

# Salicylic Acid as an Antiseptic

(By H. Humm)

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Translated from the German by G. V. Black.

As lately Prof. Bolkowick of Berlin did not agree with the results of the experiments by Kolbe by which the <sup>antiseptic</sup> qualities of salicylic acid seemed to be established but questioned them & referred to benzoic acid as giving better results — (See Berliner Klinische Wochenschrift 1875, no. 22) — it shall not be the object of this article to controvert the theories of the former but simply to gather together the results of previous

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investigation and experiments into the  
Salicylic acid. And a rapid review of  
Kolbe investigations to determine  
their weight and character.

Further experiment must be  
deferred to, to determine which  
of the acids shall gain preference,  
both technically both and in oper-  
ative employment.

I have found such satisfac-  
tory results from the Salicylic acid  
in my specialty that I cannot  
believe that it will be displaced by  
the Benzoin. Salkowski brings up  
the high price of Salicylic acid as an  
objection to its use but since this has

been so much reduced by Kolbe's method of production it has become a small item of difference.

In the conclusion of Talkowski's article he says that Kolbe's services should not be underrated because his investigations have, if nothing more, drawn attention to the aromatic combinations.

It must be said however that these investigations were made with a perfect knowledge of the character & properties of the Benzoic acid

There can be no doubt but that salicylic acid - the medical treasure introduced by Kolbe which is now the subject of so much dis-

cussion and the usefulness of which  
 is confirmed by Prof Thunisch is draw-  
 ing more and more attention not on-  
 ly from the professionally educated part  
 of the community but also the  
 producing classes are following the  
 development of its properties and  
 virtues with the deepest interest.

The undoubted confirmation of  
 its antiseptic properties points to early  
 and important changes in the pro-  
 duction of many of the necessaries  
 of life. Especially may we men-  
 tion the conservation wines Beer  
 and Meats also the management  
 of those Epidemics which depend

on Fungoid growths both in man  
and beast.

The knowledge of and the produc-  
tion of Salicylic acid is not recent  
date. It was first obtained only from  
Salicin which was discovered by  
Rigatelli in 1862 but earlier by Fon-  
tana an apothecary in Lazza near  
Verona in 1825. It was obtain-  
ed from Salix pentandra and Salix  
fragilis. According to Lach Salicin  
can also be obtained from  
other varieties of Salix as S. Pur-  
purea, S. Helix, S. Lambertiana  
and not only from the leaves  
but from the female flowers and

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the young twig.

Salicyn, Crystallizes in small four sided brilliant milk white prisms or small white scales. It is of an intense bitter and astringent Taste, is not changed in the air, Dissolves readily in water and alcohol but is not soluble in ether and the essential oils.

Melts a few degrees above 100°C and is decomposed by a few drops degrees higher heat. It is not an alkaloid but in its chemical relations is indifferent. By Sulphuric acid it is changed into a dark brown mass (Retilin) and according to Marchand its formula is  $C_{28}H_{38}O_{15}$

(Journal for practical chemistry 1842 vol  
26. Page 385)

According Piria Salicyl is the  
Radical of Salicin - With Hydrogen  
it found a Hydrate of Salicyl which  
is a red<sup>d.</sup> oil readily soluble in al-  
cohol and Ether and behaves with  
Alkalies and metalloids like the hy-  
drogen acids. When Salicyl is treated  
with melted Potassium the Salicyl  
acid is formed.

It is this formerly known but  
almost unnoticed acid which has of  
late attracted such universal atten-  
tion, not merely from the chemist, but  
also from the physician and artist.

For this we must thank Kobbe  
Thiersch Newbauer and others for their  
very interesting and complete inves-  
tigations. Especially the former who  
in company with Lautman in  
the year 1860 in a course of inves-  
tigations of Salicylic acid as a de-  
rivative discovered the Salyl acid  
which he described as Isomeric  
with Benzoic acid. Soon after-  
ward Kirkle pointed out the pos-  
sibility that there were other acids  
isomeric with the benzoic with,  
which he base upon an hypothesis  
of his own in regard to the con-  
stitution of Benzol. His con-



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conclusions were taken up by a number of chemists and it was held that the finding of one acid isomeric with the benzoic, threw the whole fabric of the chemical constitution of the aromatic combinations together (In one isomeric line) and they were therefore unstable.

A correct decision as to whether Salicylic acid is identical with the benzoic or isomeric with it is of the utmost importance. This has induced Kolbe to again take up the work formerly thrown down done

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by himself Lautevan especially  
as the ~~augmented~~ argument  
brought forward by Richardson  
and Bielstein seems not to be  
so conclusive as might at first  
be supposed.

In the summer mean  
time it was no ~~too~~ light task  
for him to more clearly prove  
his opinions of 1860 and de-  
feat Hübner's argument. This  
was largely the fault of cir-  
cumstances since it was ex-  
ceedingly difficult to bring to-  
gether the necessary materials  
for the required amount of Sady-

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cyclic acid without to great a cost.

This difficulty resulted in directing him to the finding of a cheaper mode of producing the acid. The gaultheria oil contains but a very small percent of Salicylic acid and seems poorer latterly than formerly and is therefore too costly for the preparation of very many pounds. Kolbe was therefore led to reinvestigate the plan previously described by himself and Lautman - by which Salicylic acid was prepared artificially from phenol and carbonic acid in the presence of sodium to determine whether or not it could be simplified or perfected to such an extent that a cheaper acid

could be produced. He succeeded in producing by this means very considerable quantity of the Salicylic acid, obtained was sometimes quite large sometimes very small. In finding the key to this mystery he was led to a new plan of production. Upon dissolving sodium in hot Phenol in a current of Dry Carbonic acid, Salicylic acid is formed and with it almost always more or less carbonate of Soda and Phenate of Soda. Kolbe now found that the richer the production of Salicylic acid, the less of the compounds above mentioned were formed. He afterwards observed that a

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product which was especially rich in phenate of soda and poor in Salicylate of Soda produced a large amount of Salicylic acid when treated anew with carbonic acid under a higher heat. Upon this discovery he determined to again try the plan of producing Salicylic acid from Phenate of Soda and carbonic acid which had formerly yielded but a very trifling amount. After many experiments he succeeded in determining the conditions and so completing & simplifying this process that from Phenate of Soda and Carbonic acid the theoretically reckoned amount of Salicylic acid could be obtained with

out difficulty and at small cost which was done in an iron retort prepared for the purpose in twelve hours without much attention during the process, producing 8-10 pounds of Salicylic acid.

A saturated solution of Phenol and Soda is evaporated in a shallow iron vessel and the resulting mass - Phenate of Soda - is then dried over a light heat with continued stirring & afterward rubbing until it is reduced to a dust. This is then (when large amounts are used) put into an iron retort and slowly heated in an oil metal or air bath until it has reached about  $\frac{212^{\circ}\text{F}}{100^{\circ}\text{C}}$  then a light current of

Carbonic acid is passed through it. The temperature is gradually raised, reaching  $\frac{357^{\circ} \text{F}}{180^{\circ} \text{C}}$ . Some hours afterward, some time after the introduction of the carbonic acid Phenol begins to distill over later in larger quantity. At last the temperature is raised to  $\frac{392^{\circ} \text{F}}{200^{\circ} \text{C}}$  —  $\frac{482^{\circ} \text{F}}{250^{\circ} \text{C}}$ . And the operation is ended when under this temperature with the continued passage of the current of carbonic acid no more Phenol passes over,

In regard to the process of the formation of Salicylic acid Kolbe says he had at first supposed that one molecule of carbonic acid inserted

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itself into one molecule of Phenate  
of Soda and so formed one mole-  
cule of Salicylic acid.

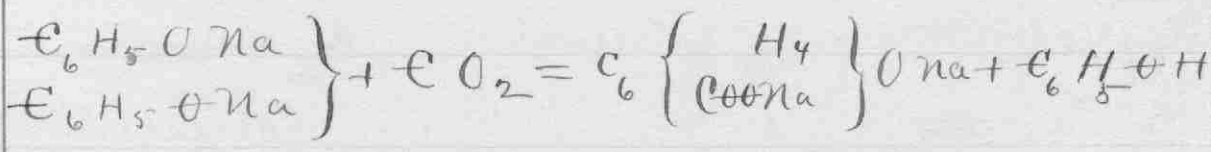
According to the following formu-  
la —  $C_6H_5NaO + CO_2 = C_6H_5OCO_2Na$ .

But I now perceive that the process  
runs otherwise - which I could not be-  
fore understand - That by the influence  
of carbonic acid on strongly heated Phen-  
ate of soda, a large quantity of quick  
crystallizing Phenol distills away from  
the phenate of soda which as I have  
later determined is just one half of the  
phenol used in preparing the phenate of  
soda. But I now perceive that the  
process runs otherwise, which I could



not before understood. The contents of the retort after the reaction is ended is after the continued passage of the current of carbonic acid until the heat has attained  $\frac{482^{\circ} \text{F.}}{250^{\circ} \text{C.}}$  as described is by a good resulting operation of a greyish white color.

It is Salicylate of Soda, the so called basic. The following formula expresses the chemical changes during the operation —



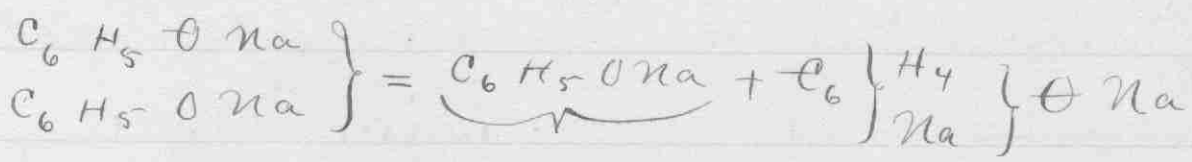
2 Mol Phenate  
of Soda

Salicylate of Soda      Phenol

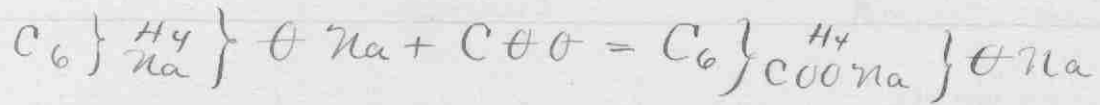
with 2 molecules of Phenate of Soda

in the presence of carbonic acid one equivalent of Hydrogen is displaced by Na. which results in the formation of Phenol and Phenate of Soda containing a double portion of Sodium which last immediately combines into the carbonic acid producing the Salicylate of Soda

thus —



2 Mol. Phenate of Soda      Phenol      Divalent Phenol



Divalent Carbonic Acid of Sod Salicylate

This last combination bears a temperature of  $\frac{572}{300} = C.$  without decomposing. It dissolves readily in water with a dark brown color. On the addition of Hydrochloric acid the Salicylic acid is precipitated in the form of a thick curd. This is dried on a linen cloth or the mother liquor passed out as well as possible. Through recrystallization and other methods of purification the Salicylic acid may be obtained perfectly pure. If it is wished that it be obtained chemically pure and snow white it is dissolved in Methyl alcohol "Ättel-alcohol" which is

removed by heating in a pure solution of caustic soda precipitating with Hydrochloric acid and thoroughly washing the precipitate. The Salicylic acid prepared with that prepared from the willow bark when not rectified its color is a light yellow from a small portion of Phenol - it is in powder crystalline or in needle like crystals - slightly soluble in cold water more largely soluble in warm water - melts at about  $\frac{140^{\circ} \text{F.}}{60^{\circ} \text{C.}}$  and by a slight elevation of this temperature is decomposed into phenol and carbonic acid. For the rea-

son that salicylic acid may be formed from carbolic acid and carbonic acid and also can decomposed into the same compounds by light heat. Prof. Kolbe came to the conclusion that it would, like the carbolic acid prevent decomposition or possessed antiseptic properties. This conclusion was verified by experiments by himself and Prof. Thiersch. Amygdalin was dissolved in water and a small percentage of Salicylic acid added and well mixed and an emulsion of sweet almonds added after a quarter of an hour there was not the slightest smell.

In a similar way a number of exper-

iments were tried with small additions of Salicylic acid and there was not a smell of the bitter almond for several days or hours and by the addition of a little greater proportion of the Salicylic acid no smell was detected for 24 hours.

Ground mustard in lukewarm water soon gives out the smell of mustard oil but fails to do so when a small amount of salicylic acid is added. A small portion of Salicylic acid added to a solution of sugar prevented yeast from working. A solution of sugar already in the process of fermentation was stopped

by a small amount of the acid.

1000 grammes\* (2.2046 lbs) of beer to which  
 0.8 to 1.0<sup>+</sup> (12.40 to 15.43 grs) of Salicylic acid  
 was added showed no sign of spoil-  
 ing after 14 days exposure - also less  
 than the one thousandth part  
 of the Salicylic acid is sufficient  
 to prevent Beer from spoiling  
 for a long time. The small  
 amount of 0.04 percent of Sal-  
 icylic acid added to fresh  
 milk is sufficient to prevent  
 its souring at a temperature

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\* 1 Liter is equal to 2.1135 pints.

+ 1 Gramme equals 15.43 grains

of  $\frac{64.4^{\circ} \text{F}}{18^{\circ} \text{C}}$  Fresh meat with Salicylic acid rubbed upon it does not spoil for weeks in the open air. Fresh eggs that were soaked for an hour in a water solution of the acid lost nothing in taste or smell in four months and could not be told from fresh eggs. The salicylic acid by common room temperature is dissolved by distilled water in the proportion of 1 to 300.

This solution is called Salicyl water by Prof Thiersch and possesses remarkable antiseptic properties. Urine to which the acid is added in this proportion or in lar-



ger quantity does not spoil and still contains uric acid after nine months. Blood and Pus are kept in the same way. A large amount of albuminates are precipitated from the serum of Pus by Salicylic acid as is also done by a percent solution of carbolic acid. Fresh and granulating wounds are in no wise injured nor is any inflammation caused by washing with Salicylic water. By long washing of wounds with Salicylic acid it may be detected in the urine.

Instead of washing with Salicyl water Prof. Thiersch advises the

application of the acid in substance to suppurating wounds or mortifying parts to the thickness of 0.2 to 0.5 centimeters, for the reason that in washing with the solution the effect will not reach to sufficient depth. After many and continued experiments Prof Thiersch is of the opinion that the salicylic acid possesses all the virtues of carbolic acid, without its objectionable features.

Neubauer and Kobbe have made further experiments for determining the antiseptic qualities which are of importance to producers of wine

and beer.

Newbauer tried the following experiments with chemically pure Salicylic acid. 50 C.C. of clear filtered unfermented wine which had been heated to  $65^{\circ}\text{C}$  was mixed with Salicylic acid and a small amount of wine ferment added to it. The same quantity of the same wine was mixed with Salicylic acid and a small amount of wine ferment added to it.

The same quantity of the same acid wine was mixed with a like quantity of wine ferment without the Salicylic acid for comparison. In the last, fermentation proceeded as soon as

the ferment spores had begun to increase in a few days - While in all experiments there was no increase of the ferment spores and absolutely no fermentation in that to which salicylic acid had been added. In order to determine the amount of Salicylic acid required to destroy or prevent the operation of a certain amount of wine ferment the following line of experiments were tried beginning on the morning of Nov. 17, at a temperature of  $20^{\circ}\text{C}$ . To each 1000 litres of unfermented wine the following quantities of Salicylic Acid was mixed, First 0 Second 12-24-36-48-60-72-96. Grammes Each of these received 1 c.c. of active ferment which was

found to contain 0.0049 grammes of dried ferment cells. The ferment used was *Saccharomyces ellipsoideus* with a small amount of *Saccharomyces apiculatus* fresh grown and entirely free from other fungous seeds. On the morning of the 19<sup>th</sup> (two days) the wine having no lactic acid (no. 1) was in active fermentation No. 2 also showed a weak fermentation not nearly so intensive as no. 1. - but apparently normal.

No. 3 & 4 first showed signs of fermentation on the 20<sup>th</sup>. No. 5. showed the first signs of fermentation on the afternoon of the 20, and on the 25 the fermentation was proceeding

very feebly.

No. 6. Showed the first gas bubble on the 27<sup>th</sup> and a very slow fermentation followed.

No. 7. Showed the first gas bubble on the 2<sup>nd</sup> of December.

No. 8. was perfectly clear at the end of four weeks. The ferment cells which had been added had sunk to the bottom - no growth had taken place. No gas bubble had been formed - not the slightest trace of fermentation could be discovered although the amount of ferment had been ample. These and other experiments in which proportionally

Large amounts of ferment was added to fresh grape juice (each 50 c.c.) showed in the most unmistakable way that the Salicylic acid slowed down the act of fermentation or prevented it entirely when a sufficient amount was used and also that when the fermentation had begun, the increase of the Salicylic acid slows it or stops it entirely according to the proportion. Also that a certain amount of Salicylic acid was required to prevent the working of a certain amount of ferment cells.

This amount is very small and is pretty certainly fixed at 1.00 gram. of Salicylic acid for 1,000. litres of grape

juice in active fermentation to destroy the fermentation entirely and permanently destroy the ferment cells.

The Salicylic acid works similarly against fungoid vegetation or moulds.

On the 27<sup>th</sup> of November 50 c.c. of sweet wine ( ) was sowed with the spores of *Penicillium glaucum* 50 c.c. of the same received 0.00028 gramme Salicylic acid and in addition the same quantity of the spores 50 c.c. of the same ~~received~~ reserved the same amount of Salicylic Acid but no spores. On the 30<sup>th</sup> day of Nov. the mould in the first was in full growth and was seeding



on the first of Dec. In the second there was no growth whatever, the grape juice remains clear and the mould spores lay poisoned on the surface.

The third which received only Salicylic acid was on the 15<sup>th</sup> of Dec. also perfectly clear and pure to the taste without a trace of fungoid growth of any kind although it was setting close to a fine growth of mould and uncovered.

The experiments of Neubauer shows that as to whether the unfermented wine will ferment sooner or later or not ferment as well at all depends wholly upon the

amount of Salicylic acid added to it and that 100 gramms of the acid to 1000 liters of the wine is sufficient to prevent fermentation entirely, even when ferment is added to it. It is also known that the spores of the ferment are found in the skins of the grape rather than in the juice and they may be destroyed then before the grapes are pressed. If we can consider that these proportions are sufficient in the cases mentioned a very small quantity must be sufficient to prevent any fermentation in the future. Weidenbusch found that new wine which was in full

process of fermentation was brought to a stand still by the addition of 8.0 grammes of the acid per liter. Also that some Prestein wine which was perfectly clear and one year old yet on the surface of which flakes of mold continued to form required 40 grammes of the acid per 1000 liters to entirely prevent their formation.

250 grammes proved insufficient.

From this case Wunderbusch argues that no fixed proportion of the acid can be determined upon with certainty but that a careful watch is necessary that new additions may be made in case of the reap-

pearance of fermentation or mold.

This is on account of the different circumstances and the different kinds and quantities of ferment or mould spores present but which can always be controlled by further very slight additions of the acid.

The Salicylic acid can be depended upon for good results in all the following cases.

1<sup>st</sup> In new wine, in which the fermentation is not quite completed.

2<sup>nd</sup> In old wine which has become sharp.

3<sup>rd</sup> In small amounts sent to

tropical climates to prevent renewal of fermentation.

4. In mixtures of different-ages and marks to prevent reactions upon each other and consequent refermentation

5. In small quantities that must stand open or upon draft to prevent mould or souring.

6. In casks which are to be kept in a certain condition, to prevent change and protect them from mould

7. In old and moulded casks to render them again fit for use.

In all the foregoing cases a strong alcoholic solution should be used

and as the acid is less soluble in wine it should be slowly added while the wine is being rapidly stirred.

Newbauer's experiments with wine induced Kolbe to try a series of experiments with Beer ferment. He took for this purpose four vessels each containing 500 c.c. of a ten per cent solution of sugar in each he placed four grammes good yeast. To the first he added 0.25 grammes of Salicylic acid.

To the 2<sup>nd</sup> a like quantity of Peroxybenzoic acid

To the 3<sup>rd</sup> a like quantity of oxybenzoic acid

B The fourth, nothing.

These were kept at the temperature of 33°-35°. Within six hours fermentation began and all the vessels except the one containing the Salicylic acid which remained clear while the others became cloudy and threw off carbonic acid. Again three vessels <sup>in</sup> each of which was placed a 12 per cent solution of grape sugar of 1000 grammes.

Into each vessel 5 grammes of good yeast was well stirred

The first then received 0.25 grammes of Salicylic acid the second 0.5 grammes of

Peroxybenzoic acid and the 3<sup>rd</sup> nothing, and all were covered with paper and kept at 35°C.

In six hours all the solutions were in active fermentation but the first was so active as the others. The small amount of 0.25 grammes of Salicylic acid is therefore not sufficient to prevent fermentation being caused by 5 grammes of yeast in that amount of 12 per cent solution sugar, a new quantity was therefore added after six hours making 35 grammes in all this amount lessened or slow-



ed down the fermentation consider-  
 ably but did not stop it entirely and  
 after four hours more 0.15 grammes  
 more were added after which  
 the fermentation ceased entirely.

The next day the liquid was  
 perfectly clear and the yeast cells  
 lay on the bottom of the vessel -  
 the solution still contained a con-  
 siderable quantity of sugar and  
 tasted decidedly ~~bad~~ sweet.

A Vögel's experiments with Dial-  
 icyclic acid on the germination of  
 seeds are also very interesting.

Three equal numbers of good  
 cress seeds were placed upon sever-

at thicknesses of filter paper. No.

No. 1. was kept wet with distilled water.

No. 2. after soaking for half an hour in Salicyl water was placed on the paper and kept wet with distilled water.

No. 3. was placed on the paper and kept wet with Salicyl water.

No. 1. Twenty four hours afterward had begun to sprout and the young plants began their development.

No. 2. & 3. Showed no signs whatever of germination even after a number of days. From this it seems

that the Salicylic acid hinders the process of germination. In the use of Salicylic medicine either inwardly or outwardly, there seems no danger or evil results following its use. Walbe took 1.5 gramm for a number of days together without any evil result effect whatever.

Fürbringer in his experiments in regard to the antipyretic effects of Salicylic acid, comes to the conclusion that it has decided power in lowering the temperature at least when septic fever is present in his experiments on Rabbits he found it to possess

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decided antipyrogenic effects.

Russ having found that his Salicylic acid had no poisonous effects even in large doses although so markedly antiseptic in its qualities decided to try its antipyrogenic qualities. He states that it proves to be a wonderful antipyrogenic which both in effects and its kinship with quinine will in a measure take its place in doses of from 4 to 8 grammes according to the intensity of the fever there is none of the unpleasant effects which are so often occasioned by quinine. Collapse and symp-

tons of intoxication are in no wise  
 to be found. He has also used it  
 in Typhoid fever, Erysipelas, acute  
 articular Rheu<sup>ma</sup>tism with the best  
 results.

Just here we should say that Firin  
 holds Salicylic acid is the radical of  
 Salicin and that Salicin has hereto-  
 fore been used in intermittent fe-  
 vers. Especially has Bom made  
 much use of it (Medic Beobach-  
 tungen und Beiträge ueber die Sal-  
 icinen aus dem Hollaendischen  
 von Solomon Potedam 1838) he used  
 it with good results in chronic diar-  
 rhea - consumption in the after treat

ment of mucus and morn fevers (Schlin-  
(Schlin and Urm Feberr)

And in fevers accompanied  
with Colliquative discharges or  
excessive sweating he gave it the  
preference over quinine for the  
reason that it worked no injury  
to the organs of digestion nor caused  
any congestions of the head.

In cases of weak stomach  
Phthisic constitution &c. He con-  
sidered it of great value.

Wagner and Preiberg say  
nothing of its antipyretic effects  
in their published reports of their  
use of it in Phthisis. But we have

no reason to suppose that it failed to produce that effect.

The Epidemic of Friedburg described by Wagner was one of the great severity and very many children were lost. Many died of common diphtheria also very many from secondary diphtheria of the upper portion of the Trachea (Kehlkopf. diphtheria)

Wagner at first treated his cases by local and mechanical means which according to the investigations of Letzler seemed to be indicated. His colleagues employed in part other modes of treatment but all of them lost a very large percent of their cases. Their

terminal use of the Salicylic acid seems now to have been the best remedy employed and gave splendid results for children that could not use a gargle he used 0.15 - 0.3 gramm in powder in water or wine every two hours and to those that could use a gargle he used the following -

Salicylic Acid 1.5

Alcohol 15.0

Aq Distilat 150.0

to be used as a gargle every hour.

If in this some crystallization should take place it will be sufficient to shake it before using. In this way Wagner treated 15 very severe cases without hav-



ing to regret the losses of a case,  
Also the course of the disease  
in these cases was very marked  
by shorter than any of those treat-  
ed by other means.

The lighter cases passed through  
the course in from three to five days  
and very bad cases in which the  
local appearances as well as the gen-  
eral symptoms justified an unfavorable  
prognosis were generally in about ei-  
ght days.

We spoke above of the local use  
of Salicylic acid in water 1-300. Prof.  
Heirsch has reported a large number  
of amputations and other large opera-

tions: - (Tamming of Herischer Noträge No. 84 - 85) which healed readily without a fever or swelling after having been flooded with Salicyl water, so that Prof. Thierch feels himself justified in stating that salicylic acid will in the future be very important to the surgeon.

After all this, it is evident that the salicylic acid will become very important to the Dental surgeon, for a remedy has long been sought that would perform the office of Carbolic acid

Thymol acid &c without the evil effects, Cauterization, bad taste-smell &c belonging to these Thems, and

now it appears that the Salicylic acid will fulfill that office satisfactorily.

From my experience it would seem that salicylic acid has an important use in those teeth with dead and decomposing pulps. The decomposing mass in the pulp chamber and root canals should be removed with suitable instruments and then the chamber and canals thoroughly washed out with salicyl water. The washing is to be repeated three or four times in as many days after which the tooth and roots may be filled without any danger of the occurrence of peri-

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cervicitis. Osterman uses the salicylic acid in substance in such cases, filling the pulp chamber with it and sealing up the cavity temporarily for a few days afterward removing and filling permanently. Further experiments by myself have given the best results carious teeth which were exceedingly sensitive but the nerve not yet exposed but nearly so I washed out thoroughly, and repeatedly for from two to four days and then if the sensitiveness was not abated I placed salicylic acid in substance in the cavity sealing it in with a tur-

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porany filling. At a fixed time this was removed and the excavation completed leaving sufficient softened dentine over the pulp to prevent exposure. This part was again covered with salicylic acid and permanent filling inserted - I have removed fillings inserted in this manner after two - three - four and six months, to see what changes had taken place in the condition of the cavity.

I found that after two months the softened dentine began to harden and that after six months this process was so complete that

pressure of the plugger could be used over the pulp without evil results.

Ostitis Pericementitis &c did not occur in any case so treated, although some of the patients were young and very sensitive and seem-  
ing especially liable to inflamm-  
atory disease processes.

As fillings I used mostly Amalgam which was afterward partly or wholly replaced by gold. I have now treated about one hundred cases in this man-  
ner. We may therefore justly say that the Zeil'eylic acid is a substance of the utmost im-  
portance both to the scientist and to

the physician as well as to in the arts; and that possibly through the interest it has awakened in the study of the aromatic compounds, far more important ~~compounds~~ results may yet be arrived at.

Dalkowski of Berlin is already of the opinion that Benzoic acid is <sup>better</sup> ~~an~~ antiseptic. He has made such a report in the Berlin Klinischen Wochenschrift no. 228, 1875. The experiments are mostly with decaying substances containing albumen. These experiments were performed in this wise: 800 c.c. of flesh was chopped very finely in water for the purpose of experiment. Half this amount received

as an antiseptic.

Palkowski denies that Salicylic acid possesses disinfecting qualities or powers for the reason that it has no strong chemical affinities, throws down no precipitates, nor has any peculiar smell. When fresh meat finely chopped or in large pieces are placed in a strong water solution of Benzoic acid, it will not spoil and the solution will remain clear and retain the smell of the Benzoic acid.

For internal administration as antiseptics or antizymotics the two acids may be used in like quantities.



tities as they both form salts of soda  
 in the blood. A series of ex-  
 periments have shown that sali-  
 cylic acid or the benzoic ether one will  
 at least entirely stop the motions of Bac-  
 tina when the solutions containing  
 them are saturated <sup>with</sup> them.

Finally it must be admitted that  
 the experiments of Salkowski Prof.  
Gawn and Thiel with Phymol Sal-  
 icylic acid and Benzoic acid as dis-  
 sfectants are calculated in some slight  
 measure to diminish the hopes first  
 raised by Cobb's reports. But Kol-  
 be's services can never be too high-  
 ly treasured in that they have given

rise to an immense amount  
of experimenting and study which  
have given again brought forward and  
given us a better understanding of the  
mol and Benzoic acid and the whole  
series of aromatic combinations.

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