
**A Critical Study of Tuberculin and
Allied Products Based Upon a
Collective Investigation.**

READ AT THE THIRTIETH SEMIANNUAL MEETING OF THE SOUTHERN
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*A CRITICAL STUDY OF TUBERCULIN
AND ALLIED PRODUCTS BASED UPON
A COLLECTIVE INVESTIGATION.*

BY F. M. POTTENGER, PH.M., M.D.

When our worthy president requested me to prepare a paper to be read before this section treating upon the subject of tuberculin and allied products, I thought best to make the basis of the paper a collective investigation. Accordingly I sent out three hundred and twenty-five letters to some of the leading clinicians of this country and Europe, taking pains to include the names of those whom I knew to be especially interested in the subject of tuberculosis, requesting answers to the following:

1. Have you had personal experience in the use of tuberculin or other culture products in the treatment of tuberculosis?

2. How many cases have you treated? What was the average period of treatment? What was the result of treatment?

3. What is your opinion of their value, and do you favor their use in the treatment of tuberculosis?

I have received one hundred and forty-three replies answering my questions

either wholly or in part. That you may know the value of this investigation I will mention that replies have been received from such leaders in the crusade against tuberculosis as Schroetter and Weismayer, of Austria; Gehrhardt, Dettweiler, Weicker, Krause, Goetsch, Bandelier, Gebhardt, Johne, Koehler, Rietchel, and Moeller, of Germany; Turban and Spengler, of Switzerland; Brouardel, of France; Giovanni, of Italy; Ransome, Heron, Latham, Mackenzie, Semon, Yeo, and Saundby, of England; and Trudeau, Bowditch, von Ruck, Loomis, Stubbart, Solly, and Denison, of the United States; and from many more besides who occupy eminent positions as clinicians.

For the kind and painstaking replies of those who assisted me in this investigation I wish here to openly express my appreciation. The cordial letters which I have received show an interest which is highly gratifying, and indicate that the profession does not bear that hostile attitude toward these remedies that it formerly did. While the medical profession is naturally conservative, yet it is progressive, and is constantly taking advantage of new methods of curing disease, and today it stands ready to sanction at least, if not adopt generally, any remedy or any method that will aid in the cure of tuberculosis, that disease which has so long baffled its skill.

An analysis of the replies to my inquiry shows the probable reason why cer-

tain members of the profession have failed to secure satisfactory results from the use of these culture products, while others have obtained such gratifying results.

Of the one hundred and forty-three who replied, thirty-two, or 22.4 per cent, recommended their use; fifty-two, or 36.3 per cent, did not recommend them; while fifty-nine, or 41.3 per cent, expressed no opinion at all. Of the fifty-two who did not recommend them, thirty-four expressed themselves as not being opposed to them, but simply not being convinced of their value; although twelve of these acknowledged that the remedies had contributed to cures in their hands. Eighteen were absolutely hostile.

Of those replying, the answers were based on personal experience in fifty-four instances. Of these, thirty-two, or 60 per cent, believed these remedies to be of value in treatment, while twenty-two, or 40 per cent, did not recommend them.

This is a much better showing than I thought possible. These remedies have certainly gained friends during recent times. It was a great surprise to find that 38 per cent of those expressing an opinion were favorable, and only 21 per cent absolutely hostile. No less a surprise was it to find that 60 per cent of those who had had experience with the remedies recommended them.

Thirty-four gave me an opinion as to the diagnostic value of tuberculin also. Of these only one was opposed; but he

was so terribly afraid of the remedy that he was not sure that it should even be used upon cattle. He certainly has not read the statistics of veterinarians upon this point. Bang has collected reports from numerous tests made upon cattle without ill results following in a single case. McEachran² reports 22,023 cattle tested in which harm was not recorded in a single instance. Jones, of Rochester, in a letter to the writer, relates his experience upon cattle during the past four years. He has tested 12,000 animals without observing ill effects, and says that examination of the carcass after slaughter always verified the diagnosis. From his experience he is enthusiastic over the test both for cattle and man. Dr. J. M. Anders³ collected statistics of 3638 tests given upon the human subject, and reports that ill effects were not recorded in a single instance. Koch⁴ also has observed over 3000 tests upon the human subject without harm. Certainly these experiences should be sufficient to place the tuberculin test upon a safe basis.

Judging from the replies received, much of the disappointment and failure to observe improvement upon the part of those who have tried tuberculin and other culture products, as well as of the harm done, has been due not only to an insuf-

²McEachran: Transactions of the British Congress on Tuberculosis, vol. iv, p. 114.

³Anders: Trans. Am. Clim. Ass., 1900.

⁴Koch: Trans. Brit. Cong. on Tuberculosis.

ficient understanding and faulty application of the remedies, but also to an inadequate knowledge of the disease which they were attempting to treat. General practitioners and surgeons began the employment of tuberculin without any special preparation or fitness for the work, and the result is about what should have been expected, about the same as would be produced if the same men without any previous preparation should begin to examine eyes and fit glasses. With such a trial, condemnation would be a foregone conclusion.

When Koch gave tuberculin to the world, medical men knew little of tuberculosis. Even the pathologists knew little of the minute pathology of the disease. Few men had ever paid close attention to its clinical course. Tubercular patients had never been watched day by day from the time the disease made its first invasion of the tissue. When men began observing, as was necessary in the administration of tuberculin, they were surprised to find that the disease runs an uneven course, and not knowing what else to ascribe the unfavorable periods to blamed many of them upon the remedy. Patients may get worse, as many of them do, under hygienic and dietetic treatment—periods of absorption, fever due to mixed infection and cavity formation, are apt to come in all cases at all far advanced—but this is not ascribed to the treatment. Let this same thing happen if cul-

ture products have been used, and it is ascribed to the remedies. When post-mortems were made on tuberculin-treated patients during the early period of its use, everything found was attributed to the remedy; when exactly the same thing could have been found in cases treated without it, or in those without treatment. I want to emphasize this one point: The effects of culture products upon the course of tuberculosis cannot be judged without an understanding of the natural clinical course of the disease; neither can the post-mortem effects be judged without a knowledge of the post-mortem findings where culture products are not used. So, as essentials to successful tuberculin treatment, I would place a knowledge of the natural course of the disease, a thorough training in pathology, and the ability to interpret the pathology ante mortem by the clinical course and physical signs.

No less essential is it to understand the remedy to be applied. It is not only necessary to know what it will do, but equally necessary to know what it cannot do. The application of remedies to disease is a responsible study. This responsibility increases with the gravity of the disease to be treated and the activity of the remedy to be employed. Therapeutic exactness, although always to be desired, is absolutely necessary at certain times. Suppose that a physician hears that strychnine is a good remedy for giving tone to the nervous system, and that, in

order to obtain best results, it must be given in ascending doses. Without studying the remedy, he begins. Soon the patient has a convulsion. He gives him another dose, larger, because in order to obtain results "it must be given in ascending doses." Another convulsion occurs. Soon the patient dies. It is very likely that this physician would ascribe the death of this patient to the remedy instead of to the improper use of it; and, of course, would fear to use it ever after. Such an order of therapy gave tuberculin a stunning blow when it was first introduced. No one knew much about it, and, furthermore, no experience had been recorded from which to gain knowledge. If there ever was a remedy that demanded therapeutic exactness, it is tuberculin. Here we have a disease which is grave and a remedy most powerful—powerful for good, if administered rightly; powerful for evil, if administered wrongly.

That the hostility to culture products is due to therapeutic inexactness is shown by my replies. Of the eighteen hostile critics, nearly all based their opinion upon trials of tuberculin when first introduced. Few of them have tried the newer preparations, which are more perfect, nor have they learned the careful manner of employing them now in use.

Those who recommend them base their opinions upon a total experience of 5742 cases treated. Those who do not recom-

mend them have had experience in 813 cases.

Of those who did not recommend them, only four had had an extensive experience. One treated 150 cases from four weeks to twelve and fifteen months. He says: "Curative value, especially in the hands of the general practitioner, is doubtful. Further experience in sanatoria and under close inspection for long periods seems advisable."

Another, who had experience in about 100 cases, does not give the average time of treatment, but says that he saw no advantage over ordinary treatment except in five or six cases.

Another used old tuberculin and tuberculocidin for three years after their introduction, treating 230 cases from five to ten weeks, with negative results. He does not "at present favor their use, but favors keeping an eye on this line of treatment."

A fourth treated 141 cases from three and a half to four and a half months, but abandoned it in the year 1891. He does not consider the newer preparations as dangerous, but does not believe that they would be active in the small doses recommended.

It is noteworthy that none of these men are hostile in their attitude. Two of them have had no experience in recent years.

Aside from these four, only one man tried the remedies on a case for as long a

period as six months, and only two others had tried them as long as three months. The rest mention from two weeks to two months. So, of the fifty-two men who did not recommend them, only six (granting that the one who treated 100 cases used the remedies more than three months) had tried the remedies on a case for three consecutive months. It takes three months to cure a very early stage case; and the danger of relapse is lessened if the time is extended longer. So we can say that, in the light of recent developments in the use of culture products, the failure to recommend them on the part of those who answered my inquiries (and I believe the same will hold good throughout, for my answers are from representative men) was based, with few exceptions, upon faulty and insufficient trial.

Contrast the short period of treatment employed by those who do not favor their use with that of those who favor it. Of the latter, one man was convinced of their value by trying them for two months. Three gave three months; and the remaining twenty-eight gave from three months to more than one year as the time necessary in order to bring about a cure. Petruschky⁵ believes the best results are obtained by extending the treatment over several years, giving a course of a few months each year.

I did not undertake to gather statistics

⁵Petruschky: "Zur Koch'schen Tuberculin Behandlung." Rep. Berlin Cong.

as to the stage of the disease in which the trial was made, but many made mention of it in their replies—enough to show that it was not made in suitable cases. When a new remedy is on trial, it should be used in cases over which it is known to have an influence, and then, after succeeding in these, it is time to experiment in new fields.

The test of a remedy is that it should do what it is recommended to do. Than this no more can be asked. Will antitoxin cure diphtheria? Yes, if administered early. Will it cure when the patient is moribund? It is not likely to do so. This is not held against antitoxin, however earnestly we wish that it might control these advanced cases. The success of antitoxin treatment depends upon the earliness of its administration, and in spite of the fact that men have failed to secure results in severe, advanced cases, the remedy stands approved, for antitoxin will do that for which it is recommended.

Culture products are remedies to be used in *tuberculosis*. That is what they are recommended for. *They are not represented as having any influence over dead tissue, or as being able to regenerate cells that have been destroyed.* If they will contribute to the cure in pure tuberculosis—that is, in incipient cases before mixed infection, or breaking down with absorption, occurs—they will do all that should be asked of them. They will then stand as remedies of value in treatment.

Unfortunately, tuberculosis is a chronic disease, and results are obtained slowly. If culture products could produce their results as quickly as antitoxin, their adoption would be quick and certain. Few men have the patience to work and wait months for the result; but unless they do, they must not hope to become successful phthisiotherapists.

That these remedies will do what is claimed for them is proven by the results obtained by those who have had experience with them, as shown in the following:

Jessen⁶ treated 14 first-stage cases, curing 14, or 100 per cent.

Goetsch⁷ treated 356 first-stage cases, curing 278, or 78 per cent.

Trudeau⁸ treated 24 first-stage cases, curing 20, or 83 per cent.

Von Ruck⁹ treated 105 first-stage cases, curing 98, or 93 per cent.

Rembold¹⁰ treated 16 first-stage cases, curing 12, or 75 per cent (six years after).

Turban¹¹ treated 20 first-stage cases, curing 20, or 100 per cent.

⁶Jessen: *Centralbl. f. inn. Med.*, 1902, No. 23.

⁷Goetsch: Personal letter to the writer.

⁸Trudeau: *Trans. of the Ass. of Amer. Physicians*, 1900.

⁹Von Ruck: *Journal of Tuberculosis*, vol. i, p. 23; *Clin. Rep. of Winyah Sanitarium*, 1899 and 1900; *Therapeutic Gazette*, May, 1896.

¹⁰Rembold: Quoted by Wilkinson. *British Medical Journal*, June 7, 1902.

¹¹Turban: *Beiträge zur Kenntniss der Lungentuberkulose*.

Wilkinson¹² treated 12 first-stage cases, curing 12, or 100 per cent.

Petruschky¹³ treated 18 first-stage cases, curing 18, or 100 per cent.

Klebs¹⁴ treated 14 first-stage cases, curing 14, or 100 per cent.

Pottenger¹⁵ treated 10 first-stage cases, curing 10, or 100 per cent.

Here we have for consideration 589 cases in the first stage of the disease treated with tuberculin and allied products. Of this number 496, or 84.2 per cent, were apparently cured. This is certainly enough cases upon which to base an opinion, and our verdict must be that culture products stand the test and accomplish that for which they are recommended, namely, the cure of pure tuberculosis. This is all the more emphasized when we compare these results with those obtained without culture products in the same purely tubercular cases:

Bowditch¹⁶ treated 66 first-stage cases, curing 39, or 59 per cent.

¹²Wilkinson: Observations on Tuberculin as a Remedy in Treatment of Tuberculosis of the Lungs. *British Medical Journal*, June 7, 1902.

¹³Petruschky: Spezifische Behandlung der Tuberculose. Paper before the 71st assemblage of the German Naturalists and Physicians, Munich, 1899.

¹⁴Klebs: *Berlin klin. Wochenschrift*, 1902, No. 23.

¹⁵Pottenger: Unreported.

¹⁶Bowditch: Report of Mass. State Sanatorium at Rutland.

Clapp¹⁷ treated 82 first-stage cases, curing 53, or 64.6 per cent.

Trudeau¹⁸ treated 300 first-stage cases, curing 204, or 68 per cent.

Stubbert¹⁹ treated 163 first-stage cases, curing 95, or 58 per cent.

This table furnishes us with 611 cases, all of which were not only in the first stage of the disease, but all of which had the advantage of sanatorium treatment. Of this number 391, or 64 per cent, were apparently cured. Now we must admit one of three things: either the difference is accidental, or those who use culture products are the abler men and more successful in their treatment, or that culture products do contribute materially to the cure. The first we cannot believe, and if either of the latter alternatives be true, they speak well for the remedies, for if the ablest men in the field of phthisiotherapy are convinced of the value of these remedies, we should certainly give their opinions weight; and, on the other hand, if they are no more skilled but are able to produce better results, curing 20.2 per cent more patients by the use of them than can be cured without them, we should certainly be convinced of their value.

It is a notable fact, and one which my replies bear out, that nearly all men who have determined to give culture products a thorough test have become convinced

¹⁷Clapp: *Ibid.*

¹⁸Trudeau: Reports of Adirondack Cottage Sanitarium.

¹⁹Stubbert: Reports of Loomis Sanitarium.

of their value. As stated above, only five men who had given them a trial of six months failed to recommend them. On the other hand, those we had given them a trial of several months in suitable cases, and whose experience had extended over several years, with the exceptions mentioned, recommended their use.

As further proof of their worth, I will cite the comparative results obtained with and without the remedies by two of the world's leading lung specialists—Trudeau of Saranac Lake, and Turban of Davos-Platz. Trudeau's experience I will quote from my former paper on "Culture Products in the Treatment of Tuberculosis."²⁰

"Twenty-four cases were treated with the remedy, of which 20, or 83 per cent, were apparently cured; and 113 without, of which 82, or 72 per cent, were apparently cured—a slight percentage (11 per cent) in favor of tuberculin. He then chooses 50 patients discharged as apparently cured with tuberculin since 1894, and 50 patients corresponding in lesions and time of treatment who were cured without tuberculin, to see the relative permanency of cures. Three of those treated with tuberculin could not be traced, so three were dropped from the list of those treated without tuberculin. Of the remaining 47, 41 remained well, one had relapsed and was living, 4 had relapsed

²⁰Pottenger: *Therapeutic Gazette*, January, 1903.

and were dead, and one had died of insanity. Of the 47 treated without tuberculin, 36 remained well, 6 had relapsed and were living, and 5 had relapsed and were dead. So we see 82 per cent of those treated with tuberculin remained well, not counting the one dying of insanity, as against 72 per cent of those treated without it, a balance of 10 per cent in tuberculin's favor; or, putting it in another way, at the end of the time considered, 68 per cent of those treated with tuberculin remained well, and 52 per cent of those treated without tuberculin remained well, a balance of 16 per cent in favor of tuberculin."

The experience of Turban is so interesting and so to the point that you will pardon me if I quote it as described by Weicker²¹ at length:

"(a) Turban treated 21 cases in stage III with tuberculin: in 8 there was tuberculous laryngitis; 9 cases survived five years, three more remained alive four years, only 5 out of 21 died within two years—25 per cent. Only one died of miliary tuberculosis, and that six and one-half years after treatment; none died of hemorrhage. Hence tuberculin does not increase risk of hemorrhage or generalized tuberculosis. Three were quite well six years after—in all, 5 were well. Tubercle bacilli disappeared from the sputum in 4 cases. Of cases treated in

²¹Weicker: Beitrage zur Frage der Volkshelstaetten, p. 22.

other ways—that is, without tuberculin—61 out of 84 died—5 from hemoptysis, 3 from tuberculous meningitis; 41 out of 84 died in less than two years—nearly 50 per cent. Compare this with 25 per cent under tuberculin treatment.

“(b) Forty-eight cases in stage II were treated with tuberculin: 9 died within two years of treatment, 3 in three years and more, 16 were alive six years after treatment, 5 more five years after treatment, 3 more four years after treatment—in all, 36 were alive. Thus of 48 cases, 36 were alive and 12 dead. Of 152 cases treated in the ordinary way, 45 were dead and 107 alive, but the figures show greatly in the favor of tuberculin treatment, because of the 107 a great number (49) had been under treatment more than one or two years.

“(c) Twenty cases in stage I were treated with tuberculin. Tubercle bacilli in sputum in 17. All were well: 10 of them six years after treatment, 2 more five years after, 1 more four years after, 3 three years after, 2 two years after, and 1 one year after treatment. In all the tubercle bacilli disappeared from the sputum. The three cases giving no tubercle bacilli in sputum had to pass through the ordeal of the tuberculin test. On the other hand, 57 cases, in which tubercle bacilli were not found in sputum, were treated in ordinary ways. They were not subjected to tuberculin test. Of the remaining 22 cases, there was one death,

and in 2 cases there was still tubercle bacilli in the sputum. Turban himself says: 'Now, if we compare the results in early cases in which tubercle bacilli were found in the sputum, the result is substantially in favor of tuberculin treatment.' Of the 86 cases with tubercle bacilli in the sputum treated with tuberculin, 45, that is 52 per cent, yielded a permanent result; of the 241 cases with tubercle bacilli in sputum that received no tuberculin, 95, that is 39.4 per cent, gave a permanent result. Still more distinctly does the effect of tuberculin show itself, if we ask how many of these cases are now free from tubercle bacilli in their sputum. Of the 86 tuberculin patients 41 are now free from bacilli—47 per cent. Of the 241 not treated with tuberculin, only 66—27.4 per cent."

For further statistics on the comparative success of treatment with and without culture products, see my former paper.²²

If the fact that all those men who are devoting their energies to the treatment of tuberculosis, and who have given tuberculin and allied products a fair and extended trial, have found them to contribute immeasurably to the cure; if the fact that those who use them cure a larger proportion of their cases than those who do not; if the fact that, in the hands of the same men, a much greater percentage of cures can be made with them than

²²Pottenger: *Ibid.*

without them is to be given consideration, then we must give these remedies a very important place in the treatment of tuberculosis. It has often been said that the same results could have been produced without their use as has been with them. The mere saying of this is not argument; but I wish to mention a few experiences which refute it. Unless he be very much prejudiced, the man who treats the cases should be best able to judge whether or not the remedies contributed to the result.

Lucius Spengler²³ says: "In the discussion which my former success provoked, they say that here at Davos they obtain equal success without tuberculin, and that it is difficult to distinguish the part that has been contributed to the cure by climate and the part by tuberculin. I simply wish to say that of the 39 patients whom I have treated and whom I am still treating with T. R., 30 had been with me six months or more, some even several years, before T. R. was made known."

Thorner²⁴ says: "I have cured poor patients with tuberculin who could not go to a sanatorium, and some others who were very poor and who had failed to be cured by several courses of treatment at different sanatoria."

²³Spengler, Lucius: "Contribution a l'etude du traitement de la tuberculose par T. R." Translated from *Deutsche med. Wochenschrift*, 1897, No. 36.

²⁴Thorner: *Tuberkulin und Tuberkulose*, Leipzig, 1901.

Denys²⁵ certainly has put the remedies to a test, so that his results leave no doubt as to the part that was contributed to the cure by them. He treated 174 cases, curing 51 or 29 per cent, nearly curing 12 or 6 per cent, and improving 64 or 36 per cent. He designates those as cured who have no more bacilli in the sputum, whose general condition is satisfactory, and who no longer react to tuberculin. He says of these: "The tuberculin treatment covered an average period of seven months. No other method was used, neither rest, air, nor medicine."

This is a creditable showing and compares favorably with the best results obtained in sanatoria, where rest, fresh air, and the best of food are provided; nevertheless, the friends of these products do not believe this to be the right way to use them. Oliver²⁶ says: "Of patients who remain nine months under treatment in the Adirondack Cottage Sanatorium, 34.5 per cent go away apparently cured." Gabrilowitch²⁷ says that as a result of ten years of treatment at Halilia, Russia, 1000 cases have been treated and 253, or 25.3 per cent, apparently cured, and 472, or 47.2 per cent, improved.

The idea seems to have gained ground

²⁵Denys: "Action curative de la tuberculin, Denys, contra la tuberculose." *Ann. med. clin. du Hainaut*, March, 1902.

²⁶Oliver: *Jour. Amer. Med. Assn.*, October, 1900, p. 1006.

²⁷Gabrilowitch: *Zeitschrift f. Tuberkulose u Heilstaettenwesen*, Bd. iii, p. 207.

in the minds of some men that tuberculin treatment and general hygienic and dietetic treatment are to be contrasted. Such an idea is absurd. The only contrast is between those cases treated with it and those treated without it; for rest, exercise, fresh air, diet, hydrotherapeutic measures, and measures for the building up and strengthening of the patients are used by every one who pretends to cure tuberculosis, no matter what remedy or remedies he employs. Artificial digestants will sometimes help stomach troubles, but their effect is heightened by the use of a properly regulated diet. The surgeon's knife removes the tumor, but the regulation of the patient's life promotes recovery. So it is with culture products. Whatever preparation is used is only one of several aids in the production of the cure; and he who does not use all is to that extent negligent of his patient.

The cure of an infectious disease consists in establishing immunity. In acute infectious diseases this is established soon or the patient succumbs; in chronic diseases, however, immunity is established slowly and often not at all.

Hansemann²⁸ says that when a tuberculous process extends beyond a single lobe, the chances are that it will not heal of its own accord. In these cases help from the physician is required, and if it

²⁸Hansemann: "Ueber Heilung und Heilbarkeit der Lungenphthise." *Berlin. klin. Wochenschrift*, Aug. 11, 1902, p. 747.

were obtained earlier there would be little need of such extensive processes as we so often see occurring. The physician's part in treating tuberculosis, either when it is pure tuberculosis or when it has reached the consumptive stage, consists in fortifying the patient against the disease. He orders hydrotherapeutic measures, rest and exercise, fresh air, and a nutritious diet, that a state of perfect nutrition may be attained, and that the body cells may become resistant to the disease. In the loose way in which we use the term, he is trying to make the tissues immune or increase the natural immunity of the patient. He can do more than this. He can induce an artificial immunity. Kitasato, Spengler, Koch, von Ruck, and others have by the use of culture products rendered animals immune, so that when doses of virulent bacilli were injected into them the disease did not spread beyond the local ulcer which formed at the site of injection. Another proof of this immunity, aside from that shown upon experiment animals, is the phenomenon of agglutination. Vaughan and Novy²⁹ say: "It should be understood that agglutination is only one of various indications that the body juices of immunized animals rob their homologous bacteria in part of their virulence. Why agglutination does not take place in all instances we are not as yet able to

²⁹Vaughan and Novy: Cellular Toxins, 1902, p. 180.

determine; but when it does occur, it is an indication that the blood of the immunized animal has some detrimental effect upon the growth and virility of the microorganism." Koch,³⁰ Moeller,³¹ as well as several other experimenters, have shown that by the use of tuberculin the agglutinative power of the blood can be raised from 1 in 10 to 1 in 300; and furthermore, that an improvement in the general health accompanies the rise. This should be sufficient proof to establish the immunizing power of these remedies. Happily, clinical evidence corroborates these facts, for when treatment is begun in an early case of tuberculosis the patient seems to become immunized; so that the disease shows less tendency to extend to healthy tissue than is usually the case, and also, when an apparent cure has been attained, there is less tendency to relapse.

With this positive, scientific proof of the immunizing power of culture products, and the corroboration which it has secured at the hands of those who have had large experience in their use, we conclude that where culture products are not used in those cases which are suitable, the patients are deprived of one of the agencies which would contribute materially to their cure.

With such proof as to their value,

³⁰Koch: *Deutsche med. Wochenschrift*, 1901, No. 48.

³¹Moeller: *Zeitschrift für Tuberkulose und Heilstaettenwesen*, 1902, p. 302.

should these remedies be employed generally, or should their use be confined to specialists? Upon this point many of my answers were emphatic, the writers taking the ground that where there was so much hope for those afflicted with tuberculosis bound up in given remedies, it were better that their use be confined to those who understand them until such time as their exact mode of administration and the exact part contributed by them to the cure might be fully determined. This opinion has been well expressed by editorials in the *Journal of the American Medical Association* and the *British Medical Journal* during the past year, which I will quote: "In the hands of those who have used this preparation (tuberculin) most faithfully and continuously, and, therefore, it is to be assumed, most intelligently, the results have been most gratifying; but tuberculin is a powerful agent, and it has shown its ability for evil as well as good. In the absence, therefore, of a remedy possessing specific curative properties and susceptible of safe *general* employment, the clinician is forced to depend upon those natural resources by which the resistance of the organism to the activities of the tubercle bacilli are increased."³² And later:³³ "With a better understanding of the way

³²Editorial: *Journal of the American Medical Association*, March 29, 1902.

³³Editorial: *Journal of the American Medical Association*, Aug. 16, 1902.

in which it is to be used, and of the cases which are suitable for its employment, tuberculin now seems about to enter on a period of usefulness as a curative agent."

"This T. R. was proved to possess distinct immunizing properties, and its curative effects were demonstrated upon tuberculous animals. It has now been before the profession for some years, but does not seem to have been much employed, although there is good evidence that it possesses the properties claimed for it by its discoverer. . . . It is perhaps as well that there should be no *general* desire to resume trial of this and similar remedies, for there can be little doubt that until their mode of production has got far beyond its present imperfect stage, the use of these preparations ought to be restricted to those who clearly understand the nature of the materials with which they are working."³⁴

The tone of these editorials leaves no doubt as to the value of tuberculin. It is to be hoped that it will become more generally used, but it is further to be hoped that no one will attempt its employment who will not first thoroughly study the remedy and thoroughly acquaint himself with the disease, as to its physical signs, clinical course, and pathology. Then, with patience and perseverance and a thorough control of the patient to be

³⁴Editorial: *British Medical Journal*, Jan. 11, 1902.

treated, he should proceed cautiously, ever recognizing the importance of his work and the end to be attained.

I now wish to quote some of the opinions as expressed in the letters and monographs received during this investigation, in order to show the attitude of the profession toward these remedies. For obvious reasons I will not mention the names of the writers in connection with the letters, but where I quote from a published article I will cite the reference.

Here is a characteristic letter from one who does not recommend the remedies: "Experience with old tuberculin in eleven cases—eight for several weeks, and three for three or four months. One seemed practically cured. Heard from her at the end of one and two years. Treated two with watery extract of tubercle bacilli. Under all these serums and some other kinds of so-called specific treatment many patients improve for a time, gaining in weight, coughing less, and even showing a lessened proportion of bacilli in the sputum. I know of no cures from any of them alone. Of course, my little experience is not enough to base an opinion on, but I am quite sure from it, added to that of others, that we have not yet struck the right thing."

Another writes: "I have treated twenty cases from three weeks to two months. Treatment resulted in no improvement, but fortunately no accidents. My opinion is unfavorable."

Another says: "Have used Koch's tuberculin, 1891, T. R., and oxytuberculin. Treated eight cases from two to six months. Result: in some cases negative; in others, especially the early cases, the patients seemed to break down more rapidly than usual. My reading and experience alike make me doubtful of their value."

Another: "Treated a few cases. Results were unsatisfactory and bad. I believe it of very little if any value, and I do not favor its use. I discarded it myself because I believed it harmful."

Still another says: "Have not used it myself, but observed ten cases under others. Do not recall period of treatment. In one case there was recovery. I have not seen or heard of a recovery or improvement that could not have been brought about under equally good environment by other treatment. I believe the method to be dangerous in unskilled hands, and unnecessary in skilled ones."

Now I wish to give some of the opinions on the other side. One man says: "Have used it constantly since its discovery by Koch, restricting its use to patients at the sanitarium who are under close observation and who are treated free. Have treated perhaps 100 to 125 cases, averaging about five months, with generally encouraging results. I favor their use in hospitals and sanatoria, and by men thoroughly familiar with this form of treatment, in suitable cases only."

Their indiscriminate use in acute and febrile cases is not admissible."

Another: "While I recognize that tuberculin is not a cure for all cases of tuberculosis, yet I have noted that it has contributed immeasurably to the cure in cases which, under dietetic, hygienic treatment at the sanatorium showed no signs of healing. I hold the combination of hygienic, dietetic, sanatorium treatment with tuberculin treatment as the most useful in all those cases which present a doubtful prognosis, with a possibility of cure. I have treated about 100 with the new tuberculin; cannot say how many with the old. Treatment lasted over a period of several months, and was given with intervals of rest between."

Another writes: "Have used old tuberculin, T. R., and baccillus emulsion in 446 cases, treating on the average 130 days. Seventy-eight per cent have been discharged as cured, and all of those have been under my observation more or less ever since, some since 1891. I hold that Koch's tuberculin as applied in purely tuberculous cases, and by the method described by me, is a specific remedy against tuberculosis, and at present the best treatment."

Another says: "Have used them for ten years in about 300 cases with good results. The use depends largely upon the proper selection of cases and the exclusion of those already overtaxed by the care of toxins appreciated by their non-resistant

systems. Diagnostic skill and knowledge of technique become then most important essentials to the successful use of this immunizing method."

Spengler³⁵ says: "Thus with the careful choice of cases, the judicious application of T. R. has given me only good results, and I consider it at the present time as a very valuable remedy in phthisiotherapy."

Heron³⁶ says: "In properly selected cases, with proper surroundings, and proper care, tuberculin can be used, not only with safety but with distinct benefit in the treatment of tuberculosis."

Moeller³⁷ says: "According to our experience (in the sanatorium at Belzig) we consider tuberculin as an extraordinarily valuable remedy in connection with sanatoria. More observations are needed to determine which cases are most suitable to the old preparation, and which are suited to T. R.; but as to the curative value there is no doubt."

Petruschky³⁸ expresses the hope that the personal fight which was shown in

³⁵Spengler: "Contribution a l'etude du traitement de la tuberculose par T. R." Published in pamphlet form from *Deutsche med. Wochenschrift*, 1897, No. 36.

³⁶Heron: Report to the Committee of Management of the City of London Hospital for Diseases of the Chest, March 21, 1901.

³⁷Moeller: Ueber die diagnostische und therapeutische Verwendung des Tuberkulins." *Zeitschrift für Tuberkulose und Heilstättenwesen*, 1902, p. 302.

³⁸Petruschky: "Der gegenwaertige Stand der Tuberkulin-behandlung," 1901.

the bitter opposition to tuberculin is now to be laid aside, and that the next decade will see the sanatorium and tuberculin treatment everywhere used in combination. He says: "The combination of the physical-dietetic treatment, alternating with the tuberculin treatment, is at the present time the most satisfactory treatment for those cases of pulmonary tuberculosis which are not too far advanced. The proper use of tuberculin for diagnostic and therapeutic purposes has been so well worked out by years of experience of a few painstaking men that it is now possible for the well informed physician to avoid all mishaps in its use."

From the answers received during this investigation I would draw the following conclusions:

1. The interest of the medical profession in tuberculin and allied products is increasing, and its attitude is gradually becoming less hostile.
2. The attitude of the profession in Europe is more favorable than in this country.
3. The greatest opposition comes from those who were unfortunate in their experience when tuberculin was first introduced, and those who, although they have had no experience, base their opinions upon this early trial, discrediting the work of recent writers upon the subject.
4. Not one man who had given the later remedies an extensive trial, in suitable cases, failed to observe benefit from their use.

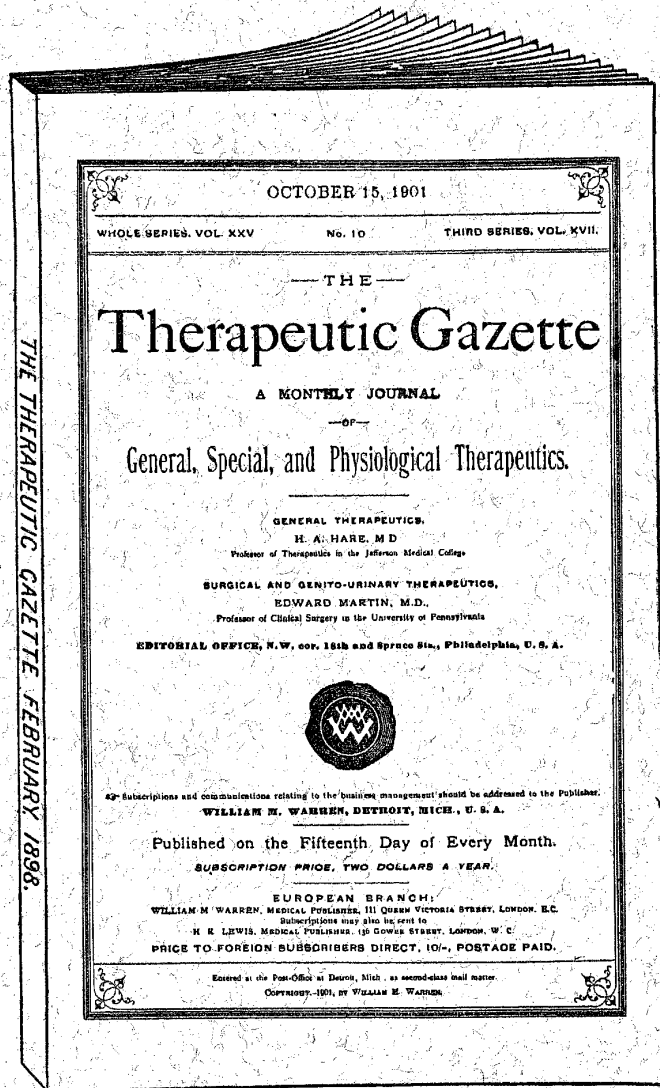
5. The disapproval and rejection of the remedies in most instances was based on faulty application and upon trials in unsuitable and far advanced cases.

6. Those who have studied these remedies most carefully, and who have exercised greatest care and judgment in the selection of their cases, have, almost without exception, been convinced of their value; and they have been able to report enough cases to prove that these remedies will do that for which they are recommended.

7. Basing an opinion on the results in 1200 first-stage cases, 611 of which were treated in sanatoria by the usual dietetic and hygienic methods, and 589 by the same careful management plus tuberculin and allied products, we find that, of those treated in the latter manner, 20.2 per cent more were cured than where the tuberculin preparations were omitted from treatment.

8. In patients treated with tuberculin and allied products there is less tendency for the disease to spread to new tissue, and when an apparent cure is attained there is less danger of relapse.

9. Tuberculin and allied products are fast becoming established as therapeutic measures in the treatment of tuberculosis, and are worthy of the earnest attention of the medical profession.



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