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" The Treatment and Prognosis of Syphilis  
in Pregnancy."

by

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Ardmore,  
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## " The Treatment and Prognosis of Syphilis in Pregnancy."

This thesis is devoted to the problem of the therapy and prognosis of syphilis in the pregnant woman. The work was carried out in the maternity wards of the North Evington Infirmary, Leicester; unless otherwise stated, the cases were under my personal care. Many other cases of syphilis in non-pregnant women, under treatment, were used as controls.

A sample of blood from all pregnant women admitted is subjected to a Wassermann Test by W.W. Mackarell, M.D. of the Leicester Royal Infirmary, and it is on the assumption that a positive result indicates syphilitic infection, either active or latent, that the following notes are based. No reliance is placed in a negative personal history as it has been found in practice that the patient's statements are worthless, either because she will not admit to syphilis, or, more commonly, because she has noticed no symptoms of that disease. All the cases belonged to the lower working class, many of them being factory girls.

Immediately the case is diagnosed as syphilitic, active treatment is commenced and continued, if necessary, up to the day of confinement.

Each case will be considered separately.

It is my purpose to maintain in this thesis

1. That pregnancy is no contra indication to the carrying out of active anti syphilitic treatment up to term.
2. That full doses of salvarsan substitute may be given for this purpose, without risk to the mother or foetus in utero.
3. That, under such treatment, there is a very great improvement in the mother's condition.
4. That the infant is apparently healthy at birth.
5. That albuminuria per se is not a contra-indication to treatment.

## Prevalence.

In a series of 112 consecutive cases of pregnant women admitted to the North Evington Infirmary during the last two years, 18 or 16% gave a positive result, and it is almost certain that several of the cases with negative sera were late latent cases of syphilis.

16% is very high when compared with the statistics of other cities or clinics, but this can be readily explained by the class of woman admitted.

1. Browning and Mackenzie have collected and published the following list:-

American negroes :- 16.29% positive.

Johns Hopkins Hospital :- 2.48% positive.

Glasgow Maternity Hospital:- 9% positive.

Woman's Hospital, Melbourne :- 7% positive.

During the last twenty years great advances have been made in syphilology; the Spirochaeta Pallida was isolated in 1905 by Schaudinn and Hoffmann ; Wassermann and his co-workers introduced the Wassermann test in 1906 and Ehrlich invented Salvarsan in 1909. Naturally, the publication of these new methods stimulated a great interest in the pathology and treatment of syphilis. The new test shed light on the aetiology of many other diseases and demonstrated their specific origin.

Though syphilis has been rampant in Europe for four centuries, the methods of diagnosis and prognosis were unsatisfactory and certainly not based on scientific principles. The " Wait and See " policy held sway, and valuable time was lost in the institution of treatment.

Mercury was always recognised as the drug par excellence in the therapy, and, though salvarsan and the substitutes provide an easy method of treatment, most workers still give some form of mercury to complete the cure.

Though much has been done to solve the problems

of "syphilization," we have still many obstacles to overcome before the disease can be finally subjugated and thrust into the background to keep company with jail fever and other horrors of the past. The greatest obstacle at the moment is public prejudice. The mere name "Syphilis" suggests to the lay mind something obscene and terrible, and the disgrace attached to the contracting of this disease often prevents the sufferer from seeking advice.

Happily for the next generation, the War brought syphilis into prominence and there are signs that the public is beginning to forget this feeling of repulsion. The special clinics and the anti natal work will doubtless control the disease to a great extent, and, when we consider its prevalence and its crippling influence, we realize that almost any financial expenditure is justifiable in an attempt to wipe out the scourge.

The general practitioner has an all powerful influence to help in this work. When he is engaged for a confinement he should be able to obtain a sample of the blood for a Wassermann

Test, just as he would obtain a specimen of the urine. There is absolutely no reason why the blood test should be neglected at this period, as there is no doubt that, if this simple procedure were carried out in all pregnant women, many unsuspected cases of syphilis would be found and many infant lives saved.

In the cases under consideration, it is the future generation we hope to benefit most. The cure in the mother is a matter of difficulty and doubt, the spirochaetes having gained a firm hold on the tissues.

By commencing anti syphilitic treatment during pregnancy we aim to cure the mother, to prevent congenital syphilis in the child, and to cause no interference or inconvenience to the otherwise normal pregnancy.

The routine management of the cases in this hospital will be described in the thesis.



Diagnosis.( in the mother.)

The positive serum Wassermann result was held to be diagnostic of syphilis in the cases under consideration. In certain tropical diseases the serum may give a positive reaction in the absence of syphilis, and, according to some authorities, the mere influence of pregnancy alone may cause the result to appear positive. In this country, the assumption that a positive serum only occurs in syphilis is probably correct, especially when the patient belongs to the prostitute class.

<sup>1</sup> Horgan states that a positive serum Wassermann indicates that the case has, or has had, syphilis, and that, " In untreated cases of the latent period, it is positive in the great majority, and in this lies the great value of the method, as by clinical observations alone many such cases could never be discovered as carriers of the disease. If a systematic series of serum Wassermann examinations be made, it is astonishing how many complete positive results can be found in people who have neither clinical signs of syphilis nor any history of a local sore. "

Does the serum of a non-syphilitic pregnant woman tend to give a positive reaction?

3 " Stuhmer and Dreyer have observed that the blood ( taken from a vein of the arm ) in several of their series of parturient women reacted positively to the Wassermann test; but afterwards the mothers and children reacted negatively, and the infants showed no signs of disease. These observers conclude that there is a tendency for the blood of parturient non syphilitic women to react positively ( Steinert and Flusser and Esch and Wieloch <sup>also</sup> have come to a similar conclusion); evidence as to the absence of syphilis in these cases is, however, by no means conclusive, and observations on a much larger scale and accompanied by greater detail as to the criteria of the tests are required before it can be accepted that pregnancy per se can cause a woman's blood to react positively."

It is surprising that many patients, considered to be syphilitic from the blood test, should enjoy perfect health, with negative histories, but control tests, in my experience, have always supported the original Wassermann result, even where the diagnosis was extremely doubtful. It has

been necessary to consider the significance of the positive result at some length as so many of my cases were apparently healthy.

Conclusions:- A positive serum Wassermann result in pregnancy indicates the presence of syphilis, either active or latent, and the patient should receive antisyphilitic treatment.

## Diagnosis in the Infant.

The well-known signs of congenital syphilis usually appear soon after birth though sometimes they do not show themselves until puberty or even later. Unfortunately, the negative serum Wassermann result is of no diagnostic value.

4 G. Ahman records seven cases of active congenital syphilis giving negative Wassermann results.

From this I conclude that, though the serum of a child born of a syphilitic mother be negative, we have no proof that the child is free from disease, and, moreover, though the serum of the mother is rendered negative by treatment during the later months of pregnancy, the child must still be considered as a potential congenital syphilitic, though the stigmata of that disease are absent at birth and the first few months of extra uterine life.

In treating any general disease occurring in pregnancy, there are certain important points which have to be considered and which may limit the selection of the drugs or modify the dose.

1. Pregnancy places a strain on the heart, and, what is more important, on the kidneys, so there is a risk of disturbing the renal function.
2. There is the risk of inducing abortion or premature labour.
3. There is the risk of aggravating any minor complication of pregnancy which may be present, i.e. Albuminuria and nervous vomiting.
4. The risk that the drugs will injure the foetus in utero.

The above dangers are more apparent than real but still they demand some thought.

It is interesting that the exhibition of quinine to pregnant women suffering from malaria does not tend to set up uterine contraction.

The barrier action of the placenta will be referred to later as it is of importance.

### Treatment.

It is unnecessary to go into the various views of the relative values of the remedies at our disposal, as it is generally admitted that the combined treatment is the best, i.e. a salvarsan substitute, mercury and the iodides. Bismuth is attracting some attention just now but has not been used in this infirmary.

The salvarsan substitute used in most cases was Nov Arseno Billon; the administration is easy and the toxicity low. It is an active spirillicide and the results which have followed its exhibition in a series of non pregnant cases have been good. The drug is best given by the intravenous route as this method is painless and is theoretically more likely to approach the *Therapia Sterilisans Magna* of Ehrlich. The intramuscular route is chosen where the veins of the arm are small or deep. The end results are good but the method is liable to give rise to local pain and difficulty in walking for a day or two.

Galyl was used in this hospital at one time but I have had no experience of it. According to the records, the immediate results were disappointing but the late results were more satis-

-factory, the serum slowly becoming negative and remaining negative. I am informed by the Medical Superintendent, that one infant, whose mother was syphilitic and treated with galyl, won a prize at a " Baby-show! "

The results from the case sheets show that only 36 % of Wassermann positive sera were rendered negative by treatment with galyl and mercury. This does not compare favourably with the results obtained from Nov Arseno Billon and mercury.

14

## General preparation of the patient for the Combined Treatment.

The necessity for careful preparation of the patient for combined treatment is well known and needs no emphasis. Most surgeons advise that all carious teeth should be extracted and the mouth rendered as healthy as possible, and, while this is desirable, it will be found in practice that many patients object to dental treatment, with the result that we have to administer mercury to cases with mouths full of decayed teeth and often with pyorrhoea alveolaris. The daily use of the tooth brush and a simple mouth wash will help to prevent the gingivitis which is sometimes a source of annoyance.

On the day prior to injection, the bowels are moved with a laxative or simple enema. The urine is tested for sugar and protein and the quantity passed in 24 hours noted. The patient is weighed. The next morning the breakfast is given as usual and the Nov Arseno Billon is injected about three hours later. If there has been any tendency to vomit, the patient is given one ounce of glucose half an hour before treatment.



After treatment the temperature is taken four hourly, and the skin is carefully inspected for a rash. If headache follows, this is an indication that there has been a lack of care in the preparation of the case: less commonly it indicates overdosage.

#### Technique of injection.

The dose of Nov Arseno Billon is dissolved in about 10 c.c. of cold sterile distilled water and drawn up, through a filter, into a 20 c.c. serum syringe. Enough water is then drawn up to fill the syringe completely. The skin of the arm is cleaned and the veins rendered prominent in the usual way. A suitable needle is now pushed into a vein until the blood flows freely, indicating that the needle is in the proper position and that there is no danger of the solution going into the subcutaneous tissue. The nozzle of the syringe is now connected to the needle and the solution is slowly injected. The needle is then withdrawn with a jerk and pressure is at once put on the puncture by a pad and bandage. If the solution is being injected into the tissues, indicated by the formation of a lump and complaint of pain, it should be immediately squeezed out, and the injection given in the veins of the other arm.

By this method it is easy to make certain that no solution reaches the subcutaneous tissue and that no air is injected into the veins. The batch number of the ampule should be noted for reference if the injection is followed by untoward symptoms.

Intra muscular route.

The method recommended by Anwyll-Davies<sup>5</sup> is used. The dose of Nov Arseno Billon is dissolved in about 20 minims of a special solution.

R	
Glucose	49
Guaiacol	1
Water.	50

Solution is easy but the result is rather thick and it is necessary to use a powerful syringe. The injection is given deeply into the gluteal muscles and the site is massaged for five minutes to diffuse the solution in the tissues.

This method usually gives rise to some local pain and it is not to be recommended in pregnancy. There is also a tendency for the solution to become encapsulated and to form a local abscess. The patients usually strongly object to intramuscular injections but never

find fault with the intravenous method.

### Mercury.

Mercury has been given in various preparations for the last four hundred years in the treatment of syphilis and no excuse is necessary for its exhibition in pregnant cases.

6. Gennerich would withhold mercury from pregnant women as it is apt to interfere with kidney function.

The drug was administered three times a day with potassium iodide in this well-known mixture.

R

Liq. Hydrarg. Perchlor.

Potassium Iodid.

Aq. Chloroformi

ad

3i  
gr. x  
3ss.

It is well to begin with half doses for the first week as this mixture may cause vomiting though this is rare. The mixture was given for three months in some cases and no ill effects were noticed.

Potassium iodide is given in the above mixture forming the yellow iodide of mercury. Osborne states  
7 " The large doses once used in tertiary and secondary syphilis are inexcusable, most of the iodide was never absorbed but passed out of the

body in the feces." He considers that" the iodides prevent sclerosis by activating the thyreoid gland, by circulating iodine in the blood and, perhaps, by causing deposited mercury to become soluble and recirculate in the system."

Excretion of the drugs.

§ Nov Arseno Billon is excreted by the kidneys, probably as a salt of arsenic.

§ Mercury is excreted in the faeces and in the saliva, and in small quantities in the urine. It may accumulate in the kidneys.

§ Potassium iodide is excreted by the kidneys and in the saliva.

The above points are important as the kidneys are overworked during pregnancy and albuminuria is common. Obviously, the exhibition of any drug which will give the kidneys more work to do is rather risky. Many of my cases, pregnant and otherwise, had albumen in the urine while under treatment and showed no signs of interference with the normal renal function. <sup>9</sup> Maclean states that albuminuria is common and not always a sign of disease.

I have often given salvarsan substitute to cases with albuminuria and casts and never found any

aggravation of the symptoms.

#### Dosage of Nov Arseno Billon.

When a positive case comes under observation in the later months of pregnancy it is advisable to give the maximum treatment compatible with safety. There may be only a few weeks left before the confinement in which to get the mother and foetus under the influence of the therapy, and even a few doses of salvarsan substitute may produce a good effect in the child though the mother will receive little benefit. The authorities agree that the dose should be comparatively small for a woman whether pregnant or not, and there appears to be little doubt that small amounts of Nov Arseno Billon will give favourable results.

10 Browning and Mackenzie give the weekly dose as the equivalent of 0.30 gm. of salvarsan.

11 Harrison also gives the dose as 0.30 gm of

" 606 "

Thus, according to those authorities, 0.45 gm. of Nov Arseno Billon would be the correct dose.

The above doses appear to me to be inadequate

to produce the best result in the foetus and it has been my custom to work up to .0.90gm of Nov Arseno Billon if there is time before the confinement. The solution must reach the foetus in very small amounts, and, by giving massive doses, I hope to sterilize the foetus thoroughly.

There may be an element of danger in this method but I have only noticed symptoms of overdosage in one case. I have also given these large doses in a series of non pregnant cases without trouble and with distinct advantage to the patient.

Should treatment be given during the ninth month of pregnancy?

//  
Harrison states that it is inadvisable to approach the end of pregnancy nearer than the 7th. month on account of the risk of postpartum haemorrhage.

12 J. Adams thinks " Syphilitic women can be treated with salvarsan substitute even up to the day of their confinement with safety and advantage."

10 Mackenzie has it that " The treatment can be continued with safety during the whole course of pregnancy up till the eighth month."

There is some diversity of opinion on this point, but the reason why treatment should be stopped in the eighth month is not quite clear. Many cases are not seen until the last few weeks of pregnancy and evidently certain workers would withhold treatment, thus giving the infant no chance of sterilization. Provided the foetus is living, I maintain that it is right to take the theoretical risks by giving active treatment, and I think my results will uphold this contention.

### Treatment of the Infant.

Though the child is apparently healthy at birth treatment should be given with a view of completing the course commenced in utero.

As a routine , inunction with unguentum hydrargyri, B.P., was found satisfactory, and interfered but little with the general management of the case. A small piece of the ointment, the size of a pea, is rubbed into the abdominal wall for ten minutes daily, and a flannel binder is then put on.

The child is carefully watched for signs of overdosage, i.e. diarrhoea, vomiting or salivation. The treatment is commenced on the sixth day and carried out for thirty days.

Nothing abnormal was noticed in the cases under this treatment. The infants were breast fed when possible: if there was insufficient milk they were given Allenbury's No.1 food with fruit juice.

A rapid gain in weight was the rule.



Management of the case during pregnancy and the  
puerperium.

In addition to, and because of, the administration of anti-syphilitic remedies general measures are of very great importance. Suitable exercise must be taken daily, house work and walking keep up the tone of the muscles and help to maintain a normal metabolism. A woman who has been in bed during the latter months of pregnancy nearly always has a uterus which is easily tired out in labour, thus increasing the risk of postpartum haemorrhage. The bowels should be opened daily and the urine tested at least twice weekly. The food should be plentiful and an extra amount of carbohydrate given to help to prevent toxic symptoms from the salvarsan substitute.

I have found that it is of the utmost importance to get rid of any leucorrhoea before the confinement, as syphilitic cases are very apt to be difficult in the puerperium, and even a very slight infection of the genital tract, which would cause no symptoms in a healthy woman, may induce puerperal sapraemia or even septicaemia. In my experience, "puerperal fever" is much commoner in syphilitic than normal women.

Leucorrhoea can be treated with hot vaginal douches of sterile normal saline at a temperature of 110° F. given twice daily, the second being followed by the insertion of a contramine pessary. Douching in the ninth month is liable to bring on labour so that care is necessary.

For a week after the confinement it is advisable to give the mother the following mixture thrice daily to keep the uterine muscle contracted.

R

Ext. Ergot. Liq.	3i
Tr. Nux Vom.	℥iv
Ac. Hydrochlor. dil	℥x
Aq. Menth. Pip	ad 3℥.

No risks whatever can be taken with a specific case at labour. Full aseptic precautions are absolutely essential if there is to be a normal puerperium.

During the puerperium, great care is necessary. The vaginal douche should be employed the moment the lochia becomes even slightly offensive. If offensive blood clots are expelled it is well to give a daily intrauterine douche: Biniodide of Mercury, 1-8,000, at 115°.F. is suitable and soon effects a cure.

Subinvolution and uterine displacements are rather common in syphilis so that the return of the

uterus to normal should be carefully watched and abnormalities treated as soon as they arise.

Perineal tears require special care and should be sutured at once. Slow healing is the rule in these cases.

Each case will now be described separately and in some detail.

Greenberg:- An unmarried Jewish domestic servant, age 17, was admitted in the eighth month of pregnancy.

She was a primipara and denied syphilis but had a yellow vaginal discharge for the last two months. Otherwise she has always been healthy.

The general condition was fair but there was evidence of malnutrition. The heart, lungs and nervous system showed nothing important.

The vaginal discharge was found to be due to an acute gonococcal infection of the urethra and cervix uteri. This cleared up under suitable treatment.

The urine, obtained by catheter, was normal.

The serum Wassermann was strongly positive.

The mercury mixture was given for three months and Nov Arseno Billon as follows:-

12/12/23	0.30 gm	
	0.30 gm	
	0.45 gm	
	0.60 gm	
	0.60 gm.	
	0.75 gm.	
30/1/24	0.75 gm	
31/1/24	Confinement.	
13/2/24	0.90 gm.	Total=5.25 gm

21/2/24 Mother was Wassermann negative.

Labour was normal; there was no postpartum haemorrhage and the placenta was healthy.

The puerperium was uneventful.

The infant weighed 8 lbs. 4 oz. and showed no signs of congenital syphilis. Ritual circumcision was performed on the seventh day. The child did not recover but died of cellulitis of the scrotum and buttocks on the 21st. day of life.

This woman received large doses of salvarsan substitute right up to the day before labour without exhibiting any signs of discomfort or of overdosage. She improved steadily and gained weight. The effect of the arsenic on the skin was noticeable; it became soft and velvety.

The child appeared to escape infection though the mother probably suffered from recent syphilis.

This case proves the great value of the therapy.

Jinks: Age 26 years; domestic servant. The first admission was in 4/1/22, in the seventh month of pregnancy.

This was the fourth pregnancy. The first two terminated before term, the infants being still born but the last child is living and well ( ? )

According to the hospital reports she was apparently healthy and showed no signs of syphilis.

The serum Wassermann was strongly positive.

She was treated by C.L.Somerville with galyl, 4.00 gm. being administered before the confinement. The Wassermann result on discharge was still strongly positive but the infant showed no signs of congenital syphilis. I had this child under my care in October, 1924, and she showed no stigmata and was particularly well nourished and healthy looking.

The mother was admitted to my wards again on 19/11/23, five months pregnant and suffering from mild influenza.

She had been fairly well since the last confinement but for the previous week had severe headache with general malaise and coryza. She denied syphilis at any period; she never had a primary sore or rash but had a " septic "

throat twice in 1919. The influenza cleared up in a few days.

The general condition was fair : the heart was normal and the lungs were clear. The liver and other abdominal viscera were normal. The skin was dry and rough but there were no suspicious scars. The mucous membranes were clear. The knee jerks and Achilles tendon reflexes were absent. Sensation was intact and the pupils were normal in reaction; equal and regular. There was no muscular tremor and Romberg's sign was negative. The gait was normal. Renal function was normal throughout her stay in hospital.

The serum Wassermann was strongly positive.

She was given the mercury mixture for sixteen

weeks, and intravenous Nov Arseno Billon weekly:-

19/12/23	0.30 gm
	0.60 gm
	0.60 gm
	0.60 gm
	0.75 gm
	0.90 gm
	0.90 gm
	0.90 gm
20/2/24	0.90 gm.

Total = 6.45 gm.

28/3/24 Wassermann positive.

24/4/24 Confinement.

30.4.24 0.30 gm. Stabilarisan.( Boot's )

7.5.24 0.45 gm. "

14.5.24 Refused treatment.

The serum Wassermann was negative a month after.

The labour was normal; there was no post-partum haemorrhage and the puerperium was uneventful. The infant weighed 6 lb. 5 oz. at birth and showed no signs of syphilis. Treatment by inunction was instituted on the sixth day. The child was readmitted seven months later, with acute broncho pneumonia. He died, and at the post mortem, I was unable to find any signs of syphilis.

There is no doubt that this woman was syphilitic. and the effect of the combined therapy was very noticeable. The skin became smooth, white and glossy, and the patient put on weight.

The administration of large doses of Nov Arseno Billon caused no trouble and the case never exhibited any signs of overdosage and there was no complaint of headache. The renal function was not interfered with; the urine was normal throughout. This case helps to prove that pregnancy is not a contra indication to very active anti syphilitic therapy.



Barnsley: Married. Age 37 years, admitted on the 15/7/24, in the seventh month of pregnancy.

This was the fifth pregnancy; the other children are living and well. Her husband stated that, for the last six months she had been dull and stupid, taking no interest in her surroundings. He could give no history of syphilis and the patient did not appear to understand the questions.

The general condition was fair. The chest was normal: no scars were found on the legs and the mucous membranes were clear. The skin was dry and the scalp hair was thin and falling out.

Nervous system :- The knee jerks and Achilles tendon reflexes had disappeared. Babinski's sign was negative and the abdominal reflex could not be elicited as pregnancy interfered. The tendon reflexes of the arm were normal ( ? ) and there was no loss of sensation or of muscular power.

The pupils were equal and regular; the reaction to light was very sluggish but present. There was no myosis or ptosis but there was a slight squint which had only appeared three months before admission. The retinae were normal. Tremor of the tongue was marked but there was no tremor of the lips. The speech was decidedly slurring.

Romberg's sign was positive and the gait ataxic.

Mental Condition :- She was stupid, dull and confused. She exhibited no illusions, delusions or hallucinations. The memory was impaired and she had difficulty in answering questions. She was lazy, took little interest in her surroundings and, after the confinement, could not be trusted to look after or feed the child. She was never noisy or maniacal.

The serum Wassermann was strongly positive.

The mercury mixture was given for three months without causing discomfort and Nov Arseno Billon intravenously as follows.

15/8/24	0.45 gm
	0.45 gm
	0.60 gm
	0.90 gm
	0.90 gm
	0.90 gm
	0.90 gm
	0.90 gm
1/10/24	0.90 gm. Total = 6.9 gm.
31/10/24	Confinement.

Renal function was normal throughout.

Labour was normal; there was no postpartum haemorrhage and the placenta was healthy.

The infant weighed 6 lbs 14 oz. and showed no signs of congenital syphilis. He received a course of mercurial inunction.

On the 28/10/24 the mother was still Wassermann positive: the mental condition was slightly worse and the nervous system showed no improvement. The pupils still reacted to light and the reflexes showed no change. This was only to be expected as she was suffering from syphilis of the nervous system, and improvement under treatment is not usual.

The large doses of salvarsan substitute given in this case are noticeable, and they did not give rise to any signs of overdosage and caused no inconvenience whatever. Possibly smaller doses would have produced as good an effect in the infant but the large doses did no harm.

This case proves that large doses of Nov Arseno Billon can be given with impunity to pregnant women.

I had intended to try intramuscular injections of a foreign protein ( milk ) in this case, but, luckily, the patient refused further treatment. I tried this therapy in a similar non pregnant case but the result was disastrous and the method appears to me to be dangerous in syphilis at least, though I have used it in rheumatoid arthritis without trouble but also without benefit.

Orme: A married woman, aged 27 years, was admitted on 17/6/24; diagnosed " Vomiting of Pregnancy."

She has been pregnant three times before but never went on to full time ; labour taking place at the seventh month in each case. Last confinement was two years ago. The infants were all still born. She contracted syphilis nine years ago, with rash and throat trouble but she did not have treatment until 1922 when she had a course of 25 " injections into the arm ". She did not know what drug was used but said it was " yellow stuff." She has never been strong but has had no other serious illness. She thought she was five weeks pregnant on admission. For the past week she has vomited several times a day and the cause assigned was " bad icecream."

She was a small, delicate-looking woman: heart, lungs and abdominal viscera were normal. The knee jerks were absent but the pupils were normal. The urine contained a cloud of albumen. The serum Wassermann was ? negative, five doses of complement partially deviated.

A provocative dose of 0.15 gm. N.A.B. was

given and the Wassermann result on the 26/8/24 was positive ( + + + )

She has had two courses of the mercury mixture; for four months in all, and Nov Arseno Billon as follows:-

3/9/24	0.45 gm
	0.45 gm
17/9/24	0.45 gm.

Refused treatment until

29/10/24	0.75 gm
	0.75 gm
	0.90 gm
	0.90 gm
	0.90 gm
	0.90 gm
10/12/24	0.90 gm

Total = 7.35 gm.

On the 6/1/25 the Wassermann was positive ( + + )

For the first five months in hospital the patient vomited stomach contents nearly every morning but the intravenous treatment did not seem to aggravate the condition and the mercury mixture was well tolerated. It was a neurosis and a test breakfast revealed no abnormality of the gastric function. The albuminuria disappeared after two months and did not recur.

At the date of writing ( 1/2/25 ) the foetal heart sounds were quite distinct and the mother felt foetal movements.

Though the serum is still positive there is a vast improvement in the general health, a great deal is due to good feeding and to hospital routine, but the therapy must have helped to a great extent.. Though the patient was small and weakly the large doses caused no headache or signs of arsenical poisoning. The therapy did not appear to be responsible for the vomiting and it certainly did not make it worse.

As the foetus in utero is still alive it will probably show no signs of congenital syphilis at birth.

Among other things, this case demonstrates the value of the " Provocative " dose in doubtful cases.

Odell, an unmarried domestic servant, aged 25, was admitted to hospital on the 23/4/23, in the seventh month of pregnancy.

There was one previous pregnancy and the child is living and well. She denied syphilis and never had any serious illness. There was an impetiginous lesion on the upper lip; this cleared up with the application of starch poultices and an antiseptic ointment.

The general condition was good; heart, lungs and nervous system were normal but there was a slight degree of anaemia. There were no scars on the mucous membranes or skin and she showed no stigmata of degeneration.

There was a trace of albumen in the urine and a few hyaline casts but the quantity passed was normal.

The serum Wassermann was positive.

The routine mercury mixture was given for three months and Nov Arseno Billon, thus:-

2/5/23	0.15 gm	Neokarsivan.
	0.45 gm	"
	0.45 gm	"
	0.45 gm	Nov Arseno Billon.
	0.45 gm	"
	0.45 gm	"
	0.45 gm	"
27/6/23	0.45 gm	"
Total =	3.30 gm.	

4/7/23 Confinement.

11/7/23 Wassermann negative( mother's )

1/8/23 Mercury discontinued.

1/9/23 Mercury given for another month.

On the 29/11/23 a provocative dose of 0.30 gm. N.A.B. was given, and the Wassermann result on the 14/12/23 was again negative.

The labour was normal; there was no postpartum haemorrhage and the placenta was healthy.

During the first four days after labour the lochia was offensive and vaginal douching was found necessary.

The infant weighed 8 lbs. 4 oz. at birth and appeared to be very healthy. At the age of 28 weeks he weighed 17 lbs. 1 oz. and showed no signs of congenital syphilis. He received a course of inunction commencing on the sixth day. He died from broncho pneumonia in August, 1924 and showed no signs of syphilis at death.

During the period in which the mother was under treatment the urine contained a cloud of albumen and a few hyaline casts: the daily quantity was normal. She had no headache and there was no vomiting or oedema. Full diet, with a large amount of carbo hydrate was given: the appetite was good.



In this case only small doses of salvarsan substitute were given as there appeared to be some risk of causing a toxic nephritis as the kidneys were showing signs of stress. Other cases have shown that this precaution was unnecessary and that full doses would have been safe. This case demonstrates that albuminuria per se is not a contra indication to the administration of salvarsan substitute.

The result of the arsenic was apparent; the skin improved in texture *pari passu* with the general health.

The results following the small doses given in this case seem to indicate that a large amount of salvarsan substitute is not necessary to produce a good result in the foetus, but, as there is no criterion as to the permanency of the cure, it still appears to me to be wise to give the maximum treatment in the time at our disposal.

The therapy caused no inconvenience; the patient exhibited no signs of overdosage, and renal function had returned to normal by the day of discharge.

Casson:- A married hawker, aged 24 years, was admitted on the 29/9/24 in the seventh month pregnancy.

This was the fourth pregnancy. The first terminated at six months; the second and third at full time but the infants were still-born but apparently not macerated. She strongly denied syphilis but admitted to having "throat trouble" frequently. She never noticed a primary sore or rash. For the last year she has been troubled with intermittent frontal headaches.

The patient was poorly nourished and sallow with malar flush. The heart was normal as were the lungs except for a few crepitations confined to the right apex. There was no cough or sputum and the crepitations had disappeared by the date of discharge. The nervous system was normal; the skin and mucous membranes were clear but the hair on the scalp was thin and brittle.

There was a profuse vaginal discharge which contained the B. Coli Communis but no gonococci. This cleared up on appropriate treatment.

There was a slight albuminuria, but no tube casts were found and the quantity of urine passed was normal.

There were no stigmata of degeneration present, but the patient was below the average intelligence.

The serum Wassermann was positive. ( + + + )

The mercury mixture was given for three months and

Nov Arseno Billon intravenously as follows :-

1/10/24	0.45 gm
	0.60 gm
	0.60 gm
	0.60 gm
	0.90 gm
	0.90 gm
	0.90 gm
19/11/24	0.90 gm

Total = 5.85 gm

2/12/24 Confinement.

The labour was normal and there was no postpartum haemorrhage. The placenta was large and greasy and presented several foci of degeneration.

The child weighed 8 lbs. 6 oz. at birth and was apparently healthy. There were no signs of congenital syphilis. The mother's milk was deficient in quantity and alternate feeds of Allenbury's No.1 food with orange juice were given. Mercurial inunction was instituted on the sixth day of life. Eighteen days later the infant only weighed 7 lbs. 5 oz. but was otherwise normal.

The mother's serum was positive after treatment,  
( + + )

Blood from the umbilical cord at birth was found

to be positive ( + + ) but blood from the child at the age of 14 days was negative.

During the first few days of the puerperium the lochia was offensive and douching was necessary.

The mother felt well after the treatment but the headache still continued intermittently. during her stay in hospital. There was a slight albuminuria all the time but no casts were found. A week after the last dose of Nov Arseno Billon the patient developed a scarlatiniform rash all over the body, most marked on the face and chest. There was some oedema of the eyelids but no ascites or oedema of the legs. The amount of albumen was unaltered and the quantity of urine passed was normal. The symptoms cleared up in a fortnight after one injection of Intramine. At this time she had no discomfort or headache but was kept in bed for a week and the mercury mixture was discontinued . There is no doubt that the rash was due to the arsenic, but, at no time, did the patient's general condition give rise to anxiety.

The infant at birth showed no signs of arsenical poisoning. ( See page 60 . )

This case shows that the Wassermann result of blood, taken from the umbilical cord at birth, is no guide to the reaction of the infant's blood taken

a few days after birth. This agrees with the findings of Browning and Mackenzie.

It was disappointing to find that the large doses of salvarsan substitute caused some signs of overdosage in this case, but I do not think that this should modify our views on the real efficacy of the therapy. The infant escaped all signs of arsenical poisoning, and this proves that Nov Arseno Billon can have no adverse influence on the foetus in utero.

Jackson:- A married factory worker, aged 22, was admitted to hospital on 4/1/21 in labour.

She denied syphilis. This was the third pregnancy, the first two ending by craniotomy, there being marked pelvic contraction.

According to her case sheets, Caesarian section was performed and a live, healthy child was obtained. This child is still alive and shows no signs of congenital syphilis.

The Wassermann result was strongly positive, and, after recovery from the operation, she received 8.00 gm. of galyd in two courses over a period of seven months, combined with mercury and iodide of potassium. When she left hospital on the 31/8/21, the serum Wassermann was strongly positive.  
 .....

The woman was readmitted to my wards on the 12/11/24 in the eighth month of pregnancy.

She had been fairly well since the last confinement but never strong. She denied syphilis at any time and had never noticed a primary sore or rash. She was subject to attacks of " sore throat "

The general condition was only fair but no signs of previous disease could be made out. There was very marked contraction of the bony pelvis.

The serum Wassermann was returned +  $\pm$  .

She received two doses of Nov Arseno Billon  
as follows:-

26/11/24	0.30 gm.
3/12/24	0.45 gm.

Caesarian section was performed on the 16/12/24  
and a live male child was obtained. The mother  
made an uninterrupted recovery.

6/1/25 The sera of both mother and child were  
Wassermann negative.

The infant, who was full time, weighed 7 lbs. but  
three weeks later only weighed 6 lbs 8 oz. He was  
slightly jaundiced on the second day but exhibited  
no signs of congenital syphilis.

In this case, we have a serum slowly becoming  
negative after 8.00 gm of galy. The treatment  
given at the second admission was in the nature of  
a provocative dose, and cannot be credited with  
having prevented congenital syphilis.

Bray: An unmarried charwoman, aged 31, was admitted on the 27/8/23 under a diagnosis of " threatened labour." She was seven months pregnant.

This was the second pregnancy, the first child is living and well. She denied syphilis and never noticed a primary sore, rash or sore throat. For the previous week she had a few pains in the back and lower abdomen which resembled labour pains. There had been a discharge of blood from the vagina for two days.

The patient was stout and well-nourished; physical examination revealed nothing of interest.

The foetal head was not fixed at the brim, but the os uteri easily admitted the tip of one finger and the placenta was not in the lower segment. A slight discharge of blood coming through the os was seen through a speculum.

The serum Wassermann was strongly positive.

Mercury was given in the routine mixture and Nov Arseno Billon, intravenously, thus:-

6/9/23	0.60 gm
	0.60 gm
	0.90 gm

On the 25/9/23 the patient was discharged



" against advice " to have her confinement at home. The foetal heart sounds were distinctly audible and the woman felt " life."

The kidney function was normal and the therapy gave rise to no symptoms.

In this case we were dealing with threatened labour and it was manifestly dangerous to give a combination of drugs which might stimulate the uterine contractions and thus aggravate matters.

The pains and haemorrhage ceased three days after admission and did not recur, though large doses of Nov Arseno Billon were exhibited. This helps to prove that the combined treatment does not tend to cause abortion, even in a patient whose symptoms indicate some deviation from the normal course of pregnancy. The large doses, without any preliminary " working-up " are noticeable.

Hollingworth :- An unmarried factory worker, aged 29, was admitted on the 19/1/24, in the ninth month of pregnancy.

She was a primipara and was always strong and healthy. She denied syphilis and gave a negative history.

The general condition was very good: nothing abnormal was found in the chest or nervous system. The skin and mucous membranes showed no signs of previous disease but the palate was highly arched. There was a cloud of albumen in the urine but no tube casts, and the quantity was normal.

The serum Wassermann was strongly positive.

She was given a course of the routine mercury mixture and Nov Arseno Billon, thus:-

30/1/24	0.30 gm.
	0.45 gm
8/2/24	Confinement.
12/3/24	0.45 gm
	0.60 gm
	0.60 gm
	0.90 gm
	0.90 gm
	0.90 gm

Total = 5.70 gm.

13/5/24. The mother's serum Wassermann was negative.

Blood from the umbilical cord gave a negative result but the infant received the usual treatment.

There was no inertia of the uterus but there was a copious post partum haemorrhage and the placenta was retained. It was removed manually, with full aseptic precautions but the patient developed a mild sapraemia necessitating the use of the vaginal douche. She made a rapid and complete recovery. The placenta was large and greasy and showed several patches of sclerosis.

The infant weighed 7 lbs. 2 oz. at birth, and showed no signs of congenital syphilis. At ten weeks of age he weighed 12 lbs 1 oz. and was apparently strong and healthy.

This case presents several peculiar points. The mother's Wassermann was strongly positive, and, by the confinement, she had only received 0.75 gm. of N.A.B. so we would have expected the umbilical blood to give a strongly positive reaction. It is too much to presume that that amount of treatment effected a cure in the mother, and, though the child showed no signs of disease at the age of three months, we cannot be sure that he escaped infection. It is,

of course, possible that the foetus in utero was never syphilized : against this is the fact that the placenta was very unhealthy though it is not certain that it was syphilitic.

While under treatment, a small amount of albumen was constantly present in the urine but the therapy caused no interference with the kidney function.

The small amount of Nov Arseno Billon given before the confinement could hardly be responsible for the post partum haemorrhage; it was probably due to the unhealthy condition of the placenta.

The correctness of the first Wassermann result may be questioned in view of the fact that the patient was apparently quite healthy. As she was little better than a prostitute, there can be no doubt that it revealed the true state of her general condition.

Liggins:- An unmarried factory worker, age 27, was admitted on the 3/5/23, full time pregnant.

She had two previous pregnancies, the children are alive and healthy. She denied syphilis and has had no serious illnesses.

The general condition was very good; there was nothing of pathologic interest to be made out. The kidney function was normal throughout.

The serum Wassermann was strongly positive.

Nov Arseno Billon was given as follows:-

9/5/23	0.15 gm	Neokarsivan.
	0.45 gm.	"
	0.45 gm.	Nov Arseno Billon.

1/6/24      Confinement.

Labour was normal. The infant weighed 9 lbs. 12 oz. and showed no signs of congenital syphilis. Three days after birth the child developed a slight conjunctivitis which cleared up under treatment. Mercurial inunction was instituted on the sixth day.

The puerperium was uneventful and the mother made a good recovery: further treatment was refused and both patients were discharged on the 16/6/24.

The child was readmitted on the 8/4/24, with a history of chest trouble. She was found to be suffering from acute bronchitis and marasmus. The stools were liquid and green and there was difficulty in getting the child to take sufficient nourishment. There were no signs of congenital syphilis; the skin was clear and the abdominal viscera normal. The Wassermann test was not made. On the 11/5/24 the weight was only 11 lbs. 6 oz. and the child was discharged " against advice " after receiving one course of mercurial inunction.

In this case the child of a syphilitic mother weighed 9 lbs. 12 oz. at birth, but, at the age of eleven months only weighed 11lbs. 6 oz. The slow gain may have been due to the general illness but chest conditions do not usually cause such a slow gain as this. It is more likely that the child is syphilitic, though there is no proof.

The point of interest in this case is the apparent health at birth followed by marasmus.

**Tidmas:** A factory worker, age 25 years, unmarried, admitted to hospital on the 7/5/24 in the seventh month of pregnancy.

She had two previous pregnancies and the children are living and well.

She has had no serious illnesses but has had a slight cough for some months past.

The general condition is poor, she was ill nourished anaemic and the skin was rough.

The heart was slightly enlarged to the right. Apex beat normal in position and the mitral sounds were clear. There was a very distinct double aortic bruit. The lungs showed moderately far advanced chronic caseous phthisis and the tubercle bacillus was found in the sputum. The nervous system was normal as was the kidney function. The mucous membranes showed no signs of previous disease. The palate was arched, and the ears were small without lobes

The serum Wassermann was strongly positive.

Mercury was given and Nov Arseno Billon thus:-

21/5/24	0.30 gm.
27/5/24	Confinement.
4/6/24	0.45 gm.
	0.45 gm
	0.60 gm.
18/6/24	Treatment refused.

Labour was normal, twins, male and female, were born. The boy weighed 4lb. 10 oz. and was apparently healthy. The girl weighed 5 lb. 6oz. and showed the following abnormalities:-

Right hand: Only two fingers fused together.

Right foot: Three webbed toes and a separate great toe.

Left foot: Four toes webbed in pairs and a separate great toe.

Otherwise the girl was healthy.

Blood taken from the umbilical cord gave a negative reaction.

The female infant was readmitted to hospital on the 6/11/24, under a diagnosis of acute bronchitis. The chest condition cleared up in a few days but the child showed marked marasmus, and weighed only 7 lbs.

12/12/24	Wassermann result negative.
12/12/24	Von Pirquet's test negative.

No diagnostic signs of disease were present but I consider this child to suffer from congenital syphilis and treat her accordingly with marked improvement.

This case is included as it shows that umbilical and infant blood may give misleading negative Wassermann results.



Welch:- An unmarried factory worker, age 21, was admitted on the 18/7/23 in the last month of pregnancy.

The patient, a primipara, gave a negative history and never had any serious illness. Nothing of pathologic interest could be made out on a complete physical examination: the woman looked well and the kidney function was normal.

The Wassermann result was strongly positive.

She received the routine mercury mixture and Nov Arseno Billon as follows:-

21/7/23	0.45 gm	
	0.45 gm	
	0.45 gm	
	0.45 gm	
21/8/23	Confinement.	
29/8/23	0.45 gm	
	0.45 gm	
	0.6 gm	
	0.9 gm	
	0.9 gm.	Total= 5.1 gm.

The labour was normal, the puerperium uneventful and recovery complete.

The serum Wassermann on 6/10/23 was negative.

The infant at birth weighed 7 lbs. 4 oz. and was apparently healthy. The gain in weight was slow.

This case shows a strongly positive Wassermann result in a healthy woman with a negative history.

The next two cases are parallel and will be considered together.

Both women, who gave strongly positive serum Wassermann results with negative histories, were admitted in labour. The general health was excellent and no signs of syphilis were made out. Treatment was refused.

The infants at birth appeared to be quite healthy and each weighed 7 lbs. 8 oz.

The apparent health of the infants at birth leads me to believe that the anti syphilitic therapy in pregnancy may get credit for results in the foetus which it did not produce.

## The Problem of the Foetal Circulation.

In the interpretation of the results of therapy in pregnancy on the foetus, the consideration of the problem presented by the relationship between the foetal and maternal blood streams is of interest. It is well known that the two bloods do not mix but are separated by four membranes or layers of cells, i.e. the syncytium, Langhan's Layer, the mesoblastic core and the walls of the foetal capillaries. It is stated in text books on Midwifery<sup>13</sup> that the " barrier action " of the placenta, prevents the transmission of chemicals, unless highly diffusible, from the maternal blood to the foetal circulation. The process of transmission is evidently no mere osmosis, but is supposed to be a vital selection on the part of the syncytium.

If these theories be true, the following points require elucidation.

If the antisyphilitic drugs administered to the mother do not reach the foetus at all or only in minute dilution, how can we account for the fact that such treatment can prevent syphilis in the offspring, the spirochaetes presumably being

in the foetal tissue long before the institution of the therapy?

If the salvarsan substitute reaches the foetus in marked dilution, is it not more likely to cause a stimulation of the spirochaetes rather than their death ?

If we cannot prove that the drugs reach the foetus, how can we state that the infant is healthy at birth though signs of disease are absent ?

If the salvarsan substitute and mercury reaches the foetus in appreciable amounts, they must tend to accumulate in the foetal tissues, unless the placenta excretes them back to the maternal blood, and, if there is a cumulative action, there would be a risk of foetal death. It will be noticed that many of my cases received large doses of Nov Arseno Billon without accident, so this risk is apparently non-existent.

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On the other hand, Professor McIlroy states that, after the administration of ether or morphine and scopolamine during labour, the infant is often born anaesthetised. The same authority considers that one can stimulate the failing foetal heart by the administration of strychnine and strophanthus, evidently by giving those drugs to the mother.

There is, however, another very important, though not so well-known, pathway by which substances in the maternal blood can get to the foetal circulation, and I think it is by this route that the antisyphilitic drugs reach the foetus. The amnion can transmit chemicals to the liquor amnii where they are held in solution. The foetus is bathed in this fluid, and the foetal skin, which has well marked powers of absorption, can absorb these drugs into the blood stream.

- <sup>15</sup> Ley states that potassium iodide, if given, can be found in the liquor amnii but not in the foetal kidneys, and he also states, " Further, Polano and others demonstrated the secretive activity of the amnion by injecting pregnant animals with pyroll blue. These observers found the amniotic fluid, the amniotic epithelium, the skin of the foetus and the intestinal tract of the foetus was stained blue, whereas the tissues and the renal and bladder epithelia were not pigmented."

It is certain, then, that certain drugs can reach the foetus, though, of necessity, in minute dilution relative to the amount administered to the mother, for, if morphia, which is extremely toxic

to the foetus, was allowed to enter the foetal circulation in doses comparable with the dose given to the mother, there is absolutely no doubt that foetal death would follow. We know that this does not happen and opium is often administered in pregnancy. In the case of Casson ( page 42 ) it will be noticed that a woman with arsenical dermatitis gave birth to a child showing no signs of overdosage. This led me to think that the foetus received only infinitesimal amounts of the Nov Arseno Billon: an unsound conclusion, because the amount of arsenic is not always the essentially exciting factor in the production of arsenical poisoning, personal susceptibility is of greater moment when therapeutic doses are being exhibited.

This case induced me to make certain experiments, similar to those of Polano, to satisfy myself that salvarsan substitute and other drugs could reach the foetus in utero. This may seem to be quite unnecessary in the light of clinical findings but, as syphilis is a protean disease in which there are alternate periods of activity and quiescence, and as there is no test which will exclude that disease with certainty, it

would be satisfactory to know that the treatment is not in vain and that Nov Arseno Billon does get to the foetus in utero.

### Preliminary Experiments.

1. Four grains of methylene blue were given by mouth to a patient  $2\frac{1}{2}$  hours before the end of the second stage of labour. The infant passed blue urine eight hours after birth. This showed that some methylene blue was transmitted by the placenta as the liquor amnii had escaped before the administration of the drug.

2. A patient was given six grains of methylene blue twenty minutes before the birth of the infant. In this case the urine was not tinted.

3. A patient was given six grains of methylene blue three days before labour, and another six grains four hours before the end of the second stage. The liquor amnii was not coloured and the infant's urine showed no trace of blue.

4. A patient was given six grains of methylene blue at six days and three days before the

confinement and other six grains before the end of the second stage of labour. In this case the liquor amnii was coloured a very dark blue and the infant passed blue urine.

5. A patient was given two grains of methylene blue every morning for ten days before confinement. At labour, the liquor amnii was not coloured and the infant's urine was not blue.

From the above experiments it appears that the maternal tissues are not always able to transmit even methylene blue to the foetus. The drug was given in powder form in cachets and there is no doubt that the mothers absorbed the drug as their urine was always deeply coloured after administration.

As the above results were not satisfactory from any point of view I made another attempt with salvarsan substitute.



To find whether Nov Arseno Billon is transmitted to the foetus.

A healthy woman was given an intravenous injection of 0.30 gm. of N.A.B. 49 hours before labour and again, an injection of 0.45 gm. of N.A.B. 8 hours before the end of the second stage of labour.

At labour the following specimens were obtained:-

1. The chorion.
2. All the blood which could be squeezed out of the entire umbilical cord.
3. An uncontaminated sample of the liquor amni.

16 These specimens were tested for arsenic by Frank Young, of Leicester, with the following results.

" Arsenic is absent from the blood, or at least present in quantities less than 0.02 parts per million.

Arsenic is present in the Amniotic Liquor to the extent of 0.6 parts per million.

Arsenic is present in the Chorion to the extent of 1.2 parts per million.

Experiment has been made to show that the presence of IRON in the blood, etc. is not

sufficient to inhibit the detection of arsenic by the method adopted, by adding an additional quantity of arsenic to another portion of the blood, whereupon it is found that the required additional quantity of arsenic is recovered.

The figures given are calculated to  $\text{As}_2\text{O}_3$   
Arsenious Oxide.

The quantity of N.A.B. given within the last eight hours corresponds to about two parts per million, assuming it to be evenly distributed throughout the body.

The results indicate that even distribution is not obtained, and in consequence there must have been either a liberal excretion of it, or that some portions of the body must contain a considerable higher proportion than those found in the parts examined."

Though it is fallacious to make deductions from one observation alone, these results prove that when Nov Arseno Billon is administered to a pregnant woman some form of arsenic is found in the liquor amnii and chorion. It is not too much to assume that the foetus can absorb this arsenic which will then have a spirillicidal action in the foetal tissues, though, unfortunately

we do not know whether the arsenic is present in the form of an organic or inorganic salt. It is certain from this experiment and from clinical observation that salvarsan substitute can reach the foetus in quantities large enough to have a spirillicidal action. It is also likely that mercurial salts, especially the yellow iodide, can be transmitted via the amnion and fluid to the foetus. Of course, it would be necessary to perform a series of similar experiments to prove the above points.

<sup>16</sup> Frank Young thinks that the lecithin in the chorion and actively growing foetal tissues attracts the arsenic administered, combines with it throwing out phosphorus, thus forming an analogous arsenical compound.

### Summary.

Fourteen cases of syphilis in pregnancy have been reviewed and certain experiments described. Very large doses of Nov Arseno Billon and mercury were given to six cases. One only showed signs of poisoning but the infant escaped overdosage. In the other cases the drugs caused no deviation from the normal course of pregnancy. One case suffered from neurotic vomiting for some months and the treatment did not aggravate the condition. In four cases there was slight albuminuria but the therapy did not interfere with the renal function. After treatment the infants were born apparently healthy and the mothers showed marked improvement. One patient, with symptoms of premature labour, was given 2.10 gm. of N.A.B. without labour following. One labour was complicated by post-partum haemorrhage which was not due to the treatment. Two patients, with positive sera, gave birth to apparently healthy children. It has been noticed that the Wassermann reaction on umbilical and on infant blood is sometimes negative in the presence of syphilis.

## Conclusions.

- (1) A serum Wassermann test should be made on all pregnant women.
- (2) Pregnancy is not a contraindication to active anti syphilitic treatment.
- (3) Treatment should be commenced as soon as a positive diagnosis is made, and continued, if necessary, right up to the day of confinement.
- (4) Very large doses of Nov Arseno Billon and of mercury can be given with impunity in pregnancy.
- (5) The therapy does not cause abortion nor injury to the foetus.
- (6) The results in the mother and infant are very encouraging.
- (7) Drugs administered to the mother are probably transmitted by the amnion and liquor amni to the foetus.
- (8) The minor complications of pregnancy are not contra indications to treatment.
- (9) The negative serum Wassermann result on umbilical blood is valueless.
- (10) The blood in infancy tends to give a negative Wassermann result regardless of

the presence of syphilis.

(11) All children born of syphilitic parents should receive appropriate treatment.

(12) Though the infant is apparently healthy at birth there is no proof that he is free from syphilis.

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