

T H E S I S for the Degree of Doctor in Medicine.

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Upon the treatment of Respiratory Affections, by the  
Intra-tracheal Injection of Drugs.

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I. History of its introduction, with Bibliography.

(a). The first investigation into the value of the injection of various antiseptic fluids into the lungs, appears to have been made by Sehrwold, who conducted a series of experiments upon dogs, with a view to ascertaining (1), what quantity and quality of fluids the lung is capable of bearing in health, and (2), what is the distribution of the fluid within the lung after its injection.

"The Percutaneous Injection of Fluids into the Trachea. 1886. The Practitioner, Vol. XXXVII - p. 298. - also D. archiv. f.klin.med. June 1886."

(b). Reichert made a series of endotracheal injections in Calves and sheep.

(c). Rosenberg of Berlin in 1886 was the first to introduce the treatment upon human beings; he read a paper upon the subject before the Berlin Medicin Gesellschaft, and a further paper before the same society on April 6, 1887.

(d). Beehag in a paper entitled "Menthol in Laryngeal and Pulmonary Phthisis, and in other diseases" in the Edinburgh Medical Journal p.625, 1888., recommended a 20% solution of menthol in olive oil,

making two or three injections of 15m each at every sitting, to secure more prolonged contact with the affected part.

(e). J. Walker Downie in "Remarks on Intra-laryngeal injection in the treatment of Pulmonary Affections", Glasgow Medical Journal 1889 p.415, used first a solution of Menthol 10% or 15% in spirit, but finding that this caused more or less spasm of the glottis, he substituted olive oil as the vehicle, as follows :- Menthol 12%, Olive Oil 88%, adding to this sometimes Creasote 2%, more particularly in cases where the breath is foetid.

(f). Sir T. Grainger Stewart used this treatment for the first time in Bronchiectasis, and in the British Medical Journal for June 3, 1893, reports a very obstinate case of that disease, which after undergoing all the usual methods of treatment without improvement, was cured in a remarkable manner, by the injection twice daily of one drachm of a solution of menthol 10%, Guisacol 2%, Olive Oil 88%.

(g). Dr. Colin Campbell published a paper in the Medico Chirurgichal Transactions for November 1894, in which he advocated larger amounts being used e.g., four or even six drachms, twice a day.

(h). In the Twentieth Century Practise of Medicine Volume VI this method is recommended for the treatment of Bronchiectasis by Prof. Sir.T.G.Stewart and Dr. Gibson.

(i). Dr. J.A.Thompson in the Journal of the American Medical Association for June 26. 1897, recommends as the most serviceable solutions, Menthol 2%, Guiacol 1%, Creasote 1%, Camphor 2 or 3%, separately or in combination. He reports a cure of a case of Phthisis, and also of pulmonary syphilis; he further recommends it in acute bronchitis after free secretion is established, and always in chronic bronchitis.

(j). A resume of the whole subject is given by Dr. Ewart in Clifford Allbutt's System of Medicine, under the heading of Bronchiectasis.

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## II. Methods of Injection used :-

(a). Sehrwold in his experiments on dogs injected the fluid percutaneously into the trachea, by means of an ordinary hypodermic syringe; the mere puncture of the trachea involved, being quite free from danger and no more troublesome than an ordinary hypodermic injection. He found in some cases that much cough was induced at first, but he reduced this considerably by warming the fluid to the heat of the body before its injection, by making it of somewhat mucilaginous consistence, and also by injecting it, very slowly.

He found that in a dog weighing 16 lbs. the injection of 10 to 25 grammes of such fluid, was entirely without significance; 100 grammes were well borne and even quantities up to 250 grammes could with care be injected.

He considered the best antiseptics to be corrosive sublimate (1 in 5,000) boracic acid 5% and salicylic acid 1%. As to position he states that in the vertical position of the body, fluid in quantities of 10 cm. practically do not reach the apices of the lungs, but by varying the position of the body, the fluid can be made to pass to almost any part of the lung. He further states that :-

"It passes not only into the alveoli and permeates their surrounding tissues, but also reaches the peribronchial and pleural fibrous structures, and even penetrates the cartilages themselves. Outside the lungs the fluids, most markedly affect the bronchial glands, and, to a much less extent, the kidneys. The lungs absorb more quickly than the digestive tract, or even the subcutaneous tissue. The absorption can be delayed by placing the animal in a horizontal position, or by using fluids of greater specific gravity or more viscid consistence. It is also delayed in all pathological conditions of the lung.

The rapidity of absorption directly corresponds with the extent of the absorbing surface, so much so indeed, that the lung of a dog, in less than five days, can absorb four times its own weight of fluid.

In consequence of this, medicines act in smaller doses, and more rapidly through this channel, than when introduced into the body in any other way, the absorption through the lungs in this respect approaching most closely in rapidity to the intravenous

injection itself."

(c). Rosenberg as explained by Beehag in his paper in the Edinburgh Medical Journal in 1888, did not adapt the percutaneous method, but injected the fluid through the larynx into the trachea. He used a 20% solution of menthol in Olive Oil, which is as much as the oil will dissolve at the ordinary temperature. If a more concentrated solution be required, it may be obtained by warming, and so a highly concentrated solution is obtained, which however, will crystallise out again on cooling.

He recommends, especially when the disease is localised in the larynx, to make at each sitting, two or three separate injections of 15 m each, with the object to getting more directly at the part affected, and ensuring more prolonged contact with the parts. After each injection the patient is to inspire deeply, by which the cooling and anaesthetic effects of the menthol are increased. The injections are to be performed once or twice a day for a period of two months; this treatment by injection he combines with inhalation of the same solution, 5m in a pint of boiling water every hour, and also he uses the solution upon a respirator in the intervals.

(e). Walker Downie :- used for injecting special laryngeal tubes made to fit on to an ordinary hypodermic syringe; these are simple tubes of equal calibre throughout, and not ending in the form of a spray: they are made in three sizes, the difference

being in the size, and form of the curves.

As to the method of administration he says :-

"the point of the syringe should go below the level of the vocal cords, and should be in that position before the fluid is injected. As much as two drachms can in this way be injected, without the slightest inconvenience to the patient. An ordinary hypodermic syringe holds 25m to 30m, and I repeat the injection two or three times at each sitting. Applying it in this gradual way I never have patients coughing as they did when the same quantity was given at one injection by means of the large syringe."

(g). Colin Campbell says:-"I found the ordinary glycerine most irritating to the bronchial mucous membrane, but Price's Distilled Glycerine is not so. Menthol, Guaiacol, Creasote, Benzosal~~ic~~c can be kept in solution in Glycerine by heat." "I have found it best generally to empty a syringe holding about 100 m. at each squirt, and to repeat this 100m two or three times at each sitting."

"Differences will be found, strange to say, in the position of the rima glottidis with regard to the base of the tongue, and occasionally one finds a patient in whom the epiglottis habitually forms an acute angle with the rima.

The size of the rima, again, differs much in different patients,. To learn my way about, therefore, I always use laryngeal reflector<sup>a</sup> for the first few injections, and afterwards I work without one.

If, when the injection is delivered, the patient be directed to incline or lie on either side, it appears probable that the bulk of the fluid will gravitate in the desired direction. I have tried to inject patients whilst they were leaning to one side, but the result was unsatisfactory. At first I employ tongue traction, but after a few injections the patients do it, holding the tongue with their own pocket handkerchiefs, thus diminishing the risk of infection.

After each sitting the syringe should be washed out with a strong solution of carbolic acid.

If the operation be properly performed no inconvenience results - neither asphyxia (which has many times been suggested to me as impossible to avoid,) pain, nor even cough. At first, I confess, my patients grumbled much, but after a painstaking experience of a few dozen injections complaints became less frequent. Three mistakes are liable to occur:

- (1). Touching the fauces, base of tongue, epiglottis or rima glottidis with the nozzle of the syringe.
- (2). Squirting down the aesophagus.
- (3). Squirting during expiration.

If the first happen, efforts at vomiting usually result. If the second, gastric pain occurs, with unpleasant eructations when menthol or guaiacol is used. If the third, a feeling of suffocation follows, whilst some or all of the fluid intended for the lungs is returned into the mouth. These unpleasant

results can be avoided by great care in passing the tube through the mouth and fauces. When the nozzle of the tube is seen to be behind and below the top of the epiglottis, the tube should be rapidly passed into the larynx, and should fit the curve of the base of the tongue, and lie tightly against it, thus fixing the epiglottis and preventing spasm.

The squirt should be delivered like lightning - either with inspiration or during a slightly prolonged interval following expiration (except when used for laryngeal affections.)"

(i). Dr. J.A. Thompson recommends as the most serviceable solution, Menthol 2%, Guaiacol 1%, Creasote 1%, Camphor 2 to 3%. These may be used separately or in combination,. In acute diseases the menthol and camphor solution are most efficient. The vehicle used should be one of the light petroleum oils or olive oil. Alcohol and water are too irritating and produce violent coughing. There is ordinarily no spasm and but little cough or distress after an injection of the above solution. The dose is from one to four drachms. Where the remedies to be used are not irritating, it is not necessary to spray the larynx with cocain. The injection can be given whilst the patient takes a slow full inspiration.

The process can be repeated until a sufficient dose has been administered. Where strong solutions or those irritating to the larynx are to be employed, that organ must be anaesthetised.

The tip of a properly curved tube of a syringe is then introduced between and below the vocal cords, during inspiration and the whole dose given at once.

### III. Cases suitable for the Treatment.

(a). Walker Downie :- "In the number of my cases are included patients suffering from tubercular laryngitis with slight pulmonary implication, early phthisis pulmonalis, pulmonary cavities, bronchiectasis following long standing bronchitis and gangrene of lung."

(b). Colin Campbell gives a table of his cases which includes, phthisis at different stages, abscess of lung, asthma, chronic bronchitis, laryngitis, ulceration of larynx and haemoptysis.

(c). Thompson:- in addition to the above found the treatment very successful in a case of pulmonary syphilis.

(d). Sir. T. Grainger Stewart obtained excellent results in cases of Bronchiectasis.

### IV. Its mode of Action and Results.

(a). Beehag observes that menthol like the other oxyhydrocarbons of the volatile oils, is anaesthetic. It is also markedly antiseptic. Shortly after applying it to, say the larynx, pain and uneasiness disappear and dysphagia is much relieved, then after applying a few times the abnormal secretion is much diminished and the whole surface becomes

clearer and healthier; the ulcers finally heal, leaving beautiful smooth cicatrices. One also sees improvement in the pulmonary condition. Directly after the injection the patient experiences a remarkable <sup>ght</sup> likeness and freeness in the breathing. The sputa during the treatment gradually lose their *humular* character, become less and less purulent and finally disappear. There is a marked diminution in the cough and an improvement in the voice. The night sweats diminish, the bodily weight increases and the system generally is improved. With regard to the anaesthesia produced by menthol Rosenberg has pointed out its cumulative effect. "After the first injection" says Rosenberg, "the anaesthesia lasts from one to three hours, after the second or third still longer, so that after a week the effect lasts for a whole day". The antiseptic properties of menthol also are very marked, as has been experimentally proved by Koch and other observers upon various forms of bacteria.

(b). Walker Downie noted the following results :-

Immediate:- within at most one or two minutes of the administration of the injection, the patient experiences a warm sensation in the region of the sternum which is soon followed by what he describes usually as a comfortable glow all over the chest. He breathes more freely and when tightness or a feeling of constriction across the chest is complained

of, this is rapidly relieved by the menthol injection. There is also less inclination to cough. The freedom from the constant tickling cough which follows injection is in many cases very marked, and more so after the first few days. This is a very important point in the treatment of tubercular laryngitis.

Expectoration. - The expectoration becomes greatly reduced in quantity, and much less offensive. In several of the cases the purulent element entirely disappeared and what little expectoration continued to be discharged resembled the frothy expectoration of simple bronchitis.

Bodily Condition. - There was marked increase in weight in most of the patients thus treated, the explanation of which I think is twofold: (a) by relief from cough sleep was less broken and thus more satisfactory, and (b) the organs of digestion were in no way interfered with by the means used to attain this end."

Its Action. - "Regarding the action of Menthol so employed, I think we may regard it to be of a triple character. It is, first, a local anaesthetic. On account of this property we have relief from cough, and that in a way greatly to be preferred to the older fashion of administration of opiates by the stomach, with their consequent deleterious effects on alimentation. Secondly, administered internally, it is a powerful, though comparatively harmless

stimulant. Thirdly, it is an antiseptic, and, being of a highly volatile character, it is readily diffused throughout the whole lung. By its use in this fashion, we have an antiseptic brought as closely in contact with the affected surface as it is possible, certainly much more completely than is the case where inhalations are employed. The active ingredient used with an inhaler is to a very large extent absorbed on its way to the lungs by the moisture on the surface of the tongue, cheeks, fauces, pharynx &c., Here, we place the antiseptic within the trachea, from which it readily enters the larger bronchi, and all air inspired passing over this, becomes laden with the antiseptic and is carried onwards to the finer ramifications of the bronchi."

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V. Abstracts of My Own Cases.

(1). Thomas Godwin :- aged 50 years, suffering from Chronic Bronchitis, is married, trade - Brass-finisher, lives at 147, Moss Street.

- (a). History of present illness. He states that seven years ago, he was seized with a pain in the right side of his chest, whilst at his work. On account of this he was kept in the house for three months, during which time he suffered much pain in breathing. After this he worked for a year, then the pains came back again and this time were accompanied by a cough and shortness of breathing.

Since then, that is during the past six years, he has been unable to work at all, and has suffered from debility, pains in the sides of the chest, a cough and shortness of breath. For the past two years he has had "a spit."

- (b). Previous Health.:- Before the above-mentioned illness he says his health was quite good. Whether he has had syphilis is doubtful.
- (c). Social History.- Before this illness he was a Brass-finisher, earning good wages. Since then he has not had the food or comfort desirable. He was never a drinker.
- (d). Family History.:- Both his parents are still alive, the father being 79 and the mother 78. One brother who was an old soldier died of Influenza. another brother of drink. Two brothers are alive and well. One sister died at 45, the cause being unknown. Three sisters are alive and well.
- (e). Present Condition. The patient is emaciated and sallow. Is very short of breath after walking a short distance, and suffers from a "hard" cough. On percussion over the right apex the note is slightly impaired and at that spot are to be heard some coarse rales. Percussion and auscultation posteriorly at the bases give a negative result. Sputum is fairly copious and mucopurulent in character.
- (f). Treatment.:- On October 29th, 1897, an intracheal

injection was given of one drachm of the following:- Menthol 10%, Guaiacol 2%, Olive Oil 88%, and this was repeated on October 30, November 2, 3, 5 and 6. He says that after injection his cough is bad for a few hours, with much sputum. Then he feels clearer and easier. Says that after the injection, in about an hour he begins to feel warm and that this warmth lasts for several hours. Also that the breathing is clearer and the sputum got rid of more easily. He thinks it makes him constive. After the injection on November 6, he says that in an hour he felt very ill, with much pain in the chest and temples and "a queer feeling all over", and remained like this all night.

He refused to have any more injections. Subsequently I gave him at times an expectorant mixture. He died somewhat suddenly on January 11th, 1899.

2. Mrs. Carroll:- Congestion of trachea, aged 40, housewife, of 77, Moss Street,.
- (a). Present Condition:- (November 26.1897) For the last four or five days she has suffered from a raw, smarting feeling over the region of the larynx and trachea, along with a tickling cough. The laryngoscope shows a moderate amount of redness at the bases of the cords.
- (b). Treatment:- Injected one drachm of Menthol 10% Guaiacol 2%, Olive Oil 88%, and also gave internally

Rg. Liq. Ammon. Acetat. ʒ II Tinct. Camph.  
 Co. ʒ II Syrup. Ipecacuan ʒ II Aq ad ʒ 38 <sup>Sig.</sup> ~~Liq.~~ ʒ I  
 four times a day.

She said that after the injection she tasted it and had a warm feeling down the chest. It caused slight coughing, but no retching. The following night she was restless, but next day got gradually better. Nov. 29th she was nearly well.

This same patient was again under treatment in June 20th 1898 for Bronchitis, I then injected Menthol 2% Camphor 2% Paroleine 96%.

June 21st, said she felt better. Tried another injection but could not get into the trachea. Twice it went into the pharynx.

3. Henry Marshall: - 109, Wellbeck Street, aged 28. suffering from phthisis, single, for the past year has been engaged in the Mineral-water trade, from November 1896 to October 1897 - was a collector for a business in the United States.

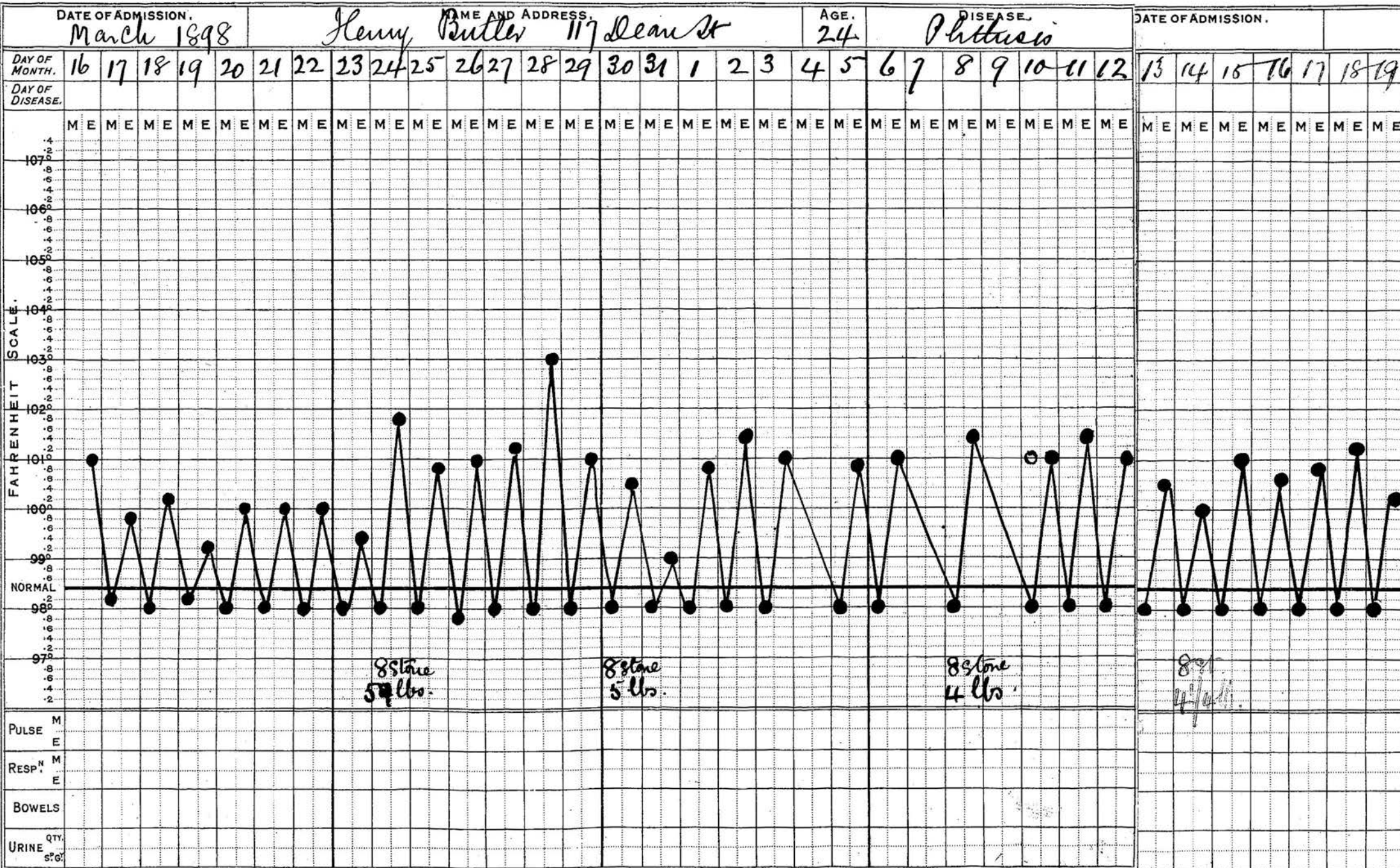
(a). History of present illness :- In November 1896, he commenced to suffer from hoarseness. Three years from the present time (January 98) he states that I treated him for dryness and weakness of the throat. In March 1897, he noticed some loss of flesh and diminution of appetite. In October 1897 a short cough came on and there was some sweating. The above symptoms have all continued unabated up to the present time, in spite of treatment by various

doctors in the United States and England.

- (b). Previous History. - he had suffered from no illness of any kind before consulting me three years ago.
- (c). Social Condition: - his parents are comfortably to-do workpeople.
- (d). Family History: - Parents are both alive and well. No brothers or sisters died. One brother and three sisters are alive and well.
- (e). Present Condition: - (Jan. 14. 98) He looks sallow and thin. Is quite hoarse, speaking in a whisper. He eats very little food. At the left apex in front, on percussion there is a slightly impaired note; the respiration is bronchial. At the end of deep inspiration one or two creaking sounds are heard.
- (f). Treatment: - Jan. 14. 98 put him on the following mixture.      Guaiacol M 16.    sp. Chloroform  
 3I Infus. Gentian 3ii.    Glycerine 3IV Aquam. ad  
 36 Sig. half an ounce thrice a day.
- His throat was very sensitive and I therefore sprayed it with cocain before injecting 3I of Menthol 10% Guaiacol 2% and Olive Oil 88%. This was repeated on Jan. 17, 19 and 21. The injection caused a slight cough afterwards and he said he felt it in the nose, mouth and chest. No further discomfort. As he was rapidly growing worse, and the injections did not seem to do any good, they were discontinued. He died on Feb. 13th, 1898.

4. Henry Butler :- living at 117, Dean Street, aged 24 years, suffering from phthisis, is single, Occupation, a piecer in the Cotton Mill.
- (a). History of present illness:- Some twelve months ago a cough began to trouble him, and he felt "not very well". For six months past he has had slight night sweats, and has lost a slight amount of weight.
- (b). Previous illness - none.
- (c). Social Condition:- is one of a comfortably situated working family.
- (d). Family History:- the mother died at 48 of "Neuralgia". The father is alive and well. A sister died of phthisis at 27. Another sister died of "decline" at 28. Three sisters are alive and well. Six brothers alive and well. (Since these notes were taken another brother has died of phthisis.)
- (e). Present Condition:- (March 7th 1899.) His face is pale and build slender. The right apex in front shows no dulness on percussion, but on auscultation numerous crepitations are heard with inspiration, but few or none with expiration. Weight five score fourteen pounds eighteen months ago he was six score. There is no hoarseness.
- (f). Treatment:- internally he was given my usual Guiacol mixture, and as an injection Guiacol 2% Menthol 1% Olive Oil 97%. His throat is easily

# Temperature etc. Chart.



seen with the laryngoscope. He takes the injection well.

March 7th.:- Says he slept better last night, also coughed and sweated less than usual. Injection given.

March 8. :- Says he was better again last night. After the injection he feels it warm to the middle of the sternum, not unpleasantly. No cough or vomiting after it. Injection given.

March 10.:- Had no injection last night. Says he missed it, he coughed more during the night than when he has had an injection. In an hour and a quarter after he has had an injection he begins to perspire slightly, and during all the evening he feels warm. Weight 5 score,  $15\frac{1}{2}$  lbs. Has gained  $1\frac{1}{2}$  lbs. Injection given.

March 12. :- Last night he did not perspire at all, only felt warm. The cough was rather troublesome. Injection. March 13, 14 & 15 daily injections.

March 16.:- Temperature and pulse chart commences here. He coughed last night very much until 3 a.m. Injection.

March 17.:- Up to now the injection has only been half a drachm, now began to give one drachm.

March 19.:- Had a fair night. His friends say he looks fatter. Injected menthol 2% Salvl. 2% Paroleine 96%.

March 20 :- Now injecting one and a half drachms

Says he has ceased to sweat at night lately.

March 24.:- Has gained  $1\frac{1}{2}$  lbs. in two weeks.

March 26. :-Altered injection to Camphor Menthol and paroleine.

March 28:- He has had some pains in the stomach during the past two or three days, with a rise of temperature. It did not come on after food or medicine.

March 29:- Temperature to-night is  $103^{\circ}$  although he seems no worse bodily. He says he has not eaten well for the last two days. Have given no injection to-day. After this date injections were given daily until April 20 when they were discontinued, as his condition did not show any particular alteration. He then ceased all treatment for a time. I was called in to see him next in January 1899, when he was suffering from acute pneumonia, and died after four days' illness.

5.

Joseph Mitchell :- of Back Portland Street, married, aged 39, an errand-man.

(a). History :- for nine or ten years he has suffered from chronic Bronchitis, severe in the winter and moderate in the summer. Lately it has become worse. He is short of breath on slight exertion, and becomes livid in the face. Coarse crepitations are heard all over the front of the chest. The expectoration is copious and muco-purulent.

(b). Treatment :- Oct: 20th, 1897 injected Guiacol

2% Menthol 2% Paroleine 96%. Also put him on an expectorant mixture with some digitalis.

23rd Oct: also 26th, 27th, 28th, 30th and 31st injected Menthol 10% Guiacol 2% Paroleine 88%.

After this date the injections were not continued, because he said they did him no good, that his cough was as bad as ever.

The first three injections in this case were made with some difficulty, on account of his throat being sensitive, after that quite easily.

6. Mary Alice Bowden:- aged 38, married, housewife at 154, Waterloo Road .

(a) History of Present Illness :- she has not felt strong since her last confinement eighteen months ago. She had influenza three months ago and since then has had a cough and lost flesh, also sweated at night.

(b). Present Condition :- (Nov. 28th, 1898.)

She looks worn and thin in the features, is of small stature and slight build. Over the upper part of the right lung there is dulness on percussion, and numerous hoarse rales are to be heard. Temperature at 8 p.m., 100° 8' pulse 112.

(c). Treatment :- She was put upon a Guiacol mixture internally and injection of menthol 10% Guiacol 2% Olive Oil 88%. She said the injection warmed her all over and kept her warm all night, also eased the cough. She had several injections but at

irregular intervals, as she had a long way to come. Then she was lost sight of. She did not seem to gain any benefit.

7. Robert McGovern :- aged 32, Tram-driver, living at 37, Turner Street, married.

(a). History :- A Doctor treated him for hoarseness two years ago and told him at that time he was weak in the chest. For the past six months he has been losing flesh, he has been hoarse for two weeks.

Has had a cough and frothy sputum for two years.

(b). Present Condition :- December 19, 1898. His build is rather spare, he has some colour in the cheeks. At the left apex in front there is flatness on percussion, and creaky rales to be heard.

(c) Treatment :- Dec. 19. He was put upon Guaiacol mixture internally and injections of Menthol 10% Guaiacol 2% Olive Oil 88%. Temperature 101°. Pulse 100. Weight 11 stone 2 lbs. Twelve months ago it was 12 st. 13 lbs. Dec 20:- Injection given. A part of the injection was returned. He says that he feels better. Temperature 100.  
Dec 21:- Injection. He very soon retches. Pulse 100. Temp. 98.8 at 9.30 a.m., Dec. 29:- Injection. A part of it came back. Temperature (morning) normal. Pulse 96.  
Jan. 3. 1899 :- The last injection made him cough for some time. To-day injected Menthol 2% Guaiacol 1% Olive Oil. Pulse 80. Temperature [3 p.m.] 99°. Is rather hoarse.

Jan 4:- Injection. Temp. (7.30 p.m.) 99°. Pulse 88.

Jan 6 :- Weight 10 st. 13 $\frac{5}{8}$  lbs. He has lost 2 $\frac{1}{4}$  lbs. since Dec. 21. He says the injections make him vomit his tea, therefore they were discontinued.

8. Joseph A. Holt:- Aged 25. Living at 171, Cotton Street, Cabinet Maker.

(a). History :- He says that he was quite well until two years ago, when he began to have a cough. He has lost flesh during the past two months. He sweats lightly at night.

(b). Present Condition :- Dec. 19. 1898.

Percussion over the right apex in front gives a note of slightly higher pitch than the one over the left apex. Over the right apex on auscultation expiration and inspiration are of equal length.

Temp. normal. Pulse 60.

(c). Treatment:- Dec. 19. 1898. He was put on a Guaiacol mixture internally and injections of Menthol 10% in Guaiacol 2% Paroleine.

Dec. 20:- He says his cough was much easier last night and all day to-day. Injection.

Dec. 21:- Says the cough is very much better, having only coughed two or three times to-day. Temp. normal. Pulse 60. Injection.

Dec. 23 :- Says his cough is almost gone and he feels almost well. Injected Menthol 2% Guaiacol 1%.

9. Mrs. Wilson:- Aged 30, housewife, 6 Lamb Street.
- (a). History :- At 21 years of age she began to suffer from Bronchitis for which she had to leave the Mill. She had suffered from it more or less ever since. She is always worse during pregnancy. She has not suffered from any other illness.
- (b). Present Condition :- January 9.1899. She is suffering from severe Bronchitis and emphysema, with typical signs. The sputum is large in quantity and frothy and at times she becomes very livid.
- (c). Treatment :- Jan. 10. Gave internally an expectorant mixture and injected Menthol 10% Guiacol 2% in Paroleine. This treatment was continued until the end of January. She then had still much sputum. Cough and copious coarse rales over the front of the chest, and at times a large flow of saliva. The injections were therefore discontinued, as they did no good.
10. Stephen Henry Marland:- Aged 29. Single, a Cotton Spinner. living at 3, Park Street.
- (a). History :- the present illness began about three months ago, when he began to feel short of breath in going up a hill or upstairs. During the last three weeks he has had some sweating in bed at night. For the past three months he has suffered from a cough, which is worse at night when he goes to bed. He spits a little phlegm when the cough is bad. He has lost flesh for about a month. Before

this illness he has never had occasion to consult a doctor. His parents both died when he was young of what cause he cannot say.

(b). Present Condition :- His appearance is that of moderate emaciation, his face is sallow. His height is rather below the medium. The features are sharp. He has a hacking cough. On percussion over the right apex in front, there is slight dulness. On auscultation here the respiration is bronchial, and with inspiration are heard a few dry crepitations. The tongue is coated behind. The bowels are moved three times a day and the motions are loose. Temp. (Jan. 28 7 p.m.)  $100^{\circ}$  Pulse  $96^{\circ}$ .

(c). Treatment :- Jan. 28th, 1899. He was put upon a mixture internally of Guaiacol, and injection of Menthol 2%, Guaiacol 1%, Paroleine.

January 30 :- Temp. (7 p.m.)  $101^{\circ}$  Pulse 120. Injected Menthol 10%, Guaiacol 2%, Paroleine 88%.

Jan. 31 :- Temp. (7 p.m.)  $100^{\circ}$  Pulse 120 $^{\circ}$ . He said the injection eased his cough last night. Injection.

Feb. 18th. :- Temp. (7.p.m.)  $99.4^{\circ}$  Pulse 112. Injection.

Feb. 3rd. Says he feels much better. Temp.  $100.4$  Pulse 120. Injected Thymal 5% Guaiacol 2%. Paroleine 93%.

Feb. 4 :- Says he feels stronger than he was a week ago, and also coughs much less in the night. Temp.  $98.4^{\circ}$  Pulse 118. Injection. Says the Thymal feels "keener" than the other

Feb. 6th:- Pulse 120. Temp. (7 p.m.) 99.4°.

Feb 7th:- Pulse 120. Temp. 100° . Injection. Says he is eating well. Slept well last night. Cough is much better. He has not sweated for the past fort - night. The crepitations still exist at the right apex. Diarrhoea is still troublesome, two or three times a day.

Feb 8th:- Pulse 120. Temp. (7 p.m.) 100°.

Feb 12th:- Pulse 108. Temp. (3 p.m.) 98.6° Injection. Weight 5 score 13 $\frac{1}{2}$  lbs. Diarrhoea only once or twice daily.

Feb. 13. Pulse 100° Temp. (7 p.m.) 100° Injection.

Feb. 29. Weight 5 score 14 lbs. A gain of  $\frac{5}{4}$  lbs.

He has had no injections since Feb. 15.

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6. GENERAL RESULTS.

(1). As the result of my observations on the above ten patients, I conclude that the most favourable cases for the intra-tracheal treatment, are those of early Phthisis and Tracheitis. Holt (8) and Marland (10) were such cases of early phthisis, and obtained marked benefit, in fact are both returned to their occupations in greatly improved health: the patient Holt improved remarkably in a few days, although he had had a cough for two years, and some loss of flesh for two months; the slight dulness in percussion over the apex, was however not cleared up by the treatment. Marland felt stronger, coughed less, began to eat well

and sleep well, and showed a gain in weight, also his sweating and diarrhoea were much lessened. These results may be taken as the usual effects of the intra-tracheal treatment, in suitable cases.

(2). In late Phthisis I found no real benefit at all e.g., Marshall (3) and Bowden (6). Both these were advanced cases. At first they seemed to think the cough was a little easier after the injection, and that they slept better at night, but the improvement was to me, so doubtful, that after a few trials I gave it up.

(3). Phthisis which is midway between early and late, is represented by Butler (4): this case took the injections steadily and easily, and improved under them in the matter of cough, sleep and sweating though no alteration in the physical conditions or in the temperature was observed. The reason of the rise of temperature in the week 23rd to 30th, is doubtful: it might be due to the injection causing inoculation of a fresh portion of lung, a danger which is apprehended by some. The injections had been given daily for sixteen days before this occurred, after that week the temperature fell, but still remained persistently higher than before.

(4). Carroll (2) Suffering from Tracheitis, represents a class which appears likely to be very amenable to the treatment, since here the fluids are brought into direct contact with the inflamed surface in a way which seems impossible for steamed or

vapourised medications. As a matter of fact, this one case was better in two days.

(5). The cases I treated of Chronic Bronchitis were practically not improved at all. This result may be due to the fact that they were all three of very old standing, and associated with emphysema, since Dr. Thompson has got satisfactory results in Chronic Bronchitis. Godwin (1) Mitchell (5) Wilson (9) Godwin said that at first it eased his cough, warmed his body and helped him to expectorate more freely: the last injection he insisted made him very ill, but this may have been an attack of dyspnoea due to his emphysema, induced by some exertion. Wilson and Mitchell gained no benefit whatever.

As to cases of Acute Bronchitis I have had no experience, neither of Syphilis of the lung which Dr. Thompson says yields to this treatment, nor of Bronchiectasis as recorded by Prof. Sir. T. Grainger Stewart.

In most of the patients the injections were made without any difficulty, and without the use of the laryngoscope. The patient holding down his tongue, the tip of the syringe is passed downwards, behind the base of the tongue, the patient told to inspire, and the injection delivered. After a few deep inspirations and a cough or two, there was usually no further trouble. In one or two the throat was so sensitive as to need spraying in preparation.

In McGovren's case, he was persistently sick on taking the first meal after the injection: since this was often in two hours' time it could hardly be from the fluid passing down the pharynx by mistake.

As to the mixture injected, four different ones have been used in the above quoted cases, viz :-

(a). Menthol 10%, Guiacol 2%, Olive Oil 88%.

This is Sir. T.Grainger.Stewart's Solution, and is usually very soothing to the cough and helps to sleep.

(b). Menthol 2%, Guiacol 1%, Paroleine 97%.

(c). Dr. Colin Campbell's mixture, made as follows :-

(a). Benzoesol 24 grains, rectified spirit  $\frac{1}{2}$  drachm: mix and add Price's Distilled Glycerine  $\frac{1}{2}$  ounce:

dissolve by heat. (b). Menthol 24 grains, rectified spirit  $\frac{1}{2}$  drachm. glycerine(as above)  $\frac{1}{2}$  ounce:

dissolve by heat. Mix a and b and keep at a temperature of 90° Fahr. or warm before using.

(d). Thymol 5%. Guiacol 2% Paroleine 93%. This combination was used with good effect.

(e). Duotal 2% Menthol 10% Paroleine 88%. This I have had made up but have not yet used.

Prof. Bayer of Brussels has lately used warmed creosotal in cases of tuberculosis and chronic bronchial catarrhs, injecting  $\frac{1}{2}$  to  $1\frac{1}{2}$  cub. cms. every second day.

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