

dans le Traitement de la Syphilis, 1909, p. 37.—34. Emery et Chatin: Thérapeutique Clinique de la Syphilis, 1909; Lévy-Bing: Les Injections Mercurielles Intramusculaires dans le Traitement de la Syphilis, 1909. See also Fournier, Le Traitement de la Syphilis; Gaucher, Traitement de la Syphilis, second edition; Lambkin, in A System of Syphilis, vol. ii., 1908, pp. 255 et seq.; Jacquet et Ferrand, Le Traitement de la Syphilis.—35. Lévy-Bing: Op. cit. (34), p. 22, Fig. 4.—36. Emery et Chatin: Op. cit. (34), Fig. 7.—37. Emery et Chatin: Op. cit. (34), Figs. 8 and 9, pp. 155 and 157.

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## AN INVESTIGATION INTO THE ACTION AND USES OF FIBROLYSIN IN MIDDLE-EAR DEAFNESS.

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IN 1892 von Hebra<sup>1</sup> published the results he had obtained with a 15 per cent. solution of thiosinamine in alcohol in the treatment of lupus and cutaneous scars. He used this solution by the injection method and showed that it had a very marked action in dissolving pathological fibro-cicatricial tissue. Thiosinamine is a substance which is chemically known as allyl-sulpho-urea. It is prepared from oil of mustard and occurs in colourless monoclinic or rhombic crystals with a bitter taste and an odour of garlic. It is an unstable compound, insoluble in water, but dissolving freely in alcohol. The physiological action of thiosinamine is, in the first place, to cause a diminution of the number of leucocytes in the blood, followed later by a very considerable increase. Its action on scar tissue is very definite. Macroscopically, after an injection a reddish scar, such as that after a burn, becomes paler, swollen, and more flexible, and the limited movements of the parts bound down by the scar tissue are increased in range, but after a short time these phenomena disappear. If, however, the injections are repeated at short intervals it is found that the above-mentioned conditions become permanent. Microscopically, turgescence is seen to take place in the individual connective tissue fibres; their outline becomes blurred and indistinct, the nuclei are pushed aside and appear more prominent, and the whole tissue becomes swollen and looser in texture. A curious feature of thiosinamine is that its action is only exerted on pathological fibrous tissue. The objections to its use are its instability, its insolubility, and the extreme irritation caused by the injection of its alcoholic solution. Felix Mendel<sup>2</sup> of Essen, however, discovered that by the combination of two molecules of thiosinamine with one of salicylate of soda a substance was produced which was easily soluble in water, was comparatively stable, and did not give rise to any irritation on the injection of its aqueous solution. To this substance—which retained all the properties of thiosinamine—was given the name of "fibrolysin."

I first saw the beneficial results obtained by its use some three years ago in two cases. The first was one of Dupuytren's contraction of the fingers, in which a fair, though not very good, result was obtained. The injections were given about once a fortnight, the fingers were frequently moved, and the hand was placed on a straight splint in the intervals; the result would in all probability have been much better had the injections been given twice a week instead of once a fortnight. The second was a case of Volkmann's contracture (the so-called ischæmic paralysis), in which a very excellent result was obtained after frequent injections. These results led me to think that fibrolysin might prove a very valuable therapeutic agent in the treatment of aural cases, and particularly in those where, as a result of suppuration or catarrh, a development of fibro-cicatricial tissue had taken place in any portion of the conducting apparatus of the ear.

In my first series of cases the results were not generally satisfactory; some cases certainly showed fair improvement, but the greater majority were in no way benefited. At this time I had been giving the injections once a fortnight, and I determined to increase them to twice a week and at the same time to apply it locally to the middle ear through an Eustachian catheter—a method employed with success

by André Horeau in connexion with thiosinamine. The results immediately improved. The method which I employ is to use one ampulla of fibrolysin containing 2·3 cubic centimetres—roughly 40 minims—as follows: 30 minims are injected subcutaneously into the upper arm, and 5 minims are insufflated through an Eustachian catheter into each middle ear. After an interval of 15 minutes massage is applied on each side for from three to five minutes by means of an oto-masseur. This routine is gone through twice a week for six weeks; if at the end of that time there is no definite improvement my experience is that the case is a hopeless one, and that it is useless to persevere with the treatment.

The cases in which I have systematically carried out this treatment are those of deafness and tinnitus resulting from (1) post-suppurative middle-ear catarrh, where there has been a cessation of discharge with formation of scar tissue and destruction or ankylosis of the ossicles; and (2) chronic dry middle-ear catarrh—i.e., non-suppurative catarrh—retracted membranes, with or without ankylosis of the ossicles.

The number of cases that have had the six weeks' treatment have been 68. Of these, 21 were cases of post-suppurative middle-ear catarrh and 47 were cases of chronic dry middle-ear catarrh. Of the 21 cases of post-suppurative middle-ear catarrh, 16 had tinnitus and five had no tinnitus. Of the 16 with tinnitus, four were complete failures; there was no improvement in hearing or diminution in the noises—indeed, one patient stated that she was much worse in both respects. Six had no improvement in hearing, but stated that the noises were less; two of these stated that the noises had completely ceased, and they thought they could hear a little better (this, however, was not borne out by the tests). Six showed good improvement in hearing to the tests, and stated that the noises were diminished in three, completely ceased in two, and no better in one. Of the five cases with deafness but with no tinnitus, two showed no improvement and three showed improvement. Of the 47 cases of dry middle-ear catarrh, 36 had tinnitus and 11 had no tinnitus. Of the 36 with tinnitus, 11 were complete failures; eight showed no improvement in hearing to the tests, but stated the noises to be diminished (completely ceased in two); and 17 showed improvement in hearing to the tests, and of these, six stated that there was no diminution in the noises (though in one they had become intermittent instead of being constant), eight stated the noises to be diminished, and three reported the noises to have quite ceased. Of the 11 without tinnitus, seven showed improvement to the tests and four showed no improvement.

In order to prove that it was the fibrolysin and not the Eustachian catheter and the oto-masseur which brought about the improvement, 15 of the above cases—all with tinnitus as well as deafness—were first treated by the catheter and massage for six weeks without having any fibrolysin, and their tests taken; they were then put on the fibrolysin course, and at the end of the six weeks of fibrolysin treatment their tests were again taken and the three sets of tests were compared. It was found that in seven out of the 15 there was no improvement in hearing, though two out of these seven reported diminution in the tinnitus. The accompanying table shows the improvement in the eight cases which received benefit—three of post-suppurative middle-ear catarrh and five of chronic dry middle-ear catarrh.

It will be seen that in Cases 1 and 5 there was a slight improvement in both ears after the six weeks' catheterisation and oto-massage, but a very much greater improvement took place under fibrolysin. It will also be noticed that the post-suppurative cases gave more consistently good results—i.e., greater improvement—than did the chronic dry catarrhs; moreover, in all the above, with two exceptions, the tinnitus was improved and in one it had quite ceased.

I turn next to the question of the permanency of the results obtained. Of the 16 cases showing improvement in hearing and diminution in tinnitus, ten were treated a year ago or over and have had no treatment since; four were cases of post-suppurative middle-ear catarrh. Of these one only has had a relapse in both hearing and tinnitus; in two the improvement in hearing is maintained, but the noises slightly returned; and in one the improvement in hearing is maintained and there has been no return of the tinnitus. Six were cases of the dry catarrhal type. Of these two have relapsed (one patient states that she is just as bad as ever, the other has had a return of the tinnitus and there is a slight diminution in

<sup>1</sup> Von Hebra: Intern. Klinische Rundschau, Sept. 11th, 1892.

<sup>2</sup> Felix Mendel: Therapeutische Monatshefte, February and April, 1905; and Therapie der Gegenwart, August, 1905.

Table giving the Results of Eight Cases after Treatment.

Number of case and nature of disease.	Tests applied and results.	Results after six weeks' treatment with Eustachian catheter and otomasseur.	Results after six weeks' treatment with fibrolysin.
Case 1. Double non-suppurative dry middle-ear catarrh.	<p>T. F. C<sup>1</sup> 256 { Meatus { R. -16                   { L. -15</p> <p>                  { Mastoid { R. + 7                   { L. +10</p> <p>                  { Rinné { R. - 7                   { L. -10</p> <p>Watch { R., 6 in.           { L., 4 ,,</p> <p>Whisper { R., 3 ft.           { L., 2 ,,</p> <p>Tinnitus.—A loud constant "buzzing" in both ears.</p>	<p>- 11 - 14</p> <p>+ 7 + 9</p> <p>- 8 - 9</p> <p>6½ in. 4½ ,,</p> <p>3½ ft. 2½ ,,</p> <p>Slightly diminished in both ears.</p>	<p>- 4 - 6</p> <p>+ 3 + 4</p> <p>- 3 - 5</p> <p>9 in. 7 ,,</p> <p>5 ft. 4 ,,</p> <p>Noises now intermittent and much diminished in intensity in both ears.</p>
Case 2. Double post-suppurative middle-ear catarrh.	<p>T. F. C<sup>1</sup> 256 { Meatus { R. -16                   { L. -19</p> <p>                  { Mastoid { R. +10                   { L. +12</p> <p>                  { Rinné { R. -11                   { L. -12</p> <p>Watch { R., 2½ in.           { L., 2 ,,</p> <p>Whisper { R., 1 ft.           { L., 8 in.</p> <p>Tinnitus.—Constant "ringing" in both ears.</p>	<p>- 16 - 20</p> <p>+ 11 + 12</p> <p>- 10 - 12</p> <p>2½ in. 1½ ,,</p> <p>1 ft. 6 in.</p> <p>No improvement.</p>	<p>- 9 - 10</p> <p>+ 4 + 6</p> <p>- 8 - 8</p> <p>5½ in. 5 ,,</p> <p>3 ft. 2 ,,</p> <p>Much diminished.</p>
Case 3. Double non-suppurative dry middle-ear catarrh.	<p>T. F. C<sup>1</sup> 256 { Meatus { R. -20                   { L. -14</p> <p>                  { Mastoid { R. +10                   { L. + 8</p> <p>                  { Rinné { R. -11                   { L. - 6</p> <p>Watch { R., 2 in.           { L., 3 ,,</p> <p>Whisper { R., 1½ ft.           { L., 2½ ,,</p> <p>Tinnitus.—Constant "buzzing" in both ears.</p>	<p>- 20 - 12</p> <p>+ 8 + 8</p> <p>- 10 - 6</p> <p>2 in. 3½ ,,</p> <p>2 ft. 2 ,,</p> <p>No improvement.</p>	<p>- 10 - 8</p> <p>+ 4 + 6</p> <p>- 6 - 5</p> <p>6 in. 4 ,,</p> <p>4 ft. 3 ,,</p> <p>"Thinks noises are much better."</p>
Case 4. Double post-suppurative middle-ear catarrh.	<p>T. F. C<sup>1</sup> 256 { Meatus { R. -14                   { L. -10</p> <p>                  { Mastoid { R. +10                   { L. + 6</p> <p>                  { Rinné { R. - 8                   { L. - 5</p> <p>Watch { R., 4½ in.           { L., 6 ,,</p> <p>Whisper { R., 3 ft.           { L., 4 ,,</p> <p>Tinnitus.—Constant loud "hissing" in both ears.</p>	<p>- 15 - 8</p> <p>+ 11 + 5</p> <p>- 9 - 5</p> <p>4 in. 7 ,,</p> <p>3 ft. 5 ,,</p> <p>Slightly diminished.</p>	<p>- 8 - 5</p> <p>+ 3 + 2</p> <p>- 4 - 2</p> <p>10½ in. 24 ,,</p> <p>6 ft. 10 ,,</p> <p>States that he very rarely has any noises now.</p>
Case 5. Double post-suppurative middle-ear catarrh.	<p>T. F. C<sup>1</sup> 256 { Meatus { R. -26                   { L. -16</p> <p>                  { Mastoid { R. +14                   { L. +12</p> <p>                  { Rinné { R. -14                   { L. - 8</p> <p>Watch { R., 2 in.           { L., 3 ,,</p> <p>Whisper { R., 1 ft.           { L., 2 ,,</p> <p>Tinnitus.—Constant "roaring" in both ears.</p>	<p>- 24 - 15</p> <p>+ 14 + 11</p> <p>- 13 - 8</p> <p>2 in. 3½ ,,</p> <p>16 ,, 2½ ft.</p> <p>Slightly diminished.</p>	<p>- 8 - 6</p> <p>+ 6 + 4</p> <p>- 7 - 4</p> <p>12½ in. 18 ,,</p> <p>3 ft. 5 ,,</p> <p>Noises markedly diminished and intermittent in left ear. Much diminished but constant in right ear.</p>

Table giving the Results of Eight Cases after Treatment—(Continued).

Number of case and nature of disease.	Tests applied and results.	Results after six weeks' treatment with Eustachian catheter and otomasseur.	Results after six weeks' treatment with fibrolysin.
Case 6. Double non-suppurative middle-ear catarrh.	<p>T. F. C<sup>1</sup> 256 { Meatus { R. -20                   { L. -34</p> <p>                  { Mastoid { R. +14                   { L. +18</p> <p>                  { Rinné { R. -12                   { L. -17</p> <p>Watch { R., 1 in.           { L., 0</p> <p>Whisper { R., 1 ft.           { L., 8 in.</p> <p>Tinnitus.—Loud, constant "buzzing" in both ears.</p>	<p>- 20 - 31</p> <p>+ 12 + 16</p> <p>- 12 - 16</p> <p>1½ in. 0</p> <p>1 ft. 10 in.</p> <p>Same.</p>	<p>- 8 - 16</p> <p>+ 6 + 12</p> <p>- 5 - 9</p> <p>10 in. 2 ,,</p> <p>4 ft. 1½ ,,</p> <p>States noises are not so loud as formerly.</p>
Case 7. Double non-suppurative middle-ear catarrh.	<p>T. F. C<sup>1</sup> 256 { Meatus { R. -25                   { L. -28</p> <p>                  { Mastoid { R. +14                   { L. +16</p> <p>                  { Rinné { R. -10                   { L. -12</p> <p>Watch { R., C.           { L., C.</p> <p>Whisper { R., 1½ ft.           { L., 1 ,,</p> <p>Tinnitus.—Loud, constant "ringing" in both ears.</p>	<p>- 26 - 24</p> <p>+ 14 + 15</p> <p>- 10 - 11</p> <p>C. ½ in.</p> <p>2 ft. 1½ ,,</p> <p>Same.</p>	<p>- 14 - 12</p> <p>+ 10 + 8</p> <p>- 8 - 7</p> <p>2 in. 4½ ,,</p> <p>2½ ft. 3 ,,</p> <p>No improvement.</p>
Case 8. Double non-suppurative middle-ear catarrh.	<p>T. F. C<sup>1</sup>. { Meatus { R. -10                   { L. -18</p> <p>                  { Mastoid { R. + 6                   { L. +12</p> <p>                  { Rinné { R. - 7                   { L. -11</p> <p>Watch { R., 2 in.           { L., ½ ,,</p> <p>Whisper { R., 2 ft.           { L., 14 in.</p> <p>Tinnitus.—Constant loud "buzzing" in both ears, especially marked in left ear.</p>	<p>- 10 - 19</p> <p>+ 6 + 13</p> <p>- 7 - 12</p> <p>2½ in. ½ ,,</p> <p>2½ ft. 1 ,,</p> <p>Same.</p>	<p>- 8 - 10</p> <p>+ 4 + 6</p> <p>- 5 - 7</p> <p>4 in. 3 ,,</p> <p>4 ft. 2 ,,</p> <p>No improvement.</p>

T. F. = tuning-fork. C. = contact. R. = right. L. = left.

the hearing power); four have retained their improvement in hearing, but in two of these there has been in one in whom the noises had quite disappeared an occasional return of the tinnitus, and in the other in whom the noises had considerably diminished there has been a slight increase. Two have retained their improvement in both respects.

Conclusions.—To epitomise briefly the results obtained it will be seen that of the 52 cases of deafness plus tinnitus the hearing improved and noises diminished in 16 (noises quite ceased in five of these); hearing improved, but noises not diminished in seven; noises diminished, but no improvement in hearing in 14 (in four of these the noises have quite ceased), and no improvement in hearing and no diminution of noises in 15. In the 16 cases of deafness without tinnitus, ten showed improvement to the various tests.

From the results obtained it would appear that this method of treatment was more successful in the non-suppurative than in the post-suppurative cases; but whilst this was so in regard to the percentage of cases showing improvement in hearing and diminution in tinnitus, yet when taken from the point of view of the amount of improvement produced the post-suppurative cases gave far better results; and I arrived at the conclusion that the fibrolysin treatment is by far the best treatment in this class of case—the earlier the case is treated after cessation of the discharge and formation of the scar tissue the better the prognosis. I think that from the results obtained it will be seen that in cases of non-suppurative middle-ear catarrh this method of treatment gives much

better chances of improvement than any other. I must, however, make an exception in the atrophic variety of non-suppurative middle-ear catarrh—the variety in which one finds, on examination with a Siegle's speculum, a very thinned tympanic membrane with an abnormal amount of movement, with marked outward bulging on the application of suction. In this type of case fibrolysin proved quite useless. In true oto-sclerosis the results obtained with fibrolysin were very poor; only two out of 15 showed any improvement, and that very slight.

In only one of my cases were there any bad symptoms produced by the injections. This was a case of a young woman, aged 25 years, with double non-suppurative middle-ear catarrh of two years' duration. She was put on the fibrolysin course, but this had to be stopped owing to her developing marked vertigo after each injection. A number of other cases in which bad symptoms have followed the injections have been reported from time to time,<sup>3</sup> but the above was the only one in my personal experience.

I must, in conclusion, express my thanks to my late clinical assistant at the Great Northern Central Hospital, Dr. Edgar Brown, for having very carefully taken the various tests and kept the records of the cases.

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## THE FATE OF DAMAGED JOINTS:

A STUDY OF CASES OF INJURY, PRINCIPALLY FRACTURES, INVOLVING JOINTS TREATED IN THE MASSAGE DEPARTMENT OF THE LONDON HOSPITAL.

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(Concluded from p. 141.)

### The Wrist.

THE most striking feature of this series is the enormous predominance of Colles's fracture; 103 cases out of 110 were of this nature. Taking the remaining seven cases first, these consisted of two cases of sprained wrist, which did well in from two to three weeks (the patients were seen a year or more afterwards); two cases of fracture of the styloid process of the radius, both of which did well in from six to eight weeks. One case of splitting off of a flake of the lower part of the radius, including the lower radio-ulnar articulating surface (this case showed a very fair result a year later); one case of fracture of the styloid process of the ulnar alone (not traced); and one case of fracture of the scaphoid and probably also of the trapezium and trapezoid (this patient attended for five weeks and did not show satisfactory progress when last seen).

*Colles's fracture.*—Of this group 91 were recent cases of fracture, and 12 were cases of some standing before massage and exercises were commenced. In judging the results the following standard has been used: 1. Very good: Subjectively perfect for any sort of work; in some cases slight deformity was present. 2. Good: Able to do heavy work—e.g., as labourer, cobbler, washing, and wringing, but with a little pain at times and perhaps slight deformity. 3. Very fair: Able to do fairly hard work—e.g., washing but not wringing, i.e., some weakness present. 4. Fair: With a fairly strong grip, and able to do light work—e.g., sewing but not heavy work or washing. 5. Bad: Unable to work at all from swelling, stiffness, and pain.

It will be noted how much the occupations of women came into this list, a natural consequence of the preponderance of middle-aged and old females amongst the subjects of this fracture. Twenty-one cases were not traced, slipping away in the earlier part of treatment. Of the 70 cases traced, the results were as follows: Very good, 12; good, 36; very fair, 7; fair, 9; and bad, 6. In other words, two-thirds of the cases were useful working results, while 1 case in 12 was hopelessly bad.

*Age.*—Taking now the various factors which influence results, one of the more, possibly the most, important is age. This is shown by the average ages of the various results which were as follows: Very good, 48; good, 43; very fair, 49;

fair, 47; and bad, 59. The subjects of the cases which did badly were on the average ten years older than the other patients. That age, however, is no bar to good recovery is shown by the good results in two cases in which the patients were over 70 years of age, and in eight cases in which they were over the age of 60 years. Under 40 years of age all cases showed good or very good results.

*Length of time of fixation.*—The time during which the joint is kept fixed before massage and movement are begun is important. Thus of cases kept splinted for less than 14 days before massage, 37 were good and seven were not good—i.e., very fair to bad; of cases kept splinted for from three to six weeks, nine were good and six were not good.

*Severity of fracture.*—In this series only a quarter of the cases X rayed showed fracture of the styloid process of the ulna; the usual percentage given is about 50. Of nine cases with fractured styloid process of the ulna, seven were good and two were bad—i.e., 1 case in 4 was bad, a higher percentage than is shown by the series as a whole.

*Deformity and results.*—Gross deformity is apt to be associated with poor result, yet several cases with bad deformity had good working hands and wrists. Of seven cases with bad deformity three were good, one was fair, and three were bad as regards function. As was previously mentioned, the bulk of the cases showed slight deformity, about one-sixth of the cases being perfect anatomically. The results, then, in cases where the styloid process of the ulna is fractured and where deformity is great show the importance of the initial damage in the prognosis.

*Duration of treatment.*—The time required for treatment varied from about three to 30 weeks, depending on the length of preliminary splinting and fixation and on the age, as the following table shows, for cases in which the results were good or fair.

Number of cases seen.	Weeks treated, average of	Average of fixation in weeks.	Average age.
7	2-4	1	34
12	4-6	1½	44
8	6-8	1¾	53
12	8-12	2½	47
9	12-18	3½	60
2	18-24	3½	50
2	24-30	4	70

The duration of fixation would seem from these figures to be of more importance than the age of patients in prolonging the time necessary for treatment.

*Conclusions about Colles's fracture.*—1. The length of time necessary for treatment before function is restored varies with the length of time the joint is fixed on a splint before massage and movements are instituted. 2. Reduction of the fracture is generally possible to some degree, but seldom entirely. 3. Fixation must be very limited both in amount and duration; an anterior cane splint acts well; a posterior splint is injurious to the tendons and ligaments at the back of the wrist and should not be used, strapping should on no account be applied, and bandaging should be very light. 4. In cases where deformity is slight and does not tend to increase, good results may be obtained without using splints. 5. A splint helps to prevent deformity, though the latter cannot be completely prevented by a splint; and excessive deformity may lead to impaired use of the limb. 6. Deformity, then, although not of prime importance, is best avoided if possible, but stiffness of joints and tendons is a worse evil than deformity. 7. One to two weeks on a splint will generally suffice, but in hospital practice another week may be advisable, as these patients often try to do things with the hand which are too much for the weak state of the wrist and may lead to increased stiffness and deformity. 8. Massage and finger movements should be started on the third day at latest; the wrist can be gently moved at the end of a week. 9. Exercises: In from two to four weeks, according to the state of the wrist, stronger active movements can be indulged in. We find that flexing and extending movements of the wrist combined with gripping are most beneficial; this is accomplished by means of a roller of varying diameter (to suit different ranges of grip) arranged like the roller of a jack-towel, but prevented from rotating too easily by graduated friction at one end. The patient practises rotating the roller against the friction, which is increased as the wrist grows stronger, in both directions. In some cases pronation and supination exercises are also necessary. For active movements a handle can be used,

<sup>3</sup> Karl Grossmann: THE LANCET, Jan. 16th, 1909; and Glas: Wiener Klinische Wochenschrift, No. 10, 1903.