hand. The difference in the pictures was caused by the difference in position of the Crooke's tube when they were taken. In taking picture 3 the tube was more to the ulnar side of the hand than when taking picture 4.

In my possession is a plate in which the deformity caused by Colles' fracture is quite closely simulated by a similar change in the position of Crooke's tube. The plate is of a normal wrist. The importance of this from a medico-legal point of view need not be enlarged upon.

I have thus shown X-ray pictures to be fallacious and misleading—and described some of the causes of these fallacies.

Figure 4.

Because X-ray pictures can be fallacious, should they be excluded from court as evidence? Certainly not. It is well to know their limitations, and to remember that appearances may deceive. X-rays, properly used, are as a search-light in the exposition of bone lesions. But the lesions must be pictured from different directions, and the resultant pictures compared with pictures of the normal opposite member. Moreover the pictures of the injured member and those of the opposite normal member, must be taken with the same relative positions of the Crooke's tube, the limb and the sensitized plate. Then can truth be arrived at, and truth is essential for justice.

99 Broadway.

Salicylate of Methyl in Scarlet Fever Arthralgia.—Professor Roger has secured rapid and marked improvement in the arthralgia accompanying infective diseases and especially scarlet fever, by the use of salicylate of methyl. Twenty to forty drops are applied to the articulation morning and night, which is afterward wrapped in oiled silk.—*Semaine Méd.*, August 18.

CORNEAL BURNS FROM ACCIDENTS IN THE USE OF CURLING IRONS. REPORT OF SIX CASES.

JOHN O. McREYNOLDS, B.Sc., M.D.

DALLAS, TEXAS.

This unusual form of traumatism is worthy of mention, because of the severity of the pain, the grave apprehensions of the patient and the uniformly speedy and complete recovery. In the six cases that have recently come under my observation (Mrs. W., Miss L., Miss E., Miss M., Miss L. and Miss H.) the injury was received directly upon the cornea by dropping the hot curling-iron upon the open upturned eye. The extent of the injury has varied from three square millimeters in area to a third of the corneal surface.

In the severer cases the pain has been very intense unless continually relieved by local anesthetics. The seared superficial epithelium in a few hours exfoliates in a white opaque mass, leaving beneath a denuded corneal surface, which soon becomes, under favorable treatment, re-covered with normal epithelium and within a few days the eye is perfectly well. In corneal injuries in general I should object to the employment of cocain, because of its bad influence upon nutrition, but in this form of injury, in which the pain is so excruciating and the danger of subsequent ulceration so slight, I have considered it prudent to use a weak solution or ointment of cocain or eucain to secure rest for the patient. For this particular purpose the eucain has the advantage over cocain in that it increases rather than diminishes corneal nutrition and also is capable of being thoroughly sterilized by heat. The additional indications are the frequent use of mild antiseptic solutions, the moderate employment of a mydriatic and the application of a light bandage to obtain rest and protection for the wounded eye.

GENERAL IMPRESSIONS FROM SIX YEARS USE OF THE OLD TUBERCULIN.

Read before the British Medical Association at Montreal, Sept. 2, 1897.

BY JAMES T. WHITTAKER, M.D.

Robert Koch announced the discovery of tuberculin at the Tenth International Congress at Berlin, August, 1890.

The publicity of the occasion, the fame of the author, above all the defiance of the disease to all treatment hitherto, lent peculiar interest to the discovery. The suddenness of the announcement was another factor. No one had even an inkling of the work leading up to it.

The declaration of the discovery of the tubercle bacillus in 1882, though credited by many of the members of the critical audience in the Berlin Physiological Society to which it was presented, met with so much scepticism in the profession at large as to have been practically disbelieved. Most of the leading medical journals discredited it; many of them derided it. When the truth asserted itself the disbelievers found themselves punished for incredulity. So, although the problem was harder, belief was easier on this occasion. In fact, there was reaction to the other extreme and more was expected of the remedy than was expressed in the modest claims of the author. This was the reason why medical men, who represent the most cautious and conservative branch of human culture, accepted the remedy at once

and began to experiment with it in a way and in cases in which the author, to use the mildest terms, had never advised it.

The disappointment which followed was intense and the expression of it was not without bitterness. In fact, we have just now reached a period when any renewed advocacy will be listened to at all.

One of my former students brought me directly from Berlin a small quantity of tuberculin, Jan. 15, 1891, as the very first importation into this country, and with this specimen I began the use of the remedy in the cases at the Good Samaritan Hospital at that time. These were four cases of tuberculosis pulmonum and one case of scrofula, to which I will allude again.

My first use of the remedy was entirely therapeutic and I did not begin to avail myself of the immediate action of it in diagnosis for two or three years. When it was used in this way the results were found, it is needless to say it, much more striking and satisfactory. The use of tuberculin should be studied, therefore, from the double standpoints of diagnosis and treatment.

The value of it in the disclosure of tuberculosis in man was not at once rightly recognized, on account of alleged dangers in the use of it; but in cattle it soon met its proper appreciation, and is perhaps nowhere more extensively and satisfactorily used than in the United States.

Aside from the objections urged by ignorant and prejudiced people, not worthy of notice, four apparently valid arguments accumulated in the course of time against the use of tuberculin in man.

1. That the reaction occurred in the absence of tuberculosis. This objection has been met by the demonstration of concealed depots.

2. That the reaction occurs in other diseases, syphilis, lepra, actinomycosis, etc. This objection has been met by the demonstration of tuberculosis coincident with or complicating these maladies.

3. That the reaction will occur in the most quiescent case even where the bacilli are not only concealed but encapsulated and depots are partly calcified. This is no objection at all, but a most striking confirmation.

4. That the use of it is dangerous; that it not only awakens the disease from latent sources but disseminates it over the body and thus leads to auto-infection and increases the danger of infection of others. This conclusion rests on a false premise and confounds the *post* with the *propter hoc*.

I will not take the time to further discuss theoretic objections but content myself with the repetition of a statement, made on another occasion, that I had used tuberculin every day in hospital and private practice for six years in now nearly one thousand cases and have never seen any kind of evil result beyond the characteristic reaction. Koch himself declares the fear of danger to be a "foolish prejudice." He says he has never seen "even the slightest intimation of any mobilization or transfusion of tubercle bacilli" in the use of tuberculin as a diagnostic agent in over one thousand cases, and this experience he thinks "should put the diagnostic value of it in man on the same plane as in animals." My own use of tuberculin has been nearly exclusively for therapeutic and only exceptionally for diagnostic purposes.

In a paper read before the Association of American Physicians in May and published in the "Transac-

tions," I reported a number of cases, doubtful and obscure, in which the diagnosis, positive and negative, so far as tuberculosis was concerned, had been easily established and mostly after failure with other means, by a test dose of tuberculin; thus in cases of neurasthenia, night sweats, joint disease, laryngitis, pulmonary tuberculosis, peritonitis, fistula, etc. Since this report I have had a striking illustration of the penalty which attaches to over-confidence in diagnosis and neglect of using the most approved method of study. This will be the only case which I will report. June 10 I was called in consultation by Dr. D., a good surgeon in Cincinnati, to aid in the diagnosis of a case of enlarged glands in the neck in a patient, a woman, aged 67. The glands had begun to grow three months before and now formed a good sized mass under the angle of the right jaw, extending down behind and below the sternomastoid muscle. There was some pain, and within the past few weeks there had been slight fever. The glands were deep-seated and hard. The patient had enjoyed good health hitherto and had no other discoverable disease. The rapidity of the growth, the presence of pain, the exemption of any affection of the lungs, above all the age of the patient, led us to declare a diagnosis of carcinoma, probably sarcoma of the cervical glands, and to advise immediate extirpation. The operation was tedious and bloody (as had been expected) and the patient succumbed in three weeks. I learned these things by letter from the surgeon, together with the fact that the glands upon microscopic and bacteriologic examination turned out to be tuberculous. Now, although extirpation is often the best treatment of an adenopathy of this kind, I should myself with a true knowledge of the disease have advised against an operation in this case at that time.

The mode of action of tuberculin, to which I allude merely from a clinical standpoint, has met with various explanations. Certain it is that together with leucocytosis and fever a sharp hyperemia is developed extending over the entire domain affected, and in this process toxins are formed or liberated which produce the characteristic reaction and give partial immunity to the poisonous products of the tubercle bacillus. The immediate benefit which nearly all patients feel is due to this immunity. The proper principle of treatment consists in pushing the development of this toxin as rapidly as possible this side of extreme reactions, before tolerance to the tuberculin itself is established in the body. Most of the protection of the body against the action of poisons is based, as we know, upon tolerance, which is probably secured by increasing the antitoxic action of serum of the blood. The patient affected with tuberculosis is not fatally poisoned by the products of the tubercle bacillus because of tolerance to the products of it begotten in this slow development. When these products are developed too rapidly the body is overwhelmed and succumbs. But the tolerance to tuberculosis as a rule is so great that individuals live for years and decades of years, and often recover entirely. The body becomes adjusted to the effects of the poison and sometimes shows in this process remarkable changes. Thus the disposition may be actually improved by it. It was Klebs, who makes anyhow such close and curious observations, who first spoke of the singular sweetness of disposition and loveliness of character sometimes seen, especially in women, the sufferers with slow phthisis. Men, it seems to me, are rather made more

irritable. The true principle of treatment with tuberculin is to secure the action of it before tolerance to it is established, for so soon as it is tolerated it loses its effect. Unfortunately there is as a rule, not time to secure immunity to the products of the tubercle bacillus before this tolerance to tuberculin is established, and so the benefit experienced at first is lost in the later treatment. For with tolerance the toxin ceases to increase the antitoxic action of the blood, and any continued use of it after this time seems really to lessen it. So when the tuberculin fails to do good and the disease reasserts itself, the use of the remedy should be stopped. Time should then be allowed to lapse, several weeks being required in most cases, and then when the tolerance is lost the treatment should be begun again. Thus the successful treatment of tuberculosis takes time, a long time, months and years, about as long as does the successful treatment of syphilis, which is usually a matter of years. The physician who expects to cure a case of tuberculosis in a few weeks will soon become discouraged and will probably join the ranks of medical men who denounce and decry the means.

The first dose for the case of lightest infection (suspected) should be 5 mg., the second 10 mg. or one centigram, the third two centigrams. These doses may be given on succeeding days, or better, every other day, preferably in the evening that the temperature records may be properly observed on the following day. Failure to get reaction from three tests excludes concealed tuberculosis. The crude tuberculin diluted one hundred times preferably with a 0.5 per cent. solution of carbolic acid, makes a 1 per cent. solution of which one interspace of the Koch syringe represents one centigram. One interspace of this 1 per cent. solution diluted ten times makes a milligram. For therapeutic use I begin with one-tenth of a milligram.

In my first use of tuberculin I was able to adhere rigidly to the rules laid down by Koch, but I was not able to select the cases or to limit myself to the first stages of the disease, the phthisis incipiens. In fact, every one of the cases of lung disease was advanced to what is commonly called the second stage, phthisis confirmata, and one of them was so far advanced as to constitute a phthisis consummata. The remedy was used in this case in infinitesimal dose, simply *ut solaminis causa*. The case of scrofula ultimately, *i. e.* in the course of two years, made a good recovery, while the cases of phthisis pulmonum all died in from four to six months. It was impossible not to feel disappointed and somewhat discouraged at the result. But on comparing subsequently the course of similar cases treated with tuberculin with other cases, it was seen that the process of the disease was slower in the first cases; for, some improvement pretty much always sets in at first. We had however nearly uniform results to report in hospital practice, an improvement for a time with subsequent continued progress downward interrupted with many stages of quiescence and occasional temporary gain. In explanation of the temporary improvement it became plain to see, as cases multiplied, that after making all allowance for the all-powerful influence of suggestion, and some for the better hygiene of hospital life, there was still room for much to be granted to the specific treatment.

It was a long time before the reason of the continued progress of the disease was ascertained, but it became apparent at last, with continued examination

of the sputum, that direct product and derivative of the disease, the closer examination of which had led to the discovery of the tubercle bacillus to constitute the luminous epoch in the history of the disease. But all attention had been directed to the detection of this bacillus in the sputum hitherto, to the neglect of other micro-organisms. As examinations multiplied in competent hands it was soon seen, or perhaps I should say, the facts already known became better appreciated, that the new advances or relapses marked by chills and sweats were due to invasions of other, especially of the pus-producing, micro-organisms, and that the disease had passed beyond the domain of tuberculosis into the wider realms of sepsis. It was at this time that the school of Koch proposed to call the seesaw temperature of hectic the streptococcus curve. The reason of the failure of tuberculin in the further course of the disease now became apparent. It was not to be expected that tuberculin, a product of the tubercle bacillus, would inhibit the growth of or destroy the influenza bacillus, the diplococcus or the pyogenic micro-organisms. The truth is, the great majority of cases in hospital practice are advanced beyond the stage of pure tuberculosis. They are cases of mixed infection or sometimes of secondary infection and belong not so much to tuberculosis as to septicemia.

The results of the use of tuberculin in private practice are more encouraging. In ordinary house practice cases are encountered in every stage, and the majority, because of the long duration of the disease, are advanced to the second stage, but the hygienic environment is better as a rule, that is, there is more breathing room, more outdoor life, including here the advantage of change of climate, more comfort in every way; as a rule to which there are many exceptions there is less auto-infection and less homesickness, and all that without saying goes with gregarious man. I had the influence of this factor impressed upon me once by the remark of a big, strong-looking man, who came back from Colorado too soon, with the apology: "Doctor, I am going to stay home; I had as leave be buried under the ground as on top of it."

But the advanced cases in private practice in the long run took the same course. The disease, after a temporary check, would reassert itself with chills, often of origin sudden and inexplicable, with hectic, night sweats and final dissolution. But every now and then there were agreeable surprises. The progress of the disease would be checked for a longer time, or the whole condition would be raised to a higher level, that of several months or several years before. In these cases the bacilli would diminish and sometimes disappear altogether and the gain in spirits, which is quick in phthisis, the *spes phthisica*, would exceed the gain in weight.

Just in which cases this gain would occur or in which it would fail to show itself could not be foretold. As in so many other things, it was necessary to try to find out. Sometimes it would be impossible to know whether the improvement was really due to the tuberculin or to conjoined treatment, but as time advanced and cases multiplied the feeling would grow that the cases treated with tuberculin off and on, more especially for a long time and judiciously, that is, with the same caution as in the use of any other agent in the materia medica, that these cases did the best. It was always easy enough to study control cases in patients who were themselves, or had been

by their physicians, prejudiced against the use of it.

So that when the diagnosis was clear, as established in a plain case by the physical signs, in a doubtful case by the discovery of the tubercle bacillus, or in a still more doubtful case by a test injection of tuberculin, I made it a practice to use it tentatively in every case, with the consent of the patient, never without it, and then continue with it or abandon it according to the results.

Some of the differences in results could be pretty definitely attributed to the kind or degree of the mixed infection, some to the localizations elsewhere in the body and some to the site of the original deposit. For instance, influenza cases, *i.e.*, cases complicated by influenza, do badly as a rule. Caries of the vertebrae, of the tarsus or carpus make ugly complications, while deposits in the pulmonary veins or thoracic duct or irruption into these vessels inundate the body to produce phthisis florida and miliary tuberculosis. We recognize these cases often after a very short examination and appreciate at once their ominous character. The continued feeding of the body from these depots makes futile every kind of therapy until more exact localization may be effected, perhaps by some kind of penetrating light, and destruction or extirpation become possible by galvano-therapy or by the knife. At the present time they constitute the despair of medicine, and the use of tuberculin is actually contraindicated in them. I know of no other contraindications.

The best results are obtained in office practice; in the first place in the way of diagnosis. It is a great satisfaction to be able to clear up a concealed case and to declare an exact diagnosis of a disease treated hitherto without a diagnosis or for something else. Thus an obstinate or frequently recurring dyspepsia, an amenorrhea, a neurasthenia, an anemia, a rheumatism, an adenitis, a little low fever (to say nothing of acute cases of chills, night sweats, catarrhs and coughs), may have their true nature revealed in this way. These are the cases (aside from the chills and fever) in which treatment furnishes the best results. Tuberculin gives good results also in childhood. Children react favorably to tuberculin, much more so than adults, so that the so-called apex catarrh of childhood will often clear up and disappear in them within three weeks.

Aside from these cases the treatment must be persistent and good judgment must be used in dosage; rather too little than too much. I have never seen any bad results from the use of tuberculin, because I always endeavored to secure a slow tolerance, so that individuals who react at first to a few milligrams become later insensitive to one hundred times as much; in fact, at last to one thousand milligrams. The evils ascribed to it I believe to be due to the disease itself, for I have seen them oftener before the use of it. But it is easy to conceive that the patient would suffer under excessive reactions and that repeated excesses might do permanent harm. But, *ex abusu non arguitur ad usum*. It is a maxim of the law, good also in medicine, that we may not from abuse argue against use.

The highest value of tuberculin is the diagnostic value, which is supreme, and which enables us to distinguish the disease at the start as a tuberculosis before the development of sepsis or other complications which go to make up that composite picture we call phthisis.

THE PHYSIOLOGY AND THERAPEUTICS OF THE THYROID GLAND AND ITS CONGENERS.

BY H. GIDEON WELLS, Ph.B.

CHICAGO, ILL.

(Awarded the L. C. P. Freer medal, Rush Medical College, 1897.)

From the chemie and pathologic laboratories of Rush Medical College.

(Continued from page 904.)

After having tested all the materials used, as to their purity, familiarity with the method was obtained by adding to pure gelatin, known quantities of iodid of potassium and going through the process repeatedly. At first an open crucible was used and it was found to be impossible to regain more than one-half of the iodine. It is probable that in this case iodic acid compounds were formed in spite of the excess of the alkali, since this loss disappeared on the substitution of a covered silver crucible. (A platinum crucible can not be used since this metal is attacked by caustic alkalies.) Another source of loss occurs on the addition of the acid to the filtrate. This must be done in a flask with a small mouth and the acid added very gradually, otherwise there is loss through effervescence. By observing these points it was possible to obtain at least nine-tenths of the original amount, which was the same limit of accuracy that Baumann claimed to reach. During the fusing it is necessary to prevent the contents of the crucible coming in contact with the lid, since in these cases no matter how carefully the deposited material was removed, the loss was always greater than could be readily explained even by considering all that touched the lid as lost.

The first series of actual analyses was made on people who, according to the history sheets, had lived at least some years in this city, who had not received iodine for at least some time before death, and whose glands appeared to be in every way normal. Twenty such glands were analyzed, the results and the main features of each case being shown in the following table:

	Sex.	Age.	Cause of Death.	Weight of gland. Grams.	Iodin p'r gram. Mgms.	Total mgr. Iodin.
1	M	45	Chronic nephritis	2.60	2.86	7.47
2	M	60	Brain tumor	4.39	2.64	11.75
3	M	60	Tubercular peritonitis	2.59	1.67	4.38
4	M	35	Pneumonia	3.88	2.58	10.00
5	M	35	Peritonitis	3.84	2.66	10.21
6	M	45	Pneumonia	10.59	0.99	10.47
7	M	44	Pneumonia	6.33	1.52	9.62
8	M	28	Endocarditis	3.71	2.74	10.17
9	M	26	Liver abscess	4.47	2.58	11.53
10	M	46	Chronic nephritis	5.16	1.82	9.41
11	M	30	Appendicitis	5.79	1.98	11.46
12	M	28	Pulmonary tuberculosis	4.88	2.28	11.15
13	M	49	Carcinoma of stomach	3.77	1.98	7.46
14	M	30	Multiple endotheliomata	9.68	1.82	17.62
15	M	35	Acute nephritis	6.66	1.52	10.12
16	M	41	Chronic nephritis	6.53	1.98	12.83
17	F	25	Syphilitic myelitis	5.44	1.82	9.90
18	M	26	Pneumonia	9.01	1.98	17.84
19	M	60	Meningitis	5.24	1.52	7.96
20	M	65	Pneumonia	4.10	1.22	5.00
Average				5.37	2.10	10.79

We find here a most surprising difference from the results obtained by Baumann, especially in his Freiburg series. While each gland averages in weight less than two-thirds the weight of the Freiburg glands yet each gram contains just six times as much iodine, and the total amount in each gland is over four times as much. Even in comparison with the Berlin series the difference is still greatly in favor of the Chicago glands, which contain over twice as much iodine in