Observations on the action of Cepaiva-balsam and the changes it undergoes in its passage through the system.

**Chemical Composition**

Cepaiva-balsam, as an oleoresin. (1) Stölze, who seems to have been the first to analyse it, gave its composition as follows:

- Aetherol oil: 38.00
- Yellow hard resin: 52.75
- Brown soft resin: 1.66
- Water and loss: 7.59

(2) Gerber gave a very similar analysis of the same, which analysis differs from that of Stölze, only in the different proportions of the same factors. According to (3) Bernatzik, Cepaiva-balsam consists of an aetherol oil and a resinous compound of unknown composition. This opinion is more or less held by many writers as for example by (4) Sachs and Dulh, (5) Rancet, (6) Vood, (7) Rothnagel, and Rosbach.

The oil was according to (8) Weikart first discovered by Hoffman. The cepaivinic acid spoken of by almost all writers was discovered in 1829 by (9) Schwatzer, and afterwards also found by (10) Rose and (11) Hesse.

**Physiological action**

(12) Mutschlerich made four experiments on rabbits with the oil of Cepaiva-balsam, and came to the conclusion...
that it increases the quantity of urine secreted.

(3) Weichert made two experiments, one with Copaiva-balcam and one with the oil upon himself. He found the resin in the urine again, but the oil he could not find, and came to the conclusion that the oil was organic in the body, and escaped as carbonic acid and water. This led him to conclude that the oil was inactive in a case of gonorrhoea, and that the Copaivic acid was the active part.

Bernatzik experimented on medical students and himself. He made one experiment with Copaiva oil on a student and one upon himself; two observations with the resin on two separate students and one observation with Copaiva-balsam on another. From these observations he was of the opinion that the Copaiva oil causes increased flow of urine, but that the Copaiva resin acts much more energetically on the genito-urinary organs. Moreover, he found that the resin could not be looked for in the urine before six hours had elapsed after taking it, and that no more resin is excreted thirty-six hours after the dose. The reason why Weichert did not find any Copaiva oil in the urine Bernatzik maintains was due to the too early examination of the urine. The flow of urine when the resin was given never went beyond the normal quantity, and as long as the resin was excreted there was a diminution. He found the Copaiva-balsam far more active than the Copaiva oil, and moreover, found the resin excreted, when Copaiva-balsam was given.
to be almost the same in amount as when the resin alone was given. He further maintains that the oil only moderates the active action of the resin, and that it is doubtful whether the resin alone has a better action than the Copra-vulvalum Therapeutic action.

(13) Alston says: "Copra-vulvalum is an antiseptic, direct and curative." (14) Fothergill does not deny Copra-vulvalum this antiseptic action, but thinks that it acts as a stimulant, and that it stimulates the parts to contract and this opinion is founded on his experience. By these two authors it is said to have been made use of in their time for consumption or Phthisis, internal ulcers & gonorrhoea. In 1782 (15) Theven said of Copra-vulvalum that it is the best medicine known for gonorrhoea, having been proved by thousands of cases. (16) Blandy thinks it acts by increasing the flow of urine in gonorrhoea.

(17) Toft is of the opinion that it acts by increasing the secretions from the mucous membranes of the genitourinary organs. (18) Sachs and Dulk think it an exciting tonic, increasing the secretions as well as the excretions of the mucous membranes when they are in a diseased state. Thus it also acts on the mucous membranes of the lungs and does not act only on the mucous membrane of the genitourinary organs. Mitscherlich maintains that it increases the flow of urine, and acts on the mucous membranes of the genitourinary organs.

(18) Sigmund says: it (Copra-vulvalum) would altogether seem to exert a powerful effect upon the mucous
membranes restoring their power of healthy action.

(19) Pereira considers the action of Copaivabalbasm to be on the mucous membranes of the genito urinary organs. It changes both the quantity and quality of the urine—the quantity being increased, and in quality, the urine gets a darker colour, and has a balsamic odour. Its action is moreover perceived by the feeling of warmth and prickling before and after micturition. Moreover, on the mucous membranes of the lungs, it acts as an irritant. In large doses it produces according to the same writer haematuria and dysuria. In addition Pereira states that it acts more as an aromatic than turpentine does.

(20) Seeber speaks of Copaivabalbasm as an excitant to the mucous membranes of the genito-urinary organs, and that it is made use of in Gonorrhea, Catarrh of the Bladder, Catarrh of the air-passages, Blindness, Etc., but does not think very highly of it.

(21) Kramer maintains that Copaivabalbasm diminishes the flow of urine, even bringing the urine secretion to a standstill, that it moreover causes burning and pain when used too early in gonorrhea, and also doubts its good effects. Sichart thinks that the Copaivabalbasm has no action at all, and that the action of Copaivabalbasm is due to the Copaivic acid present in the balsam. According to him, the Copaivic acid is absorbed.
by the blood, and combines them with the potash-
and soda present in the serum and forms
soluble salts. As compounds of these alkalies the
coparic acid is excreted by the urine. He further
explains the action of coparic acid by stating that the
coparic acid salts neither coagulate nor modify,
or combine with the proteinsubstances in any form,
but such as it were the neutral or acid fats by
a process of endosmosis and exosmosis from the pro-
cells and thus cause shrivelling up of the same,
and prevent their further growth, and this he main-
tains is the reason why coparic balsam is of
greater use later on in gonorrhoea, when the disease
has become chronic, and puscells have formed and
less set in the early acute stage.
Bernstein experimented and caused experiments to be
made for him on patients troubled with gon-
orrhoea. The different kinds of resin were tried on 31
patients, the coparic oil on 15, and the coparic-
Balsam on two and injections of urine obtained
from persons who had taken either the oil or
the coparic balsam were made. In 12 cases 60 cases
in all experimented on. He found that the coparic
oil was not inactive, but that it had not the
curative action that coparic balsam had in
gonorrhoea; that neither coparic balsam nor any
of its constituents had a specific action on
gonorrhoea; moreover he found it doubtful whether
the resin alone had a better action than the
the Coparivabalsam, but the Cepairiv acid and its salts he maintained are inactive. To explain the action of Cepairivabalsam when given internally thus: "it is carried to the diseased parts by the blood, and there stimulates the elastic fibres to contract, and by this contraction reduces the secretion of the mucous membranes of the part and changes moreover the quality of the secretion. Further by this contraction the parts take on a certain state of callosity and in this manner the young epithelial cells are fixed and form normal epithelium, and are prevented in their further growth. The relaxed state of the diseased part is thus changed and regains its former tone."

(22) Sir Henry Thompson considers it a good diuretic and is supported by (23) Wilkes and others in this opinion.

(24) Hasemann thinks most authors are of opinion that Copania oil is the active part, and building upon the experiments of others maintains that it increases the flow of urine.

(25) Kohler, after giving the various opinions of different observers, concludes that Copairiv acid and its compounds formed in the body have a curative action on the mucous membranes of the genital, urinary and pulmonary organs. The Copania oil is not inactive as much as it is converted into Copairiv acid in passing through the system. The
The copharvic acid modifies the secretion of the glands, at least those glands of the mucous membranes of the genitourinary system. Moreover, if the secretion be purulent, the copharvic acid salts act on the pus cells through endosmosis and exosmosis in such a manner as to change the form and contents of the cells and limit their further growth.

(26) Waldenburg and Simon think it a diuretic.

Frost is of opinion that clinical experience proves that Copharvicbalsam has a peculiar stimulative and alterative action on the mucous membranes of the genitourinary organs.

Kottwitz and Hessbach maintain that Copharvicbalsam increases the flow of urine, and acts locally as an antiseptic on the mucous membranes of the genitourinary apparatus.

Taking all these different opinions together, there remains great uncertainty about the action of the balsam. By some it has been, by others it is still made use of in Phthisis, Cystitis, bronchial, cataract, ulcerative processes, etc. Most writers agree in this that the drug is sometimes of use in gonorrhoea. Bernatzke thinks it is excreted by the skin and the mucous membranes of the genitourinary and pulmonary systems, so that we may take it for granted that whatever the action of Copharvicbalsam may be, and whatever factor or factors or products of the drug maybe
the active part, that the action will be manifest on the parts where it or they are excrated. In gonorrhoea Cepawabalsam has also been made use of as injections into the urethra, and according to (23) Dullas of Odessa, (28) Bates and others with distinct benefit and according to others without doing the slightest good.

The question therefore is: how does Cepawabalsam act in gonorrhoea? In the knowledge obtained from the literature on Cepawabalsam we find it applied to processes where we would expect antiseptics to work well, is it therefore possible that Cepawabalsam may act antiseptically? Keeping these questions in mind I commenced my experiments on the drug.

While working in the pharmacological laboratory of Strassburg, I got through the kindness of Professor Schmiedeberg permission to make use of his labor. I try in order to enable me to institute experiments on Cepawabalsam to enquire into the action of it in gonorrhoea, and the changes it undergoes through the system. In how far I succeeded in clearing up our knowledge on these points the following experiments will show.

I commenced by preparing specimens of urine, and mixing half the specimen with Cepawabalsam. This I thought would more or less correspond to the direct application of Cepawabalsam in gonorrhoea by means
of injections.
April 23rd. The urine of a dog was taken and filtered, and 8 specimens prepared, four of which were put aside without any addition of Coparabalcam; of the other four, one drop of Coparabalcam was added to one specimen, 2 drops of the same were added to a second, three to a third and four to a fourth, and each of these last four was then well shaken up. There was then noticeable a slight difference in colour in the specimens of urine mixed with Coparabalcam, as compared with the others prepared without any addition. Most of the Coparabalcam was soon again seen floating at the top, but there was evidence enough in the colour and opacity of the specimens to show that some Coparabalcam was held in solution or suspended. The specimens were then all left uncovered in the laboratory. Those put up without the drug were slightly opaque on April 27th. The Coparabalcam floating on the urine of the other specimens became green on May 1st, and on May 8th all the specimens, both those mixed with Coparabalcam and those to which none was added, were equally decomposed and foetid in smell. In those not mixed with Coparabalcam there was great opacity, a film, and marked streaks. It was difficult here to test the acidity and change into alkalinity of the specimens mixed with Coparabalcam, hence the reason of the nonappearance of such an important quality. Here I applied the Coparabalcam, as it were, externally, let us now look at the specimens of
of wine taken from man and animals where the Cepaea
sulcata was given internally. Before giving the denotations
of these specimens it is best to state that only positive
facts have been noted, and where no remarks are made
for several days, it is to be understood that there
were no noticeable changes. This was done to avoid
repetition. I will commence with the specimen of
rabbits' wine, next take those of human wine, and
conclude with dogs' wine.

Rabbits' wine specimens:

June 28th:
No. 1 is the urine of a rabbit fed on milk for the
previous ten days. The urine, which was part of the
collection of the previous 24 hours, was filtered, and its
properties were: acid, transparent, fresh, and no odor.
No. 2 is the urine of two other rabbits also fed on
milk during the previous ten days. Moreover these
two rabbits were given each two grams of Cepaea
sulcata (injected by catheter into the stomach) each
day for the previous two days. The urine of which
the specimen was taken was collected during the
previous 24 hours, was filtered and then had the fol-
lowing properties: alkaline, slight opacity, no odor.

At the time this specimen was prepared both rabbits
were already very ill and the one died a few hours after,
the other within 36 hours.

No. 1. July 1st: slight odor of decomposition, a slight film,
a slight deposit, marked streaks, moderately opaque.
alkaline, a very foul smell, a thick film, marked streaks, very opaque, a heavy deposit.

No. 2. July 1st: beautiful smell, a minute film, slight streaks, moderately opaque. July 1st: very much the same. July 11th: the same as on July 1st.

**Human Urine specimens.**

Let us now see what action Copava-balzam has when taken internally by a human being. As I was unable to get anyone on whom I could depend, I took the Copava-balzam myself.

I Series. June 22nd: I took one gram of Copava-balzam at 9.30 A.M. and prepared specimens. All the specimens were filtered and had the following properties: moderately acid, transparent, no odor.

No. 1. is the urine of my colleague passed at 9.30 A.M. 
No. 2. is my own urine passed at 9.30 A.M. and collected since 8 A.M.
No. 3. is my own urine passed at 3 P.M. and collected since 3 P.M.
No. 4. is my own urine passed at 7 P.M. and collected since 5 P.M.


No. 2. June 23rd: Slightly alkaline, slight odor of decomposition, slight opacity, a commencing deposit.
June 24th: moderately alkaline, a foul smell, slight streaks, moderate opacity, heavy deposit.
No. 3 corresponds to No. 1 in every respect.

June 24th: neutral, slight odor of decomposition, no streaks, a thin deposit. June 25th: it corresponds to No. 1.

II Series. June 26th. I took one gram of opoponax balsam at 7 P.M., June 27th another gram at 9.30 A.M. and a third one at 7 P.M.; and on June 28th one and a half grams at 10 A.M. The specimens were all filtered into clean glasses, and had the following properties unless otherwise stated:
moderately acid, transparent, no odor.

June 27th: No. 5 is the urine of my colleague, passed at 7 P.M.: slightly alkaline.
No. 6. is my own urine passed at 7 P.M. and collected since 3 P.M.
June 27th: No. 7. is my own urine passed at 8.30 A.M. and collected since 8 A.M.

No. 8. is my own urine passed at 3 P.M. and collected since 12 A.M.
No. 9. is the urine of my colleague, passed at 4 P.M. strongly alkaline.
No. 10. is my own urine passed at 7 P.M. and collected since 9 P.M.

June 29th: No. 11. is my own urine passed at 9.30 A.M. and collected since 8 A.M.

No. 5. June 28th: a slight streak on the side of the vessel.
June 29th: moderately alkaline, a slight odor of decomposition, slightly opaque, marked streaks, a commencing deposit.
July 1st: moderately alkaline, a foul smell, marked streaks, heavy deposit.

No. 6: June 29th: slightly alkaline and is No. 5. over again.
latter having kept a little better up to July 1st. No. 7: June 30th: minute streak, slight opaqueness, slight deposit. July 1st: slightly alkaline, doubtful smell, slightly opaque, slight streak, a heavy deposit. July 3rd: moderately alkaline, a slight film, quite opaque, a heavy deposit, slight streaks. This specimen was kept up to July 11th and no increase in decomposition could be noticed.

No. 8: June 29th: fine streaks, a commencing deposit. June 30th: also slightly opaque, a slight deposit. July 3rd: slightly alkaline, no odor, a minute film, a minute streak, slight opacity, commencing deposit, floating moulds. July 4th: moderately alkaline, doubtful smell, slightly opaque, slight film, slight streak, moderate deposit, floating moulds. This specimen I kept a few days longer and found no further change.


No. 10: June 30th: slightly alkaline, slightly opaque, slight deposit. July 1st: moderately alkaline, a foul smell, thick film, heavy deposit, very opaque, marked streaks.

No. 11: July 1st: a mere trace of opacity, a slight streak. July 3rd: slightly alkaline, no odor, heavy deposit, a slight streak. Further on it corresponded to No. 7 and was also kept up to July 11th without any noticeable increase in decomposition.
III Series July 3rd.

I took one gram of opoponax balsam at 9:30 A.M., a second gram at 12:45 P.M., a third at 3:15 P.M., and a fourth at 7 P.M. All the specimens were filtered, and had the following properties unless otherwise stated: moderately acid, transparent, no odor.

No. 12, is my own urine passed at 12:45 P.M. and collected since 12:45 P.M.
No. 13, is my own urine passed at 3:15 P.M. and collected since 12:45 P.M.
No. 14, is the urine of my colleague, passed at 4:30 P.M., very acid.
No. 15, is the urine of my colleague passed at 7 P.M., slightly alkaline.
No. 16, is my own urine passed at 7 P.M. and collected since 3:15 P.M.
No. 17, is my own urine passed at 10 P.M. and collected since 7 P.M.

July 4th.
No. 18, is my own urine passed at 9:30 A.M. and collected since 8 A.M.
No. 19, is the urine of my colleague passed at 10:45 A.M.
No. 20, is my own urine passed at 12:45 P.M. and collected since 9:30 A.M.
No. 21, is my own urine passed at 3:15 P.M. and collected since 12:45 P.M.
No. 22, is my own urine, passed at 7 P.M. and collected since 3:15 P.M., very slightly acid.
No. 23, is the urine of the servant of the laboratory, passed at 7 P.M., and very acid.

No. 12, July 5th: a slight streak, a commencing deposit July 6th: also slightly opaque, a minute film. July 9th: slightly alkaline, no odor, minute streak, minute film, a mere trace of opacity. July 12th: moderately alkaline, doubtful smell, a slight film, a slight streak, a sheaf deposit, a mere trace of opacity July 17th: only now the smell is foul.
No. 13, July 5th: commencing deposit. This specimen is C66.12
Repeated, except in this that it is more opaque.
No. 16. July 5th: a mere trace of opaqrity, a commencing deposit. July 8th: moderately alkaline, doubtful smell, great opacity, a slight film, a slight streak, a slight deposit. July 12th: also slight odor of decomposition. For a couple of days longer no change was noticed.
No. 17. is No. 16 repeated.
No. 21. July 8th: minute streak, commencing deposit, a trace of

July 22. July 26th: slightly alkaline, no odor. Further we may say it is No. 21. over again.


IV Series. July 12th: Took 2 grams of copaiba balsam at 7.45 A.M.

Two more at 10 A.M., another two at 12:45 P.M., and a fourth equally large dose at 3:30 P.M. Severe diarrhoea coming on prevented me to take two more doses as I intended. Since about noon on July 12th to 12 o'clock noon the following day I had watery stools. I suffered moreover during this time from severe headaches, lumbago, weakness, no appetite, and thirst, and these symptoms got so bad on July 12th towards the evening that I had to lie down at 7 P.M. from which I awoke the next day at 8 o'clock.

The specimens of urine in this series were all filtered, and had then the following properties unless otherwise noted: moderately acid, transparent, no odor.

No. 24. is my own urine passed at 10 A.M. and collected since 8 A.M.

No. 25. is my own urine passed at 12:45 P.M. and collected since 10 A.M.

No. 26. is the urine of my colleague passed at 3:15 P.M.

No. 27. is my own urine passed at 3:15 P.M. and collected since 12:45 P.M.

No. 28. is my own urine, passed at 5:30 P.M. and collected since 3:15 P.M.

No. 29. is the urine of my colleague passed at 7 P.M.
No. 30. is my own wine, passed at 7.30 P.M. and collected since 5.30 P.M.

No. 31. is my own wine, passed at 9.30 P.M. and collected since 7.20 P.M.

July 13th: No. 32. is my own wine, passed at 9.45 A.M. and collected since 8 A.M.

No. 33. is the wine of my colleague, passed at 10.30 A.M.: slightly acid.

No. 34. is my own wine passed at 12.45 P.M. and collected since 9.45 A.M.

No. 35. is my own wine passed at 4 P.M. and collected since 2 P.M.

No. 36. is the wine of my colleague, passed at 6 P.M., slightly alkaline.

No. 37. is my own wine, passed at 7 P.M. and collected since 4 P.M.

No. 38. and No. 39 were also prepared on this occasion, but as I neglected to note down to whom it belonged I will not include these two numbers.


July 17th: slightly alkaline, moderate opacity. This specimen became gradually worse, so that on July 20th I could note: moderate film, moderate streaks, moderate opacity, a slight deposit, a foul smell, which had been much obscured by the strong anise seed smell.

No. 27. July 17th: slightly opaque. July 15th: slightly alkaline,
slight odor of decomposition, a minute film, a slight streak, very opaque, no deposit. July 17th: alkaline, foul smell, marked streak, moderate film, moderate opacity, commencing deposit.


No. 29. July 15th: slightly alkaline, slight odor of decomposition, a marked film, a slight streak, very opaque, a commencing deposit. This specimen got so cold that I could not keep it longer than July 17th.


No. 31. Corresponds to No. 30. in every respect but there was no odor in this specimen on July 17th.


No. 33. July 15th: a minute opacity, minute film. July 17th: slightly alkaline, a foul smell mixed with a sweet one, a very thick film, a marked streak, moderate opacity, commencing deposit.

No. 34. July 15th: a minute film, a commencing deposit. July 17th: neutral, doubtful smell, slight streak, slight opacity, a floating
mouldy. July 18th: moderately alkaline, a foul smell, a thin film, great opaqueness, a slight deposit.
No. 35. July 13th: a slight deposit. July 17th: alkaline, a foul smell, a minute film, great opaqueness, heavy deposit.
No. 38. P.S. No. 39 specimens are to the specimens of my own urine passed at 10 P.M. in the evening and at 8 A.M. on the day after respectively. Both specimens kept up to July 18th, when they rapidly changed for the worse.

V. Series. July 17th: I took 2 grams of Conacbalanum at 7.30 A.M., an equally large dose at 1 P.M. Lumbago, headache, diarrhea, thirst, and loss of appetite setting in prevented me from continuing to take the drug for that day. The specimens prepared were all filtered, and then had the following properties: moderately acid, transparent, no odor.
No. 40. is my own urine passed at 7 P.M. and collected since 11 A.M.
No. 41. is urine of my colleague passed at 3 P.M.
No. 42. is my own urine, passed at 3 P.M. and collected since 7 A.M.
No. 43. is my own urine, passed at 3 P.M. and collected since 8 P.M.
No. 44. is my own urine, passed at 7 P.M. and collected since 5 P.M.
No. 45. is urine of the servant of the laboratory, passed at 7.30 P.M., slightly alkaline.
No. 46. is my own urine, passed at 10 P.M. and collected since 7 P.M. July 18th.
No. 47. is my own urine, passed at 10 A.M. and collected since 9 A.M. slightly alkaline.
No. 48. is the urine of my colleague, passed at 10.30 A.M.
No. 49. is my own urine, passed at 7 P.M. and collected since 10 A.M.
No. 50. is my own urine, passed at 3.30 P.M. and collected since 1 P.M.
No. 51. is urine of my colleague, passed at 11 P.M. slightly alkaline.
No. 52. is my own urine, passed at 7 P.M. and collected since 3 P.M.
No. 42. July 19th: neutral, slight opacity. July 20th: slightly alkaline, July 21st: moderately alkaline, doubtless smelly, minute film, minute streak, moderate opacity. In this state it remains up to July 24th, when it had the following properties: alkaline, slight ammoniacal foul smell, minute film, slight streaks, slight opacity, slight deposit.
doubtful smell, slight opacity. July 21st: moderately alkaline, minute film, no streak, slight opacity, commencing deposit.

July 24th: minute streaks, slight deposit. In this state it remained up to August 5th.


No. 47: July 20th: slightly alkaline, foul smell, slight film, very opaque, commencing deposit.


No. 50: Corresponds to No. 47. Being however less opaque and having no mouldy fungus.

No. 51: July 19th: slightly alkaline, doubtful smell, thin film, slight opacity. July 20th: Light odor of decomposition, moderate film,
moderate streaks, moderate opacity, commencing deposit.

July 24th: moderately alkaline, foul smell, marked film, marked streaks, moderate opacity, moderate deposit.


VI. Series. July 26th: at 10 A.M., I took 2 grams of Carminic acid, at 12 M., another 2 grams, and at 4 P.M. an equally large dose. On this occasion I suffered less, having merely colic pains during the night and a watery stool in the morning. The specimens were all filtered and had the following properties:

No. 53. Is my own urine, passed at 1 P.M. and collected since 7 A.M.

slightly acid.

No. 54. Is urine of my colleague, passed at 12 M.: slightly acid.

No. 55. Is my own urine, passed at 3:15 P.M. and collected since 12 M.;
v very slightly acid.

No. 56. Is urine of my colleague, passed at 5 P.M.: slightly acid.

No. 57. Is my own urine, passed at 5 P.M. and collected since 3:15 P.M.;

slightly alkaline.

No. 58. Is my own urine, passed at 7:30 P.M. and collected since 5 P.M.;

very slightly acid.

No. 59. Is my own urine, passed at 10 P.M. and collected since 7:30 P.M.;

very slightly acid.

July 27th. No. 60. Is my own urine, passed at 6 A.M., collected since 10 P.M.
of the previous night; very slightly acid.

No. 61. Is my own urine, passed at 10 A.M. and collected since 6 A.M.
No. 62. is my own urine, passed at 1 P.M. and collected since 10 A.M.
No. 63. is my own urine, passed at 3 P.M. and collected since 1 P.M.
No. 64. is urine of my colleague, passed at 3.30 P.M.
No. 65. is my own urine, passed at 9 P.M. and collected since 3 P.M.
No. 66. is urine of the laboratory servant, passed at 7.30 P.M.
No. 67. is my own urine, passed at 9 P.M. and collected since 7 P.M.


No. 70. July 28th. slighter trace of opacity. July 29th. slightly alkaline, slight odor of decomposition, a thick film, marked streaks, slight opacity, commencing deposit. July 31st. moderately alkaline, foul smell, thick film, minute streaks, moderate opacity, slight deposit.

No. 72. is No. 55. repeated.
No. 73. July 28th. a mere trace of opacity. July 29th. slightly alkaline, doubtful smell, minute film, minute streak, slight opacity, commencing deposit. August 2nd. slightly alkaline, foul smell, slight film, marked streaks, moderate opacity, slight deposit.
No. 74. corresponds to No. 58.

No. 75. was like No. 58 up to July 29th., when it became worse. August 2nd. very alkaline, very foul ammoniacal smell, thick film, marked streaks, slight opacity, heavy deposit.


No. 63. July 29th. Slight opacity, commencing deposit. July 31st. Slightly alkaline, doubtful smell, minute film, minute streak, and in this state it remained up to August 5th.


No. 67. July 29th. A slight streak. July 31st. Minute film, floating moulding. Commencing deposit, no smell, transparent, slightly acid. This in condition was observed on August 5th.
Specimens of dog's urine. The Copranalbalum was given to a middle-sized dog, May 3rd, at 5 P.M. the dog was given 2 grams of Copranalbalum, a similar dose on May 4th, at 10.30 A.M., one gram at 1 P.M. and another at 7 P.M. As the dog had on each of these nights following severe diarrhea, no Copranalbalum was given on May 5th.

May 6th. At 9.30 A.M. the urine passed during the previous 24 hours was collected, being from passages, filtered and had the following properties: acid, transparent, no odor. Two specimens.

May 22nd. a minute trace of opacity. May 24th. a minute film.

June 1st. very slightly acid, slight opacity, slight film, good smell, no streaks, a thin deposit. June 3rd. slightly alkaline, double film, heavy deposit. June 10th. strongly alkaline, strong ammoniacal odor, slightly opaque, heavy deposit, slight film. Thus it remained for a long time after the ammoniacal odor getting stronger, but no opacity nor foul smell set in.

On May 10th the dog was given one gram of Copranalbalum at 7 A.M., another at 1 P.M., a third at 7 P.M., a fourth on May 11th at 10 A.M., a fifth at 7 P.M., and a sixth on May 12th at 10 A.M. All the specimens prepared were drawn by catheter from the dog, filtered and had the following properties: slightly acid, no odor, transparent.

No. 1 is the urine of a dog not experimented upon, and drawn off at the same time as Nos. 2 & 4. Very acid.

No. 2 is the urine of a second dog, not experimented upon.

No. 4 is the urine of the dog 'to which the Copranalbalum was given, slightly alkaline.
The urine of all the specimens still to be mentioned was treated, and put like those already mentioned from dogs kept in the laboratory, and fed like the dog which was given the Copavabalban. These dogs had never been experimented upon in any way, and the urine was in each case drawn off by catheter and then filtered.


In this state it remained for a few weeks longer.

May 16th: The dog had no Copavabalban during the previous three days, and was given two grams of Copavabalban at 10 A.M.

Both specimens of urine here mentioned were drawn at 5 P.M. filtered and had the following properties: slightly acid, transparent, no odor.

No. 5th is a specimen of urine of a dog, not experimented upon.

No. 6th is a specimen of the urine of the dog, that was given
The Cepania Balsam. The dog had not passed urine since 6 A.M.
No. 5. May 20th: slightly opaque, slight streaks. May 22nd: neutral,
slight odor of decomposition, slight deposit. May 27th: a film,
moderate streaks. June 14th: strongly alkaline, a very strong odor of decom-
position, a moderate film, slight opacity, moderate streaks,
a few mouldfungus balls floating, a slight deposit.
June 10th: neutral, no odor, no minute film, transparent, commen-
cing deposit. June 17th: slightly alkaline, a trace of opacity,
doubled small. June 23rd: moderately alkaline, a strong
ammoniacal odor, floating mouldfungus and several fungal
depositors, a trace of opacity, a minute film, no
streaks, commencing deposit.

May 23rd. On May 21st the dog got no Cepania Balsam; on May 22nd
however he was given 1 gram of the drug at 8.30 A.M., and
another at 7 P.M. and on May 23rd two grams were given to
the dog at 8 A.M. Both specimens here mentioned were drawn
off at 7 P.M. by catheter, filtered, and had the following
properties: acid, transparent, no odor.
No. 7 is a specimen of urine taken from a dog, not experimented upon.
No. 8 is a specimen of urine of the dog that was given the
Cepania Balsam.
No. 7. May 27th: neutral, slightly opaque, a film, slight streaks,
slight odor of decomposition, commencing deposit. June 1st:
moderately alkaline, foul smell, a film, masked streaks, very
opaque, a slight deposit.
No. 8. June 12th: slightly alkaline, a minute film, transparent,
no streaks, no odor. June 22nd: slightly opaque. June 10th
moderately alkaline, slightly opaque, slight odor of decomposed propionic acid, a marked film, a slight deposit.

June 21st: The dog had one gram of Copaiba balsam in the morning and one in the evening, and had severe diarrhea in the forenoon. He had been similarly treated the previous three days.

No. 9 is a specimen of urine of a dog, not experimented on. The urine was drawn, filtered and had the following properties: acid, transparent, no odor.

No. 10 is a specimen of urine taken from the dog, which was given the balsam Copaiba, and had the same properties as No. 9.


July 4th: On July 3rd and July 7th the dog was given on each day one gram of Copaiba balsam at 9 A.M. and another at 7 P.M.

No. 11 is a specimen of urine of another dog, not as yet in any way experimented upon, and kept in the laboratory. The urine was filtered and had the following properties: neutral, transparent, no odor. This and the next number were both
No. 12. is a specimen of urine of the dog fed on Copavai-balbamin, was filtered and had the following properties: moderately alkaline, transparent, no odor.


No. 12. July 8th: slightly opaque. This specimen corresponds to No. 11.

July 11th: On July 10th and July 11th, the dog was given one gram of Copavai-balbamin at 10 A.M. and one at 7 P.M. on each of these days. No. 13. is the urine taken from another dog, not as yet much experimented upon. It was filtered, and had the following properties: slightly alkaline, transparent, no odor.

No. 14. is a specimen of urine of the dog fed with Copavai-balbamin. It was filtered and had the following properties: acid, transparent, no odor. Both urines were drawn off by catheter at 7 P.M.


July 19th: No. 15. is a specimen of dogs urine drawn off at 7 P.M. The dog was given Copavai-balbamin on this and the previous four days at the rate of one gram at 10 A.M.
and another at 7 P.M. on each day. The wine was filtered and had the following properties: slightly acid, transparent, no odor.

No. 16. is wine of a dog, not experimented upon in any way. It was filtered and had the same properties as No. 15.

No. 15. August 2nd. neutral, commencing deposit. The same condition was found on August 5th.

No. 16. July 20th. neutral, transparent, small, a trace of opalescence, July 24th. slightly opaque, marked streaks, minute film, slight deposit, slight odor of decomposition. August 2nd. neutral, soured, small, slight film, marked streaks, slight deposit, slightly opaque.

It may look remarkable, that some specimens decomposed so much sooner at one time, than others at another, but this can be accounted for to a great extent by the great changes in the temperature. Towards the end of June the temperature rose as high as 30° C (86° Fahr.) and for several days about that time it was over 25° C (77° Fahr). Let us take up the specimens in the order given. On the first 8 specimens, with four of which coprah-balsam was mixed, I found not the slightest difference in the rate of decomposition of all the specimens, as they all became equally soon soured and decomposed. It cannot be said that the coprah-balsam had no effect, because it did not mix with the wine, for the wine from its colour did evidently take up some coprah-balsam, though the quantity so taken up was very small, as the greater part of the coprah-balsam floated on the top. The quantity of wine per litter amounted to only 0.50s.
centimetres. The copaiba-balsam pure and simple has therefore no preservable effect on urine.

Rabbit's urine.
Here the action of the copaiba-balsam, when given internally, was evident. Not at all gradually from bad to worse, although it was very strongly acid when prepared. In contradistinction to this, we have the urine specimen No. 1, taken from the rabbit, that got copaiba-balsam, which (October 2) thought it was moderately alkaline when put up, and got opaque within the first three days, nevertheless kept in a good state as long as it was kept, and it was kept a few days longer than No. 1.

Human urine specimen.
On looking over these specimens, 67 in all, it strikes one at once as to how much better many of the specimens prepared the day after which the copaiba-balsam was taken, kept than those put up on the same day. This was the more remarkable, as often through the diarrhoea. Had the greater part of the drug must have been removed from my alimentary canal, and therefore could not be absorbed into the blood, and eliminated by the kidneys. Only some of the specimens calling for special attention will be noted here. I will compare those specimens with each other, which were put up within a couple of hours of each other, or those prepared the same forenoon, or the same afternoon, only as by so doing the specimens are viewed under very much the same changes conditions and the same influences.
to show with more force the antiseptic action of copaiba balsam on human urine, let us take a glance first at the following specimens: thus comparing No. 1 with No. 3; No. 4, with No. 6; No. 7, with No. 8; No. 10, with No. 19; No. 24, with No. 26; No. 47, with No. 48; No. 52, with No. 51. I find that my urine decomposed far sooner than that of my colleague, and that these specimens enumerated here were prepared rather soon or very late after the copaiba balsam was taken, so that probably either the products of the copaiba balsam were not eliminated as yet or were already all eliminated.

Next let me look at another set of specimens. Thus comparing No. 1, with No. 3; No. 5 with No. 6; No. 12, with No. 13; No. 14, with No. 22; No. 23, with No. 27; No. 26, with No. 28; No. 32, with No. 33; No. 35, with No. 36; No. 42, with No. 43; No. 47, with No. 41; No. 53, with No. 54; No. 55, with No. 57; No. 59, with No. 63; No. 69, with No. 74. I find that all these specimens decomposed about equally soon, whether they were my own or those of my colleague or those taken from the servant of the laboratory, and when these specimens of mine were prepared, the probability is that some of the products of the copaiba balsam were already on the process of elimination. This probability, according to Prof. Bernatzik's experiments, becomes a certainty.

Comparing the following specimens with each other, No. 7, with No. 15; No. 8, with No. 17; No. 16, and No. 18 with No. 15; No. 20, with No. 21; No. 29, with No. 19, No. 25, with No. 26; No. 30, and No. 31, with No. 27, No. 32, with No. 33, No. 37, with No. 36, No. 40, with No. 41, No. 44, with No. 46, with No. 45, No. 49, with No. 48, No. 50, with No. 51, No. 58, with No. 57, No. 61, with No. 56, No. 63, with No. 64, No. 65, with No. 66. I found that my own specimens had become foul, moderately alkaline, having
a sort of doubtful smell and in some cases contained a minute film, while in others neither film nor the slightest or the minisent streaks were to be seen. These specimens cannot be well explained why they should change thus far and no further. There is no doubt however that these specimens of mine were in every respect far better than those taken by my colleague, and other specimens of urine of myself taken too soon or too late after the copanibalism had been administered, that moreover they kept better and could be kept in the laboratory for a much longer time, than those specimens of my colleague, without my finding the slightest increase in decomposition. As these specimens did not withstand the decomposition so well as other specimens presently to be mentioned did, it becomes a question whether I was the proper person for experimenting on, as moreover I often suffered from an indefinite fever during the time I devoted myself to this subject.

The numbers 28, 31, 64, 867 are most satisfactory to look at, as they remain acid there is no apparent and without odor for a long time. About the last two numbers it was a regret that the laboratory was to be closed. Else they might have been observed for some time longer, as three days after their respective number of normal urine had become quite foul, they still showed no change. In these specimens if it were not the action of the copanibalism or its products or the urine it is difficult to account for the long preservation, in a fresh state of these specimens. It is therefore clear that the copanibalism products extracted by the urine retarded the decomposition and acted as a weak antiseptic to the human urine.
With these specimens before me and comparing those numbers of mine mentioned first, with those mentioned later on, there is also a very marked difference, both in the rate of decomposition which speaks in favour of the copanabalsam products, acting as a fresh antiseptic. Another reason probably of the not altogether satisfactory results, which I had expected, after the experiments made on dog's wine, is no doubt in this that I did not continue to take copanabalsam, and the quantity I took was too small to do justice as an antiseptic to the quantity of wine exerted during 36 hours. After the copanabalsam was taken, recollecting moreover that according to Bernatzhk part of it is removed by the legs, and part probably by the skin, and in my case by the stools through the waters here I had at different times after taking the copanabalsam. In the first experiments I was obliged to cut short the experiment as I felt myself totally unfit for anything in the afternoon. I may draw this the following conclusion from my experiments on human wine: that in my case the specimen of wine prepared very soon or very late after the copanabalsam was taken decomposed far sooner than those specimens taken from my colleague that other specimens of my wine taken when in all probability some of the copanabalsam products were already eliminated took the same length of time, as those of my colleague to become foul; that another set of specimens of my wine passed when more copanabalsam products were eliminated kept a few days longer than those of my colleague before they became foul; and lastly there were some specimens amongst my wine passed which probably most copanabalsam products were eliminated in which no changes at all were observed until some days...
had elapsed after the specimens of urine taken from my colleague were decomposed. Nevertheless, from the specimens of human urine alone I claim only a weak antiseptic action for the copanibalbalam products.

Specimens of dogs urine.

Flaunting over the specimens of dog's urine (I had 8 specimens of urine taken from the dog which was given the copanibalbalam compared with an equal number of specimens of urine of dogs, not so or otherwise experimented upon in any way and also kept on similar food), there cannot be the slightest doubt that the products of copanibalbalam acted antiseptically, and prevented the setting in of decomposition keeping the urine of the dog which was given the copanibalbalam twice thrice, four five times as long in a fresh state, and without any change, as the urine taken from other dogs could and did remain before it was good. The only specimen that failed to show this was No.12 and it may be that the dog had that morning an unusual severe diarrhoea. Customarily it was for the dog to have severe diarrhoea each night so that I did not think it necessary after the first couple of weeks to note down the occurrence of this symptom. The good effect in the dog's urine will be due in a great deal to this that the dog was give each day (Sundays excepted), 2 grams of copanibalbalam, and that his blood thus got saturated with the drug. It is plain from these specimens, that copanibalbalam does act as an antiseptic, or better said that the form in which copanibalbalam is excreted by the kidneys acts as an antiseptic. Although antiseptic action cannot be claimed for the copanibalbalam or its products as decomposition is not postponed indefinitely
though the antiseptic action was very well manifested.
In the specimens of dog's urine. The action of ephraimolabum
in gonorrhoea is thus easily understood, when, it acts
antiseptically, for it will both prevent the urine becoming
foul, and render the products of gonorrhoea innocuous.
and dispose of the different theories of authors on this
subject.

The question now arises; in what form does ephraimolabum
appear, or what products of the drug act antiseptically?
For the investigation of this question, the dog was given
the ephraimolabum, day after day and the urine collected.
Following the process of (30) Prof. Schmiedeberg and Dr. Meyer,
and (35) Friedemann for the detection of the Changes the campfer
undertakes in the body, the urine was taken, and basic
acetate of lead and ammonia were added alternately as long
as any precipitate resulted. It was then filtered and the
precipitate carefully and well washed out with distilled
water. The precipitate was then taken into a vessel and
diluted sulphuric acid then added, until the solution became
strongly acid but still left some lead unprecipitated by
the sulphuric acid. The precipitate was next filtered off,
and washed out with distilled water, and the resulting filtrate
was then taken and sulphuretted hydrogen allowed to pass
through when the remaining lead present in the filtrate
was precipitated down. When this was finished air was
blown through the fluid to remove any excess of sulphuretted
hydrogen, and the solution was then filtered. This having
been done the filtrate is then evaporated on a waterbath.
This whole process is repeated once more to get the

substance purer, and the last filtrate is evaporated to a
syrup, when a black tarry mass separated, evidently from
its balsamic odor, a product of copaiba balsam. If the syrup
were not too far down evaporated, be taken portion-wise
into a test-tube hydrochloric acid added and then boiled, the
solution turns brown and black. Another portion placed in a
test-tube and treated with cupric oxide and caustic potash produces
a green solution. This on being slightly heated turns immediately
yellow, and afterwards brown and black but no red of copper
is precipitated. This proves the presence of specific
copaiba-glycemic acid (the so-called "copaite copaico-
glycemic" acid of the Germans). The amount shown
was too little for extended examination.

The filtrate, resulting from the filtering off of the sulfides
of lead, is concentrated to some extent and hydrate of
Barium added, and then heated to drive off the ammonia
present and again filtered to get rid of the excess
of Barium hydrate present; the filtrate resulting from this
process is then subjected to the passage of pure Carbonic
acid to precipitate the excess of Barium as carbonate
of Barium and then filtered; if the filtrate resulting
from this second procedure be evaporated on a water-
bath, crystals of a Barium salt are produced. These
crystals were too few to work upon, and on adding
hydrochloric acid to them a precipitate resulted which
was only partially soluble in ether, and the ether
extracts of the precipitate poured off and evaporated gave
a resin as residue probably copaico acid.

If the filtrate resulting from the removal of the sulfide of
lead be evaporated to a syrup, and to a portion of the syrup be added Chlorite of Barium no change is noticeable, but if in addition some Hydrochloric acid be added, in the solution heated, Sulphate of Barium is soon formed, and an aromatic odor is noticeable. The same was found with the Barium salt already alluded to, that when Hydrochloric acid be added a precipitate results which is partly soluble in ether, the insoluble part being Sulphate of Barium; corresponded to it, the soluble part was no doubt a resin. By heating the same syrup with acetic acid no change took place. These facts would according to Baumann prove that there is "pained sulpheric acid" ("Sezernite Schröpfliche" of the Germans) present in the syrup, and that the amount present in the syrup was great. Normally "pained sulpheric acid" is present in the urine but where it is increased. It must therefore also be considered that Copavabalbamon increases the quantity of pained sulpheric acid.

Pure sulpheric acid which may be called Copavaglyeronmonic acid (corresponding to the Camphoglyeronmonic acid of Prof. Schmiedeberg), and pained Sulphuric acid are thus found present in large quantities in the urine when Copavabalbamon be given to a dog, and these are probably the products of Copavabalbamon that act antiseptically on the urine.

Already reference has been made to a black tarry mass separating on evaporating down the filtrate in a waterbath. This tarry mass must be considered a product of decomposition.
of the original pumice is only seen when the filtrate be far evaporated that becomes syrupy or tarry. It is
soluble in alkalies. From this tarry mass or syrup an ather extract was made, and the ather then
poured off, and this repeated several times. The ather extract was next well shaken up with Sodium Carbo-
nate, and the ather poured off. The ather was then
well washed with water and distilled off. The water
solution was next mixed with some more distilled
water, and several times filtered through Charcoal.
An extract with ather from this purified filtrate was
then made, and the ather poured off. This being repeated
several times. The resulting ather extract was then
slowly evaporated, when long needlelike crystals of an
irregular form and soft and quite colorless made
their appearance. They are soluble in both water
and ather. The crystals resemble the Camphor oil crystal
found by Prof. Schmiedeberg in living dogs. Camphor was
given, and moreover are obtained by a similar process.
These crystals are no doubt crystals of Copana oil, corres-
ponding to the Camphor oil.

There are thus two products of decomposition of the pared
Glyceric acid (Copavoglyceric) and pared Sulphuric acid
found in the spruce wood. The copana oil corresponding
to the Camphor oil, and the black tarry mass soluble
in alkalies probably Copavinic acid.
The Copavabalsam, not being extracted either as Copavas-
balsam, or Copavina oil or Copavic acid by the urine
must act in some other form, and it follows there-
fore that the copaiba-balsam must act antitoxically
through its products: paired glycuronic acid and palis-
sulphuric acid. These products I found greatly in-
creased in the urine by giving the dogs copaiba-
balsam. The dog was always fed on horseflesh so
that from that food no such increase could have
come... The oil and the blackberry mass were only
found as endproducts when the filtrate was evaporated
very far.

Literature. Only the literature mentioned in the above
is given here.
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