see that the syringe is quite clean. The small lump which results from the injection must be carefully rubbed away, and, if necessary, a little oil may be used to facilitate the rubbing. I place great importance on this rubbing, which should be continued quietly and gently for about five minutes. It may, at the time, seem to be an unnecessary waste of time but that I am certain, it prevents necrosis in many cases.

Prophylactic treatment of malaria during pregnancy is much the same as that in the non-pregnant state. I daily prefer the small regular dose of quinine to one large dose administered once or twice a week. Thus I have found the administration of 2 grains once daily during the fever season sufficient to prevent the appearance of malaria in patients who, I knew, were subject to regular attacks. This method still
adopt, and I can safely say it is not in any way prejudicial to the nutrition of the foetus nor does it interfere with the proper action of the uterus at term.

To sum up this part of my paper there is absolutely no doubt but that the one and only treatment of malarial fever during pregnancy is, par excellence, the treatment with Quinine. In the early stages of pregnancy there is possibly a small risk in the use of the drug but if prudently used, and perhaps if combined with morphia the risk is reduced to a minimum in comparison with the risk of continuance of the fever. This latter, if it continues will, sooner or later, prove fatal to the foetus and possibly endanger the life of the mother. Under the administration of Quinine, if an abortion does occur, it is very easy to condemn the drug, but I venture to say not so easy to prove effectually what part the Quinine has taken in this untoward result, and what part the fever itself. In the later stages of pregnancy, say
after the 7th month, the use of
Quinine, in further medicinal doses
for malaria, is quite unattended
with any risk of premature labour
To stay your hand and temporize
with other drugs is to let the fever
slowly but surely poison and kill
the foetus.

Absolute rest in bed is essential in
the treatment of all cases, whether in
Early, or late pregnancy, with malaria

The occurrence of malarial fever during
the puerperium, and its treatment.

Plagge in his System of Midwifery
refers to this as "Parérgo- malarial
fever." He says "There is a peculiar
form of febrile disturbance which
sometimes occurs in the puerperal state,
and which is apt to be confounded
with septicaemia, to which attention
has been especially directed by Dr. J.
Barkley under the term of "Parérgo-
malarial fever." It is especially apt to
be met with in women who have been
exposed to malarial poison during
their former lives, the occurrence of the
fever being probably determined by the purpural state. Diagnosis is not easy (He was writing in 187) Barker insists on the fact that 'purpura-malarial fever generally commences after the 5th day after delivery, while septicaemia almost always does so before that time. In malarial fever moreover the intermissions are much more marked, while there are frequently recurring chills or rigors which is not the case in septicaemia.'

Salaline (Manual of Midwifery) says: 'Latent malarial infection may become active during pregnancy. This is more likely to happen in the purpural state, at which time fever ascribed to malaria is relatively more common in malarial districts. At this time also the character of the fever is modified; instead of being intermittent it becomes remittent, and the paroxysms become irregular.'

The reason why the malarial parasite becomes active at this time is, no doubt, due to the lowering of the general body resistance caused by the secretion of
labour. It seems analogous to the fever which follows an accident or an operation in a fever-susceptible and Schachke advises that quinine should be administered to persons who have had malaria, previous to an operation or on their being wounded.

It is so extremely common to find a malarial fever following confinement in tropical regions, that it is a safe rule to keep parurient women on quinine for 3 or 4 days following the confinement. According to Dr. Albert Smith, "it also diminishes the lochial flow, whereas in former labours, the change being remarked by the patients themselves, and consequently lessens the severity of the after pains."

Dr. Maclean Selson of the London Mission Hospital in Hong Kong, who has had very large experience among the poor native community, informs me that he has never had a case of post-partum haemorrhage, and this he attributes, in great part, to the regular administration of quinine during the puerperium.
This statement is supported by Dr. Smith (quoted by Playfair) who says - "women that had flowed in former labours escaping entirely there not having been an instance of post-partum haemorrhage in the 42 cases under his observation."

The occurrence of malarial fever during the puerperium I will illustrate by a few cases, some from hospital patients, and some from my private practice.

Mrs. J. was confined on the 23/5/03.

On the 25th the temperature rose to 100.8°F, and on the 27th it rose to 102.0°F.

Examination of the blood on the 27th revealed the simple Tertian parasite. She was put on Quinine 8.4; four hourly, with the
Result as per accompanying chart.

Case II: Mrs. J.R. admitted to hospital for expected confinement. Was confined on the 7th March 1902. Labour normal.

The day following parturition the temperature rose to 104°F. Examination of the blood revealed the simple tertian parasite, giving grains to four hourly with result as per Chart.

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<th>March 7</th>
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This case, as well as the two following, show that the usual time limit of 5 days of Dr. Forteyl Barker, cannot be depended on for diagnosis. Of course, even Dr. Barker made this observation the diagnosis of malaria has been made easy by the examination.
of the blood for the malarial parasite which should be done in all cases.

Case IV. The following chart is rather a formidable looking temperature during the fever period but it yielded perfectly to Quinine four hourly.

Examination of Blood on the 21st revealed the malarial parasite. Result shown on the chart.
Examination of the Blood on the 30th showed the malarial parasite. She was put on Quinine four hourly with the result shown in the chart.

The following chart shows that the fever may be delayed for a few days.

The malarial parasite was found in the Blood on the 14th and she was put on Quinine $0.1$ grains $v$ four hourly with satisfactory results.

These charts have been chosen from cases where the labour was normal and uncomplicated. They serve to show how common malarial fever is during the puerperium.

In attending native women it is as well...
to give Quinine, in every case, for the
first few days following parturition.
This practice is the one adopted by my
friend Dr. Maclean Gibson of the
London Mission, and with, he assures
me, the best possible results.
In the case of European women it is
not necessary unless they have had
malaria previously, but there is no
doubt that, in them, it is beneficial by
preventing excessive loss of blood, an
element, which, once lost, by Europeans
in tropical countries is exceedingly
difficult to regenerate.
The conclusions I draw from my
study of this subject are
Firstly - As a general rule, a strong
healthy woman will not abort from
an acute attack of malarial fever
during pregnancy.
Secondly - Quinine is not an debility.
The exceptions to this rule are too rare
to give the drug any blame to be so
called.
Thirdly - The regular use of Quinine
for malarial fever during pregnancy
is not only wise but absolutely essential. That probably it is good treatment, in tropical regions, to administer quinine, in every case, for the first 3 or 4 days following parturition.

Extracts in this paper have been made from the following books:
- Saladin - Manual of Midwifery
- Wood & E. - Pharmacology Therapeutics
- Hale White - Pharmacology Therapeutics
- Payzant - System of Midwifery
- Albert Smith - Trans Coll. Phy. Phila. 1875
- Cushing - Pharmacology Therapeutics
- Purcell - Pharmacology Therapeutics
- Rander Branton - "Actions Of Medicines"
- Schulte - "Diseases Of Tropical Countries"