

The value of strychnine in tuberculosis was pointed out by the late William Pepper,¹⁷⁸ who reported a case cured by this drug as main remedy. T. J. Mays¹⁷⁹ recommends it highly, and raises the dose from $\frac{1}{30}$ grain (0.002 gm.) very gradually until the physiological effects are observed (about $\frac{1}{12}$ gr.—0.005 gm.), then maintains it at that point. All symptoms are improved, including the cough. Ferran¹⁸⁰ likewise praises strychnine. W. F. Milroy,¹⁸¹ who has used it considerably "with the most gratifying results," sustains Pepper's teaching that success "is dependent upon its administration in the maximum physiological dose."

Digitalis is highly beneficial in asthenic cases, especially when the heart is dilated owing to hypoactivity of the adrenal system.* Not only does it stimulate powerfully the adrenal center and greatly increase the quantity of auto-antitoxin in the blood, but the direct action of the increased adrenal secretion on the right ventricle, by augmenting the contractile power of the latter, causes the blood to be distributed with more vigor throughout both lungs, including the diseased areas.* *Digitaline*, $\frac{1}{8}$ grain (0.008 gm.), gradually increased to $\frac{1}{4}$ grain (0.016 gm.) twice daily during meals if given alone, or one-half these doses if given with other adrenal stimulants, is of great value in the class of cases mentioned.*

In the first volume¹⁸² I stated that "weakness of the right ventricle as a result of suprarenal insufficiency is an important factor in the pathogenesis," and also¹⁸³ that absolute integrity of the adrenal system is "a *sine qua non* of perfect immunity against pulmonary tuberculosis, i.e., against the intrusion of pathogenic germs of any kind (and particularly the tubercle bacillus) in the circulations not only of the lungs, but also of the intestines." In a recent paper, Stow¹⁸⁴ adduced considerable evidence showing that "heart lesions accompanied by well-marked pulmonary stasis, thus concentrating in the lungs the immunizing agents of the blood, whatever they may be, are rarely followed by phthisis pulmonalis, or if this previously existed, they exert a salutary effect upon it, and that the reverse conditions frequently are followed by pulmonary tuberculosis." The reader must be referred to the original for the data presented, which fully sustain what I have advanced several years earlier, pointing out also the identity and the source of the immunizing agents. The digitalin I use in the class of cases mentioned is Merck's German, which is uniform in its action.

The influence of *high altitudes* on the prevention and cure of pulmonary tuberculosis is due to the concomitant action of some of the factors referred to above.* The atmospheric pressure being reduced proportionally with the altitude, the volume of oxygen per cubic foot of air is correspondingly reduced.

* *Author's conclusion.*

¹⁷⁸ William Pepper: Univ. Med. Mag., Dec., 1895.

¹⁷⁹ T. J. Mays: Jour. Amer. Med. Assoc., Oct. 10, 1896.

¹⁸⁰ Ferran: La médecine moderne, vol. xii, p. 383, 1901.

¹⁸¹ W. F. Milroy: N. Y. Med. Jour., Aug. 25, 1906.

¹⁸² Cf. vol. i, p. 228, Foot-note.

¹⁸³ Cf. vol. i, p. 774.

¹⁸⁴ Stow: Amer. Jour. Med. Sci., Oct., 1906.

In order to insure adequate oxygenation, the number of red corpuscles is (physiologically) increased, and the proportion of oxyhæmoglobin (adrenoxidase) likewise. The contractions of the heart and vessels being more vigorous and numerous, more blood, richer in adrenoxidase,* circulates through the lungs in a given time than at a lower altitude. The conditions that exist under the influence of digitalis are thus reproduced, viz., the lungs are more actively immunized during health and disease.*

Out-of-door life, i.e., living in the open air as nearly as possible all the time, is a potent factor in the cure of tuberculosis. Sunlight and fresh air are themselves remedial, the latter by affording the adrenal secretion as it passes the alveoli to become converted into adrenoxidase,* a volume of oxygen which the partially reduced air of a room does not afford. The balcony, roof, or garden of a residence may be used to advantage in this connection, warm clothing and shelter from wind and rain being about the only precautions indicated. The breathing of cold air is not hurtful, day or night, as a given volume of cold air contains more oxygen than the same volume of warm air.

That the pulse-rate, the rate and depth of respirations and the vigor of the cardiac contractions are increased in high altitudes is generally recognized. The fact that the respiratory exchange is actually increased was shown by Bürgi.¹⁸⁵ The augmentation of red corpuscles corresponds with the altitude; thus Huggard,¹⁸⁶ in a table, gives among others the following comparative observations: Sea level, 4,974,000 (Laache); Zurich, 411 meters, 5,752,000 (Stierlin); Davos, 1560 meters, 6,551,000 (Kündig); Arosa, 1800 meters, 7,000,000 (Egger); Cordilleras, 4392 meters, 8,000,000 (Viault). Comparative experiments at Basle (266 meters) and Davos (1560 meters), by Jaquet and Suter,¹⁸⁷ showed, moreover, that in rabbits "the entire quantity of blood was greater by 14.8 per cent. in the Davos than in the Basle rabbits." Huggard also states that "the hæmoglobin usually increases in amount." De Saussure¹⁸⁸ observed in high altitudes "a kind of fever produced by the frequency of the respiration, which quickens the circulation of the blood."

Space cannot be devoted to a description of the many devices that have been proposed to insure adequate out-of-door life and yet protect the patient from the inclemencies of the weather. Considerable valuable information on the subject will be found in a recently-published work by J. B. Huber, of New York, on "Consumption and Civilization."

AGENTS WHICH CAUSE DESTRUCTION OF THE TUBERCLE BACILLI INDIRECTLY.—The beneficial effects of *tuberculin* are

* *Author's conclusion.*

¹⁸⁵ Bürgi: Arch. f. Anat. u. Phys., Physiol. Abth., S. 509, 1900.

¹⁸⁶ Huggard: "Handb. of Climatology," p. 127, 1906.

¹⁸⁷ Jaquet and Suter: Corres. f. schweitzer Aerzte, Bd. xxviii, S. 104, 1898.

¹⁸⁸ de Saussure: Cited by Huggard: *Loc. cit.*

indirect in that this substance depresses the test-organ. It provokes a fall of the opsonic index which lasts from a few hours to two weeks. This is due to the depressing action it has upon the test-organ, which entails a corresponding decrease of adrenoxidase in the blood.* The general adynamia observed during the first and second stages indicates that tissue metabolism is deficient from the start, owing to this factor—the identical one which causes the opsonic index to be low in this disease.* When successive doses of tuberculin are administered, the blood becomes too poor in oxygen to carry on catabolism (the phase of metabolism always morbidly influenced first), and waste-products of various kinds, including the detritus from the diseased areas, accumulate in the blood.* A pseudo-pyæmia or septicæmia being thus evoked, the usual result follows: the adrenal system reacts more or less actively,* as shown by the rise of temperature. The blood becomes rich in auto-antitoxin; the opsonic index rises and the destruction of wastes and detritus proceeds—along with all the tubercle bacilli that are within reach of the blood's adrenoxidase, its thyroidase, and its phagocytes.

Hence the danger of employing large doses of tuberculin. The functional activity of the test-organ and of all the organs of the adrenal system is lowered to such a degree, that the protective mechanism cannot react, and the more tuberculin is injected the worse this condition (the negative phase of Professor Wright) becomes. This entails another morbid factor: the proportion of auto-antitoxin and thyroidase in the blood being greatly diminished, the tubercle bacilli are allowed to multiply rapidly, the adrenal system is increasingly depressed, while the blood is further deprived of oxygen. A vicious circle is started which ends in general collapse.* The discouraging results obtained by Koch and his followers when tuberculin was first introduced are thus accounted for.

When minute doses of tuberculin are used in chronic cases which show a low opsonic index and no fever, such untoward effects do not occur. The blood's adrenoxidase is only reduced sufficiently to permit a slight accumulation of toxic wastes*—enough to cause a reaction of $1\frac{1}{2}^{\circ}$ to 1° F. (0.28° to 0.55° C.).

* Author's conclusion.

As the least increase of auto-antitoxin in the blood is destructive to any tubercle bacillus reached, each time such a febrile state is brought about many germs are destroyed and the time finally comes, in suitable cases, when none remain to propagate their kind.*

This process accounts for the manner in which tuberculin indicates the presence of tuberculosis, *i.e.*, for its usefulness in diagnosis.* In a normal subject the presence of an average quantity of adrenoxidase causes the tuberculin to be destroyed at once; conversely, a tuberculous subject whose test-organ (and therefore the adreno-thyroid centers) is already materially depressed is always on the verge of pseudo-pyæmia due to hypocatabolism.* The additional reduction of oxygen which the test-dose entails suffices, therefore, to produce the most prominent symptom of pyæmia: fever.*

All this is based upon the effects of Tuberculin T. R. employed by Professor Wright. The fact that this observer says himself that there occurs after its use "a period of intoxication which is characterized by a decline in the antibacterial properties of the blood" which is "more or less prolonged" according to the dose, shows plainly that its effects are due to direct stimulation of the test-organ. The character of the febrile process incited is plainly that described—a normal outcome of the depression which the tuberculin produces.

The various explanations of the mode of action of the many vaccines and sera tried so far, have included the word "immunity." Koch ascribes it to a local action on diseased areas; Ehrlich to union with receptors produced by tissue-cells; Marmorek to a sensitizing action on the tubercle bacilli, combined with a thermogenic action. Behring—at least his new T. C.—to a direct action on the cells of the host. These are in reality but guesses which throw no light upon the question. Wright's demonstration of the increased opsonic index has furnished the most valuable indication on this score, though even he does not point to the source of the immunizing substances. Indeed, without the adrenal system, which supplies all the factors required to elucidate the question as a whole, the problem was inscrutable.

As to the results of sanatorium cases treated with tuberculin, a table prepared recently by Fortescue-Brickdale,¹⁸⁹ gives a percentage of 88 per cent. cures in 863 cases. In this country, Pottenger¹⁹⁰ collected 611 cases with 64 per cent. of cures. Both these series, however, refer only to patients in the first stage. Von Ruck, of Asheville, N. C.,¹⁹¹ who uses a watery filtered extract—far safer, therefore, than tuberculin—has obtained good results in the three stages when the disease existed in an uncomplicated form, *viz.*, 94 per cent. in beginning phthisis (171 cases); 65.7 per cent. in more advanced cases (350 cases); and 27.3 in the "far advanced stages" (352 cases).

The crucial feature of the question, however, is the comparison of patients treated with tuberculin, with patients in which it was not used,

* Author's conclusion.

¹⁸⁹ Fortescue-Brickdale: *Bristol Med.-Chir. Jour.*, Mar., 1906.

¹⁹⁰ Pottenger: *Therap. Gaz.*, Mar. 15, 1903.

¹⁹¹ Von Ruck: *Med. Record*, Jan. 20, 1906.

although the climatic and other advantages were the same. Trudeau, of Saranac Lake,¹⁹² gives the following percentages calculated on the basis of an equal number of treated and untreated patients:—

TUBERCULIN—	INCIPIENT		
	Apparently cur.d	Disease arrested	Active
Treated	56 per cent.	34 per cent.	10 per cent.
Untreated	50 per cent.	38 per cent.	11 per cent.

TUBERCULIN—	ADVANCED		
	Apparently cured	Disease arrested	Active
Treated	27 per cent.	55 per cent.	18 per cent.
Untreated	6 per cent.	51 per cent.	43 per cent.

The post-discharge mortality affords more exact evidence, however: The following table includes the cases discharged during the last 15 years from Saranac Lake, omitting the last year:—

TUBERCULIN—	INCIPIENT		ADVANCED	
	Living	Dead	Living	Dead
Treated	79 per cent.	21 per cent.	61 per cent.	39 per cent.
Untreated	63 per cent.	37 per cent.	36 per cent.	64 per cent.

Although these figures do not show so striking a result as statistics based on all cases treated with tuberculin, the fact remains that tuberculin improves greatly the chances of recovery. One salient point asserts itself, however: the advanced cases are shown to derive considerable benefit from this treatment in sanatoria, a fact which cannot be said to apply to private practice. Conversely, judging from the results obtained by others and my own, I believe that during the first and second stages of the disease, the use of iodine, thyroid, etc., in the manner indicated, and with the auxiliary measures, saline solution, out-of-door life, etc., affords at least as good a chance of recovery as the use of tuberculin or any similar method of treatment.

AGENTS WHICH INCREASE THE ALKALINITY OF THE BLOOD.
—Important in connection with all the foregoing measures is the preservation of the alkalinity of the blood up to its normal standard, a condition which tuberculosis tends greatly to compromise, thus decreasing in proportion the auto-protective functions of the body. The lymph circulation being rendered still more torpid than usual, the bacteria are retained longer in the lymphatic vessels and glands,* where they rapidly proliferate. When its osmotic properties are normal, the bacteria are swept with relative rapidity into the blood-stream, where they are soon destroyed.*

* Author's conclusion.

¹⁹² Trudeau: Amer. Jour. Med. Sci., Aug., 1906.

The patient should be urged to drink freely of water. When he eats normally, the addition of *sodium chloride*, 10 grains (0.6 gm.), to a glass of milk, taken twice daily, and the free use of vegetables to insure an extra supply of potassium salts to the blood, suffice.* In the more advanced stages, however, the measures recommended farther on (under "Fever") are indicated.

Stadelmann¹⁹³ and A. Robin¹⁹⁴ and many others have emphasized the importance of the loss of inorganic salts during tuberculosis. Even those who antagonize this view, Steinitz and Weigert,¹⁹⁵ admit that their chemical analyses showed a diminution of sodium and chlorine elements—both essential, we have seen, to osmosis. The addition of the salt solution—by enema or subcutaneous injection—in advanced cases is at times very beneficial. C. Rea Burr¹⁹⁶ characterizes as "extraordinary" the effect observed in one of his advanced cases. Quinton used injections of isotonic sea-water with success, a fact confirmed by Chauffard¹⁹⁷ and others. Carles¹⁹⁸ found the oral use of sea-water quite as effective. It does not cause the sudden rise of temperature—proof, by the way, that the auto-antitoxin is suddenly rendered able to carry on bacteriolysis, etc.—observed after its hypodermic use. The sea-water is simply filtered, since sterilization by heat impairs its virtues, and taken at first in spoonful doses half an hour before meals, the dose being gradually increased until half a tumblerful is taken. Watkins¹⁹⁹ observed "granules" or "third corpuscles" in the blood in tuberculosis—obviously blood-platelets, the presence of which, as I have shown, indicates deficient alkalinity.

SYMPTOMATIC TREATMENT.—*Cough*.—One of the most pernicious habits which the empirical administration of remedies has introduced is the use of opiates in the cough of tuberculosis. As they give relief by causing sympathetic constriction of the arterioles, they reduce the volume of blood admitted to the lesions and promote indirectly, therefore, the multiplication of the tubercle bacilli.* The retention of sputum which contains billions of these germs per cubic centimeter is obviously an additional source of danger. Cough is a protective phenomenon, and is due usually to excessive viscosity of the bronchial secretions—a baneful condition which is offset by the use of alkaline fluids, as stated above.* When the patient is undergoing the medicinal treatments indicated in the foregoing pages, especially *thyroid extract*, the *iodides*, or *creosote carbonate*, the

* Author's conclusion.

¹⁹³ Stadelmann: Bull. gén. de thérap., Oct. 23, 1896.

¹⁹⁴ A. Robin: *Loc. cit.*

¹⁹⁵ Steinitz and Weigert: Deut. med. Woch., Bd. xxx, S. 838, 1904.

¹⁹⁶ C. Rea Burr: Boston Med. and Surg. Jour., Feb., 1900.

¹⁹⁷ Chauffard: Bull. méd., June 7, 1905.

¹⁹⁸ Carles: Province méd., May 26, 1906.

¹⁹⁹ Watkins: Med. Record, July 14, 1894.

cough soon shows signs of improvement, because the lesions themselves are being healed and the detritus ejected becomes gradually less.*

Where the patient requires assistance is on rising, owing to the accumulation of muco-purulent secretions in the respiratory tract during the night. If he can rid himself of these before leaving the bed, he is usually comfortable the rest of the day. To facilitate this he should first resort to posture, viz., lying on the side opposite to that of the affected, with his head hanging over the edge of the bed. The cough being aided by gravity, considerable sputum is thus gotten rid of—the first installment. He should then carefully wash out his mouth, and drink a glassful of hot water containing twenty drops of *aromatic spirits of ammonia*. This is soon followed by a general feeling of warmth and a desire to cough. The former position being resumed, the remaining muco-purulent materials—those in which bacteria are usually found—will be voided. After again washing his mouth and cleansing his teeth carefully, the patient can then take his breakfast without being disturbed by spells of coughing. The same procedure on retiring tends much to insure a good night's rest.

I can only give here the general principles of measures which considerable experience in such cases has shown me to be effective. The physician's ingenuity will suggest many others on similar lines. I *never* prescribe opiates in such cases, and ascribe the good results obtained partly to this fact. It is a very unfortunate fact that the text-books still advise the use of such remedies, hydrocyanic acid, etc. The blind use of such agents and the fact that most cases of tuberculosis are dubbed "bronchitis" at first, thus giving ample time to the bacillus to do its fell work, is, in my opinion, one of the chief causes of the great mortality of tuberculosis—a disease which in its incipiency can almost invariably be cured.

It is important in this connection to distinguish between useful and useless cough. Some patients acquire the *habit of coughing*, and the least prickling sensation in the larynx is the signal for an artificial paroxysm which they could readily prevent if warned that it does harm. Indeed, examination of the larynx in such cases shows marked congestion, especially of the interarytenoid space. When this is present, *vomiting* is apt to occur, owing to the intense sensitiveness which the upper respiratory tract finally acquires. The instruction to the patient should be to avoid coughing until he feels distinctly that there

* Author's conclusion.

is some mucus to eliminate. In some instances, he is unable to do this, and remedies are necessary to break the habit. After clearing the respiratory tract before retiring, as stated in a foregoing paragraph, *bromide of sodium*, 10 grains (0.6 gm.), may be taken, but only two or three nights. The laryngeal vessels, thus depleted (since the bromides in small doses depress the blood-pressure only) a few times, cease to congest the sensory terminals of the region.* Obstinate coughs are also benefited by the *oil of sandalwood*, 5 grains (0.3 gm.) three times a day, or fluid extract of *hydrastis canadensis*, twenty drops in water immediately after a meal. These substances are stimulants and aid the curative process. At times, however, they are not well borne by the stomach; *eucalyptus oil* 1 drachm (4 gms.) in *chloroform* 1 ounce (30 gms.), used as an inhalant, may then be tried.

As already stated, the cough usually ceases to be troublesome after the general treatment recommended has had time to stimulate the diseased areas. When either iodine, the iodides or thyroid extract is used, the muco-purulent expectoration not only becomes free and is voided without difficulty, but the relaxation of the laryngeal vessels to which the local irritation is due, is overcome by the fact that their muscular elements are the seat of enhanced metabolic activity. The caliber of the arterioles being reduced, the laryngeal capillaries receive less blood.

Hæmoptysis is another symptom which is to a material degree prevented by the use, as curative remedies, of the preparations of iodine or thyroid extract, since by stimulating the adrenal system, they greatly increase the proportion of adrenoxidase in the blood.* As this body is the fibrin ferment the patient is supplied at all times with the ideal blood-constituent that will protect him.* Even hæmophilics are protected, since their blood under the influence of thyroid extract in small doses, becomes coagulable in less than three minutes, as compared to eleven minutes when untreated.* As in most instances the bleeding is due to ruptured capillaries, the presence of considerable fibrin ferment in the blood causes them at once to be obstructed by a coagulum, thus arresting the flow; the hæmorrhage is cut short almost as soon as begun.*

W. J. Taylor,²⁰⁰ acting on my discovery that the adrenoxidase of the blood was the fibrin ferment and that thyroid extract, by increas-

* Author's conclusion.

²⁰⁰ W. J. Taylor: Monthly Cyclo. of Pract. Med., July, 1905.

ing the production of the former, would arrest the bleeding even in hæmophilia, administered it in 3-grain doses (0.2 gm.) thrice daily, in three surgical cases. The coagulation time was reduced from eleven and one-half minutes to two minutes and six seconds in the most severe case, and the operation, entailing incision in the right loin and replacement of a kidney, was free from hæmorrhage. "To the astonishment of all present," says the operator, "the wound was remarkably dry, there being much less oozing than is usually seen in such operations." The effect was as striking in the other two instances.

When a free hæmorrhage occurs, the treatment of the tuberculous process must be set aside. As the purpose is to contract the arterioles, *morphine*, not less than $\frac{1}{4}$ grain (0.016 gm.), hypodermically, is of great value, since it produces precisely this effect—provided atropine be not given simultaneously as is usually done, since this drug increases the propulsive action of the arterioles.* To prevent recurrence, *veratrum viride*, 5 drops (1905 U. S. P.), may also be given every hour three times, then every three hours. By causing a fall of the blood-pressure, it perpetuates the effect of the morphine. *Potassium bromide*, 15 grains (1 gm.), renewed in three hours, then in four hours, produces a similar effect,* and reduces the tendency to cough besides. *Chloral hydrate* in similar doses acts in the same way.* Either of these remedies does not prevent the use of a second dose of morphine four hours or more after the first, if needed.

Several auxiliary measures are important. The patient should be placed in a *semi-recumbent position* to avoid the untoward effects of gravity which recumbency and the vigorous cardiac contractions that the upright position entails, involve. *Cold or iced compresses* to the nape of the neck, which cause reflex sympathetic constriction of the arterioles, and a *bandage* tightly wound around one or more of the limbs to interfere with the return of blood to the heart, are likewise useful. The patient should *avoid all movements* for a few hours at least, and be relieved of anxiety by reassuring words.

My observations in such cases have led me to conclude with Jacoud that morphine is the most efficient remedy in hæmoptysis; and also with Jay,²⁰¹ Plassetsky,²⁰² Fraenkel,²⁰³ and others, that ergot should not be used in hæmoptysis. As I have shown under "Ergot," it causes a primary rise of blood-pressure and only subsequently constriction of the arterioles, and even this only when large doses are given. The patient is thus forced to traverse a dangerous phase to be relieved, and

* Author's conclusion.

²⁰¹ Jay: Mercredi médical, Sept. 11, 1895.

²⁰² Plassetsky: Ejenedelnaya (St. Petersburg), No. 50, 1895.

²⁰³ Fraenkel: Münch. med. Woch., Bd. xlvi., S. 827, 1899.

again when the effect of the drug is passing off, thus exposing him to secondary hæmorrhage. The use of digitalis, emetics, etc., is also condemned by the first-named observers, and rightly, too, in my opinion. The effect of the ice-bag is so marked, that Rossbach observed laryngoscopically blanching of the tracheal mucous membrane under its influence. This measure is also recommended by S. Solis-Cohen,²⁰⁴ who applies the ice-bag over the heart or over the seat of bleeding.

The fever of the two first stages is a protective process* and therefore does not require medication. Under the influence of the iodides or thyroid extract, it may increase at first and coincide with free expectoration and perhaps the appearance of bacilli which had not been detected before. If it persists, however, a good plan is to add *creosote carbonate* to the iodine or thyroid, beginning with 5 grains (0.3 gm.), but raising the dose only to 15 grains (1 gm.) during meals. This hastens the anti-toxic process and the pyrexia is soon reduced to a slight but salutary level.

The fever of the hectic stage is partly due to a cause which has so far escaped attention, viz., a marked rise of the blood-pressure, due to irritation of the vasomotor center by the great quantity of toxic wastes and detritus in the blood.* Large enemata of warm (110° F.—43.30° C.) *saline solution* once daily, after the bowels have been moved, or *hypodermoclysis* or even *endovenous* injections of the same solution, greatly improve the patient's condition by promoting osmosis* and a free flow of urine, which carries away large quantities of the noxious substances. He should also drink copiously of a beverage composed of *milk and Vichy* mineral water, equal parts. These measures afford considerable relief.

Antipyretics do more harm than good. This applies especially to the coal-tar products, the use of which, as emphasized by many observers, causes marked depression. Aspirin has been recommended, but it causes profuse and depressing sweating.

The *nightsweats* of the hectic period are closely allied to the febrile process. The peripheral congestion incident upon the general vasoconstriction plus the febrile process, *i.e.*, the supreme effort which the adrenal system is making to rid the body of the tubercle bacilli and their endotoxin, and also, at this stage, of those that constitute the "mixed infection," becomes such, periodically, that the sweat-glands are themselves excited

* Author's conclusion.

²⁰⁴ S. Solis Cohen: Jour. Amer. Med. Assoc., Feb. 23, 1901.

to hyperactivity.* This is mainly due to the physiological function which supplies the skin with moisture, the evaporation of which cools the surface. The measures just described are of cardinal importance in this condition, therefore, since they tend to rid the blood of the poisonous substances which exaggerate the febrile process.* Sponging of the body is very helpful during the sweating, and medicines should be avoided at this stage.

The night sweats of the first and second stages, and of the third stage when there is hypothermia, are due to the general depression of the adrenal system, which, as we have seen, the presence of the tubercle bacilli entails.* The peripheral arterioles being relaxed (as under the influence of pilocarpine) the sweat-glands—that is to say their spiral muscles—become passively congested and overactive* and free sweating occurs. The aim here is to restore the arterioles to their normal caliber.* *Atropine* fulfills this precise rôle, provided, however, it is not given in too large a dose; $\frac{1}{100}$ grain (0.00065 gm.) hypodermically, or $\frac{1}{60}$ grain (0.001 gm.) by the mouth, usually suffices. It is preferable to morphine, which constricts the arterioles unduly. Another agent which acts much as does atropine is *camphoric acid*; it may be given in two doses of 15 grains (1 gm.) each, at short intervals, in capsules or cachets, two or three hours before the sweating period begins.

I have never used camphoric acid, but Stockman²⁰⁶ states that it is more effective than atropine and that the tendency to excessive sweating soon disappears.

GENERAL HYGIENE.—The specified diets often prescribed may be reduced to the simple formula: three substantial meals daily. With out-of-door life and appropriate treatment based on full recognition by the physician of the functions of the adrenal system in the curative process, the chances of recovery are very great, at least in the first and second stages of the disease.* No patient should be allowed to lapse into the third stage.

PROPHYLAXIS does not, of course, enter within the scope of this work, but I would urge that the very laudable and fruit-

* Author's conclusion.

²⁰⁶ Stockman: Edinburgh Med. Jour., Jan., 1897.

ful work done at the present time in this direction should include a recommendation to practitioners to attach more importance to "coughs and colds" than they do. Most of the cases that the consultant is called upon to examine are victims of carelessness in this direction. My own plan is to treat *all* coughs of obscure origin, especially those ascribed to "colds," as if I were dealing with incipient cases of tuberculosis, without, of course, mentioning the fact to the patient. I prescribe 10 minims (0.6 mg.) of *creosote carbonate* and $\frac{1}{40}$ grain (0.0016 gm.) of *strychnine*, or 1 grain (0.06 gm.) of *thyroid gland* instead of the strychnine, during each meal, and instruct the patient to remain out of doors as much as possible. A common cold or even a "bad cold" promptly disappears under this treatment without opiates or syrups—and the patient is fully protected in case the cough should prove to be, as is often the case, the first and only sign of a tuberculous infection.