authentic pharmaceutical information. The only conditions which it requires for acceptance of articles are: that they shall not be fraudulent; shall be of known composition; shall not be advertised to the public and thus encourage self-medication, and shall not be useless or harmful. Certainly we could not require less exacting standards for the remedies we use, if we are to exercise ordinary intelligence in our prescribing. And if in connection with these very lenient requirements we remember that the Council stands ready to investigate without delay any remedy in its opinion worthy of examination, it seems clear that to conform to its standards in the use of remedies would not place any embarrassing or useless limitations on one's therapeutic resources.

In the case of the Pharmacopeia and the National Formulary there is a good deal that we may do. These official standards are revised decennially. New preparations are added and others are dropped. A critical comparison of the drugs and preparations, now officially recognized by these two standards, with our modern dermatologic materia medica, would, I believe, be of considerable value in improving for dermatologists the next editions of these works. It would show numerous preparations which might be omitted as useless and would call attention to some which should be officially recognized by these works.

The Pharmacopoeial Convention will welcome such suggestions. The Convention for the Revision of the United States Pharmacopeia meets in 1910, and the present, therefore, is an opportune time for effort in this direction. In view of this approaching convention I believe that it would be highly desirable for this Section to appoint a committee to consider this subject during the next year, with a view to offering suggestions concerning matters of dermatologic interest which might properly be considered by the Pharmaceutical Convention. This would be in line with the efforts of the Committee on Pharmacopeia which has been appointed by the House of Delegates of the American Medical Association.

In closing I wish to express the high appreciation I have of the honor conferred on me in selecting me to preside over the deliberations of this body. There are few things more grateful than evidences of esteem from one's colleagues.

Experimental Alcoholic Paralysis.—Aubertin and Lhermite (*Compt. rend. Soc. de Biol.*, 1909, lxvi, 38) performed experiments to determine the localized nervous effect, if any, of chronic alcoholism. It was found that animals which were given quantities of absinthe daily developed paralysis of the posterior limbs, and after an interval of about ten months died of cachexia. Postmortem, the spinal cord showed a reduction in the number of nerve cells in the anterior horn. This reduction was fairly well confined to special groups of cells. The degenerating cells showed the appearance of chromatolysis. In the area of the atrophied nerve cells there was a great proliferation of glia cells. These changes were practically absent from all parts of the brain. The peripheral nerves were intact and showed relatively no lesions. Only a few interannular segments showed some degeneration on the medullary sheath. Since the changes in the brain are not sufficient to account for the systemic changes seen in the animal, Aubertin and Lhermite conclude that the paralysis is to be considered a result of poliomyelitis. It is further asserted that chronic alcoholism may be accompanied by paralysis associated with an extensive degeneration of nerve cells in the ventral horns of the spinal cord, and without any visible changes in the nerve fibers.

Original Articles

TWELVE YEARS OF PULMONARY TUBERCULOSIS TREATMENT IN THE WEST *

E. S. BULLOCK, M.D.

IN COLLABORATION WITH

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The time has come when we should make a conscientious and scientific attempt to fix the value of climate, and especially high altitudes, in the treatment of pulmonary tuberculosis. I am not sure that it can be accomplished at this time, but that is no excuse for not trying, and one purpose of this paper is to assist, as far as possible, in the elucidation of this problem. I also desire to place before the profession, after twelve years of tuberculosis work, some practical observations along other than climatic lines, which I trust will be of service.

ALTITUDE IN TUBERCULOSIS

We must all admit that, until settled, the question of the place of climate in the treatment of pulmonary tuberculosis is one of great importance, for the physician certainly does not wish to send consumptives to distant resorts if as good results can be obtained nearer home. Twenty or twenty-five years ago there was an all-abiding faith in the efficiency of climate in tuberculosis, for the quite simple reason that nothing was done for consumptives at home, and all knew that some at least recovered when sent to distant climates. Then came the time when efforts were made in behalf of the too-long-neglected consumptive, and our beloved and respected Trudeau was among the first to show clearly that, in early stages especially, a certain proportion of these unfortunates could be returned to health and usefulness in their home climates. Then succeeded the period of almost childish enthusiasm for the results of treatment in home climates, and we are still passing through that stage, though there are portents of an early emergence.

It is curious and quite true that in many ways we are behind Europe, though as a nation not fond of admitting it; a little slow in backing a good thing (the sanatorium movement was twenty-five years late in reaching us) and still a little slow in discovering its limitations. In Germany, years ago, they found that the so-called cured patients were prone to relapse and die, and that the sanatorium must be supplemented by something else if the cured patients were to remain "cured." In this country we are just in the process of finding this out, especially those physicians who are not directly under the influence of the *esprit de corps* of the sanatorium movement. Such physicians, living in proximity to these institutions, have an excellent opportunity to observe the results, and often to care for the "cured" patients after relapse has occurred.

No man can spend years in contact with tuberculosis, and have left any great enthusiasm for the results of treatment, either climatic or otherwise, and most of us who have been long enough in the work rather lament the fate that made us specialists in the disease; for

* Owing to lack of space, this article is here abbreviated by the omission of a portion devoted to the consideration of therapeutic agents other than climate. A copy of the reprint containing the whole article will be sent by the author, or THE JOURNAL, on receipt of a stamped addressed envelope.

really it is fate and not choice that makes most of us tuberculosis specialists, nearly all having served time as consumptives before taking up the work. We are coming to recognize clearly that the root of the evil must be attacked by prevention, not cure, and that it would have been better for civilization if all the money expended in attempts at "cure" had been directed to the accomplishment of prevention instead. It is, however, our business to care for the sick as well as to prevent sickness, and after infection has occurred it becomes our plain duty to do all we can for the unfortunate person on whom the parasite has fastened.

A careful study and observation of tuberculosis will convince any one that, left to itself after the onset of tangible symptoms, it is the same old fatal disease it always has been, and that, even under the best of conditions, and with every modern weapon brought to bear, it is ultimately nearly always fatal in any stage beyond incipency. Until we have learned how to bring these people under treatment in the earliest stages, we have no right to wax enthusiastic over our efforts to cure tuberculosis. As Dr. Trudeau recently wrote, "The more attention you give to the tuberculosis problem the more it grows in size."

tion is not the more creditable from the fact that our opponents have adopted the same sort of argument, and hitherto have been satisfied with invective and unsupported opinion where the claims of climate are concerned. To put it colloquially, however, it is up to us to make good, rather than for the rest of the profession to prove that we are wrong, for we wish the general practitioner to make a certain disposition of his tuberculosis patients—one that is vastly more comfortable and less expensive not to make. To make good, as the saying goes, is our mission here.

People are not sent to Saranac Lake because of the climate, but, as we all know, on account of the excellent character of the work that has been done there from the beginning. Even if the argument goes against us it may not be too much for us to hope that we may be able to continue our chosen work in the sunny southwest, where it is vastly more comfortable, if not more scientific, to practice the outdoor life.

Now, let us throw the searchlight of facts on this perplexing question. We shall then be more than willing to leave the decision in the hands of the profession.

A mile above the sea, in a climate that for comfort can not be surpassed, whatever its scientific usefulness

TABLE 1.—FORT BAYARD, N. M.: RESULT OF TREATMENT IN COMPLETED CASES FROM 1899 TO 1907, INCLUSIVE*

Class.	No.	%	App. Cured.		Arrested.		Improved.		Unimproved.		Died.	
			No.	%	No.	%	No.	%	No.	%	No.	%
Incipient	124	4.9	42	41.9	42	33.8	15	12	15	12	0	0
Mod. advanced	1,689	43.4	72	6.6	326	29.9	384	35.2	292	26.8	15	1.3
Far advanced	1282	51.1	3	.23	122	9.5	305	23.7	447	34.8	405	31.5
Acute miliary	9	.35	0	0	0	0	0	0	0	0	9	100
Total	2,504		127	5.07	490	19.5	704	28.1	754	30.1	429	17

TABLE 2.—FORT STANTON, N. M.: RESULT OF TREATMENT IN COMPLETED CASES FOR 1906, 1907 AND 1908*

Class.	No.	%	App. Cured.		Arrested.		Improved.		Unimproved.		Died.	
			No.	%	No.	%	No.	%	No.	%	No.	%
Incipient	17	5	7	45	6	29	1	11	2	8	1	5
Mod. advanced	99	26	16	15	36	34	25	23	6	9	17	18
Far advanced	227	66	12	4	30	17	41	17	36	14	119	44
Total	343	..	35	21	72	26	67	17	44	10	139	22

* Practically all patients presented bacilli in sputum on admission.

To return to climate, however: We know that there has been a vast expression of opinion on this subject, but so far, unfortunately, it has been mostly opinion. The scientific facts we require in order to reach a decision on the value of climate in tuberculosis have not been forthcoming to any great extent, especially in this country. Recently, Bonney of Denver published an otherwise creditable work on tuberculosis, but the chapter on climate, or rather the climate of Colorado, was the same old thing—opinion, opinion, and little else, of which we are all so weary, and with complete justification, too. As one reviewer quite aptly put it, "If climate is such a good thing in tuberculosis, why not prove it and then stop talking about it?"

Twelve years ago, fate sent me west with tuberculosis and I was fortunate enough to recover. I have devoted the best part of my life to the establishment of an institution for its treatment in the far west. If I am on the wrong track I wish to know it, and to retrace my steps before it becomes too late. I resent, however, having my motives questioned simply because I am and have been a climatic worker; because the facts in my possession seem to justify the continued advocacy of climate. I know that by our everlasting proclamation of unsupported personal opinion we climatic workers are to blame for the attitude of suspicious criticism that has commonly been adopted in discussing our work. That we are under a cloud I freely admit, and our posi-

tion may be, there exist two great government institutions for the treatment of tuberculosis—Fort Bayard and Fort Stanton. The former is for officers and soldiers of the United States Army, and the latter for officers and sailors of the merchant marine. About three thousand patients have been discharged from these institutions, and after nearly ten years' existence the results obtained should be worthy of careful comparative study. A foreword, however, is in order in regard to these institutions and their management. Both are under the direction of officers of their respective services, who have no personal interest in the exploitation of climate, and who come and go when their tours of duty are ended. This continued change in management, as well as in the personnel of the subordinate staff, is, of course, inimical to achievement in tuberculosis work. The members of the staff can not be expected to take the interest in it that characterizes those who have chosen it as a life vocation. Red tape and official detail consumes much of the time of those in charge, and, as these institutions are very large, that close supervision of patients, so essential to the accomplishment of the best results, is to a great extent impossible. Personal contact with patients, always in the services rather distant and much too dignified for friendly confidence, is entrusted largely to subordinates, who are even less interested than their chiefs. Careful individualization, as we all know, is most essential to the accomplishment of good results

in tuberculosis; for we never realize when an apparently trivial interference from us may mean the future welfare of our patients. When institutions go beyond a certain size, as in these government sanatoria, it is practically a lost factor. One thing we can say, however, about the men who direct these institutions; they are honest men, and their statistics are honestly and carefully compiled. Much more important than the character of the medical corps in its influence on results is the character of the patients handled at these government institutions. Without a doubt no other institutions, outside those of a penal character or insane asylums, can show quite so inferior a class of patients as these two have to accept. Their patients are mostly soldiers and sailors; equally improvident, thoughtless, dissipated, ungrateful, and to a great extent syphilized; it is almost impossible to hold them under treatment long enough to do them any permanent good; for, as you may not know, the length of time they remain under treatment is entirely in their own hands. Colonel Bushnell, in command at Fort Bayard, recently told me that the results among the officers, in whom he found a high

report 43 per cent. of cures and apparent cures; in the moderately advanced class they report 11 per cent. of cures and apparent cures, and in the far-advanced class 3.1 per cent. cures and apparent cures. In none of the approximately three thousand cases from which these figures were derived did tuberculin treatment enter as a factor. Further, nearly all patients presented tubercle bacilli in the sputum on admission; all were under treatment over thirty days, and no case was considered in which the patient was admitted arrested or cured. With one exception, to be presently discussed, these qualifications will be applied to all other cases and institutions considered in this paper. In many eastern institutions the plan has been adopted in classification of admitting patients with tubercle bacilli in the sputum credited to them if such had ever been present at any previous period, even though absent on admission. This is not the case with the western institutions discussed in this paper, where patients are credited with a sputum bacillary content at the time of admission only. I should explain, perhaps, that at Fort Bayard and Fort Stanton the results are substantially the same.

TABLE 3.—ADIRONDACK COTTAGE SANITARIUM 1907 REPORT: RESULT IN 157 PATIENTS DISCHARGED WHO REMAINED FROM 3 TO 26 MONTHS, OF WHOM 129 WERE TREATED WITH TUBERCULIN*

Condition of Patients When Admitted.	No.	%	Non-tuberculous. No.	%	Apparently Cured. No.	%	Disease Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	Died. No.	%
Incipient cases	61	39	..	..	23	38	27	44	9	15	2	3	0	0
Advanced cases	94	60	..	..	5	5	60	64	17	18	10	11	2	2
Far advanced cases	1	1	..	..	0	0	0	0	1	100	0	0	0	0
Non-tuberculous	1	1	1	100	0	0	0	0	0	0	0	0	0	0
Total	157	..	1	1	28	18	87	55	27	17	12	8	2	1

* These results are practically the same as for all previous years, and many of these patients did not present bacilli on admission.

TABLE 4.—RHODE ISLAND STATE SANATORIUM FOR CONSUMPTIVES 1907 REPORT: RESULT IN 94 PATIENTS DISCHARGED WHO REMAINED FOR 3-13 MONTHS. NOT TUBERCULIN TREATED*

Condition of Patients When Admitted.	No.	%	App. Cured. No.	%	Disease Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	Died. No.	%
Incipient cases	20	21	11	55	8	40	0	0	1	5	0	0
Mod. advanced cases	61	64	6	9	36	59	11	18	8	13	0	0
Far advanced cases	13	13	0	0	5	38	4	30	4	30	0	0
Total	94	..	17	18	49	52	15	15	13	13	0	0

* These results are practically the same as for previous years and 16 of these patients did not present bacilli on admission—a class in which it is very easy to get cures anywhere.

grade of cooperation, were astonishingly good. Later on we shall show statistically the exact influence of character and temperament on results. Everyone who does this work recognizes the tremendous import of these factors on the part of patients in the final result, and for this and other reasons mentioned these institutions make much the worst showing of any of our western sanatoria. Therefore, no one can accuse us of unfairness in selecting the results of their work for comparison with that done at tuberculosis sanatoria located in unfavorable climates.

Now, just what has been accomplished in the cure of tuberculosis at Fort Bayard and Fort Stanton during the past ten years? For the sake of clearness I shall confine the question to "cure and apparent cure" which mark definite results, and about which there is little chance for difference of opinion in classification. For the moment I shall leave out of account the "arrests," the "improved," the "unimproved" and "dead." Those interested in these details will find them in Tables 1 and 2. Thus, readers will be able to carry mentally the essential facts and figures, and I shall avoid confusion in the final summing up. Also, for the same reason, I have combined and averaged the results at the two institutions under discussion. In the incipient class they

Dr. Sands and I have elected to compare the Fort Bayard and Fort Stanton results with those of four eastern institutions in the work of which climate can not be said to enter as a factor to any appreciable extent, and which, compared with each other, like the two institutions already considered, furnish about the same results, namely, the Adirondack Cottage Sanatorium, Sharon, in Massachusetts, the Massachusetts State Sanatorium, and the Rhode Island State Sanatorium. These institutions, as we know and admit, are about as well and scientifically conducted as any that exist. They are under the direction of tuberculosis workers from choice and not from orders, who are deeply interested in tuberculosis as a vocation, and at nearly all individualization is practiced to a great and influential extent. At these eastern institutions they have a much better type of individual to deal with, too.

Thus, it may be said, we have selected favorable eastern institutions to be compared with unfavorable western ones, and still we are able to show that Fort Bayard and Fort Stanton obtain better results. In considering these eastern results, we are still dealing with approximately three thousand cases, with the qualifications before mentioned. The combined results of the work at these institutions are given in Tables 3, 4, 5 and 6.

Cures and apparent cures in incipient cases, 42 per cent.; in moderately advanced cases, 6 per cent., and in far-advanced cases, 0 per cent. The difference is not great, but it is in favor of the two government institutions in New Mexico in each and every class, and when the differences before mentioned, in management and type of cases, as well as bacilli presented in all cases on admission, are considered, the difference becomes real and quite markedly in favor of high altitude treatment. In one of the institutions considered, namely, Sharon, Mass., the proportion of patients not presenting bacilli on admission was so very large that we compiled only such of their cases as presented bacilli on admission.

I am taking it for granted that, of course, all understand that proper management can not but be vastly more important than any climate. I desire to call attention to the fact derived from the above statistics that the differences become more markedly in favor of high altitude treatment the more advanced the cases. This is as it should be, for if there is anything at all in a favorable climate we should certainly expect to see its operation in the more advanced type of the disease. The

Further to elucidate this problem, Dr. Sands and I have elected to compare the results obtained at the New Mexico Cottage Sanatorium under our management with those of the Loomis Sanatorium at Liberty, N. Y., under the management of Dr. Herbert M. King. Both are private institutions in the sense that they do not receive government or state aid. We would not have chosen the results of our own work for comparison with that of the Loomis Sanatorium if another western institution of the same type had been available. This is a matter of taste and not of science, however; for we are as sure as can be that our statistics have been carefully and conscientiously compiled. It is hardly necessary to state here that, to be available for statistical comparison, all cases must have been classified according to the Turban scheme, as modified by the National Association for the Study and Prevention of Tuberculosis. This method has been employed in all the statistics used in this paper. As we all know, the personal equation is bound to enter into any scheme of classification so far devised, and it goes without saying that the best of classifications is necessarily imperfect. In order to free our sta-

TABLE 5.—SHARON SANATORIUM, 1907 REPORT: RESULT IN 18 PATIENTS DISCHARGED WHO HAD BACILLI ON ADMISSION AND IN A FEW OF WHOM TUBERCULIN WAS EMPLOYED*

Class.	No.	%	App. No.	Cured. %	Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	No.	Died. %
Incipient	8	44	3	37	4	50	1	16	0	0	0	0
Mod. advanced	8	44	0	0	2	25	6	75	0	0	0	0
Far advanced	2	11	0	0	0	0	1	50	1	50	0	0
Total	18	..	3	16	6	33	8	44	1	5	0	0

* Results practically the same as for previous years. As a large percentage of the patients did not present bacilli, such were omitted.

TABLE 6.—MASSACHUSETTS STATE SANATORIUM 1908 REPORT: RESULTS IN 619 PATIENTS DISCHARGED, IN MANY OF WHOM BACILLI WERE NOT FOUND ON ADMISSION AND IN WHOM TUBERCULIN WAS NOT USED TO ANY EXTENT*

Class.	No.	App. No.	Cured. %	Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	No.	Died. %
Incipient	230	76	33	107	46	40	17	7	3	Not mentioned.	
Mod. advanced	312	25	8	117	37	137	43	33	10	Not mentioned.	
Far advanced	77	0	0	12	15	37	48	28	36	Not mentioned.	
Total	619	101	16	236	38	214	34	68	10		

* Results correspond to those of previous years.

more incipient the case the more easily is the cure obtained anywhere; and, *per contra*, the more advanced the case the more necessary it becomes to avail ourselves of every favorable influence, and climate is apparently the most potent after proper management. In this connection we must not forget to emphasize the fact that at the two government institutions 60 per cent. of all cases admitted are far advanced. This is especially true of Fort Bayard, where a large majority of the patients have been subjected to the almost fatal Philippine climate. Tuberculosis in our army is part of the price we have paid for our tropical possessions, and here let me ask, if there is nothing in climate, why is it that every medical officer who has served in the Philippines will testify to the fact that not only is tuberculosis horribly common and fatal among the natives of European descent, as well as among the aborigines, but also that when one of our soldiers becomes infected the only way to save him is to get him home and to Fort Bayard as soon as possible? That is not very soon, however; it is a long way home from the Philippines, and these cases often go from incipient to far advanced between the time of diagnosis and arrival at Fort Bayard. Let us not forget, in the face of the above easily confirmed facts, that the climate of the Philippine Islands in its relation to tuberculosis bears a somewhat similar relation to the climate of our eastern states that the latter do to the climate of New Mexico.

tistics from bias as far as possible, however, they were checked direct from the case records by both of us. The figures were checked as well by the Rev. Francis W. Carroll, the chaplain of our institution. I might also add that if there was any doubt about the proper classification of a case we placed it in as unfavorable a light as it would stand. We are also sure of the statistics of the Loomis Sanatorium; for every one recognizes the honesty and scientific attainments of the head of that institution. We have chosen these institutions for comparison, because, unlike those already studied, they present the most favorable results obtained under their respective climatic conditions. In both institutions tuberculin has not been employed sufficiently to make it important to take its use into consideration. In both we are dealing only with cases under treatment over thirty days, and all cases admitted arrested or cured have been eliminated.

At the Loomis, in the incipient class, they obtained 62 per cent. of apparent cures; in the moderately advanced class, 16 per cent., and in the far-advanced class, 3 per cent. At the New Mexico Cottage Sanatorium we report in the incipient class 83 per cent. of apparent cures, in the moderately advanced class 50 per cent., and in the far-advanced class 13 per cent. Thus, it can be seen, the results are again in favor of the institution with favorable or high altitude climate. This is not a slight difference as in the previous instances, but

"he who runs may read." Again, as in the case of Fort Bayard and Fort Stanton, the more advanced the case the greater the difference in favor of high altitude treatment.

It may be of interest to know how we explain the marked discrepancy between the results of our own work and those obtained at Fort Bayard and Fort Stanton. We think we have already made that point plain in the discussion of those institutions, the character of their management and of their patients. In regard to the difference in our favor in the study of results at the Loomis and New Mexico Cottage Sanatorium, we are sure that Dr. King has no advantage over us in institutional essentials, although probably our superior in the management of tuberculous invalids; and yet his results are not as good as ours. The reason must lie in the more favorable climatic environment, especially high altitude, and such we think it is. Time, of course, is a large factor in obtaining good results in tuberculosis, and the fact that at the New Mexico Cottage Sanatorium the average length of treatment is 9.3 months, which is somewhat longer than most institutions report, may have a bearing on our results.

pointment. I trust that it may also help others to solve the problem: "What shall I do with my consumptive patients?"

For the sake of perfect fairness, let us exclude from our thoughts the results of the comparison between the Loomis Sanatorium and the one under our management, and think only of those remaining east and west. We can grant, I believe, that we have properly estimated the work at the government institutions and that the result is even more in their favor than it seems to be. Still the difference in favor of high altitude treatment is not sufficiently great to justify shattering every established rule of the treatment of tuberculosis for the sake of sending a consumptive to the distant high altitude climate. I will try to make just what we mean plain to all, and in order to do this it will first be necessary to show that the influence of an unfavorable temperament or financial condition is most important in the final result, and should certainly be considered in sending a patient far from home. If it seems certain that a properly regulated life is impossible, such a patient should not be sent away, for the natural tendency to irregularity will be more pronounced in the idle life

TABLE 7.—NEW MEXICO COTTAGE SANATORIUM: RESULTS IN 241 PATIENTS DISCHARGED, WHO REMAINED OVER ONE MONTH, EXCEPT THOSE ADMITTED CURED OR ARRESTED*

Class.	No.	%	App. Cured. No.	%	Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	No.	Died. %
Incipient	47	19	39	83	8	17	0	0	0	0	0	0
Mod. advanced	48	19	24	50	16	33	4	8	3	6	1	2
Far advanced	146	60	19	13	45	30	37	25	39	26	6	4
Total	241	..	82	34	69	28	41	17	42	17	7	2.8

* Includes all cases discharged to Jan. 1, 1909. In 67 tuberculin was employed.

TABLE 8.—LOOMIS SANATORIUM AND ANNEX 1908 REPORT: RESULT IN 263 PATIENTS DISCHARGED WHO REMAINED OVER ONE MONTH, EXCEPT THOSE ADMITTED CURED OR ARRESTED*

Class.	No.	%	App. Cured. No.	%	Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	No.	Died. %
Incipient	42	17	27	62	6	15	7	17	2	4	0	0
Mod. advanced	115	43	19	16	40	35	36	34	18	15	2	2.5
Far advanced	106	40	4	3	14	15	43	39	36	33	9	7.5
Total	263	..	50	11	60	22	86	32	56	21	11	4

* Forty of these patients were treated with tuberculin.

Before leaving the subject of statistical comparison it may be well to combine the results of the western institutions we have been considering and compare them with the combined results obtained at the institutions located in the east. Fort Bayard, Fort Stanton and the New Mexico Cottage Sanatorium in the incipient class report 56 per cent. of apparent cures, in the moderately advanced class 24 per cent., and in the far-advanced class 6 per cent. The Adirondack Cottage Sanatorium, the Massachusetts State Sanatorium, the Rhode Island State Sanatorium, the Sharon and the Loomis Sanatorium report 47 per cent. of apparent cures in the incipient class, 7 per cent. in the moderately advanced class, and 0.6 per cent. in the far-advanced class. So, finally, there seems nothing to do but gracefully to admit that high altitude treatment furnishes better results than can be obtained in unfavorable or low altitude climates.

Medical questions are notably knotty and difficult of solution. We so often work in the dark as regards important factors that there comes a time when doubt of nearly everything assails us. Many times I have had moods of black pessimism in regard to the rôle of climate in tuberculosis, but this study of statistics, undertaken primarily to convince myself and Dr. Sands, has helped me to feel satisfied with my lot and to know certainly that my task is not useless. To return to my little oasis in the desert is a comfort and not a disap-

such a patient is often compelled to lead. And if such a one is sent to an institution it will simply make things uncomfortable for himself and every one else. A patient of this type is likely to become a peripatetic consumptive, roaming the west in search of the health that is never found. If the financial condition is not such as to permit a patient to go away in peace of mind for at least a year, and have during that period the best of care and treatment, then such should be kept at home. Fifty per cent. of our cases are classed as unfavorable as to temperament or financial condition, and this operates against them as follows: In the incipient class the percentage in favor of the properly equipped individual as to money and temperament is 17; in the moderately advanced class 18 per cent., and in the far-advanced class 15 per cent. These figures are much too conclusive to be overlooked when deciding on the disposition of a tuberculous invalid. Practically, does it seem reasonable that any one can do well when constantly worried about money and other important things? I am certain that our results would not be nearly as good if I had not by persistent begging been able to keep many patients under treatment who otherwise would have been forced to leave the institution. Thus, by sending away persons not properly equipped, an enormous burden is thrown on our institutions for tuberculosis in the west, a burden that detracts largely from the pleasure and comfort that otherwise might be derived from the work. This

applies to our western communities as well, and in Los Angeles the evil of indigent consumptives has grown to such proportions as to compel the citizens to take united action to insure their future protection.

I have admitted that climatic treatment offers no wonderful inducements for sending consumptives far from home. To be exact, the chances of the incipient are increased 9 per cent. by proper treatment in a high altitude climate, 17 per cent. in the moderately advanced class, and 6 per cent. in the far-advanced class. I have also defined two classes that positively should not be sent away. I have also pointed out that a good climatic environment does not justify breaking all the established rules of the treatment of tuberculosis. The sanatorium régime, with its hard and fast rules and constant medical supervision, is easily the most important factor in treatment. Therefore, it is much better to keep a patient in an unfavorable climate and in a good sanatorium than in the most perfect climate in the world outside a sanatorium, and, except for an occasionally and practically useless call on a physician, do just about as he pleases the rest of the time. In illustration of this point permit me to observe that at a meeting of our local county society, the physicians present, the majority of those practicing in Silver City, admitted that

conduct our institution for much less than you can properly care for patients in private rooms in your hospitals here. Without our partial endowment the rate we are forced to charge would, of necessity, be higher than it is. A properly conducted institution for the tuberculous implies a full corps of doctors, nurses and all the usual hospital employés, and has more than a hospital plant as well, for, to get the best results, we must provide separate cottages for patients. It seems necessary to mention this matter, as so many of our eastern friends have asked us why we can not charge less, seeming to forget that it is unreasonable to ask us to do in a country of high prices what they can not and would not do themselves in a country of much lower prices. From its organization, three and one-half years ago, the New Mexico Cottage Sanatorium has supplied 2,246 months of treatment at a total cost to the institution, without profit, of \$202,140. As the average length of stay is 9.3 months, the average cost per patient is \$838, and, of course, to this sum must be added the cost of transportation. Thus, the total cost for nine months' treatment is nearly \$1,000, and it may readily be seen how impossible it is, at present at least, to bring sanatorium treatment in the west, for private patients, within reach of more than comparatively few of the vast army of human beings

TABLE 9.—NEW MEXICO COTTAGE SANATORIUM: CASES WITH FAVORABLE TEMPERAMENT AND FINANCIAL CONDITIONS

Class.	App. No.	Cured. %	Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	Died. No.	%
Incipient	25	89	3	10	0	0	0	0	0	0
Mod. advanced	16	57	7	25	1	3	2	7	2	7
Far advanced	14	21	22	33	6	9	19	29	4	6

Total 121, or 50 per cent.

TABLE 10.—NEW MEXICO COTTAGE SANATORIUM: CASES IN WHICH EITHER TEMPERAMENT OR FINANCES WERE UNFAVORABLE

Class.	App. No.	Cured. %	Arrested. No.	%	Improved. No.	%	Unimproved. No.	%	Died. No.	%
Incipient	13	72	5	27	0	0	0	0	0	0
Mod. advanced	9	39	9	39	3	13	2	8	0	0
Far advanced	5	6	23	29	31	39	19	24	1	1

Total 120, or 50 per cent.

outside the institutions located in Grant County there had been only seven or eight cures in the memory of the oldest medical inhabitant. It is only fair to add, however, that the climate does help many people in the far-advanced stages to keep on living.

I do not mean to maintain that every consumptive outside of an institution is necessarily mismanaged; for here and there will be found a doctor who knows the ropes, and a patient with sense enough to cling to them, but such doctors and such patients are quite exceptional, we are sure. To sum up in a few words, I most emphatically maintain that no consumptive should ever be sent away if it is not certain that he will have as good care and management in the distant climate as he could obtain near home. It was genuine pity for the homeless and often itinerant consumptive that originally actuated me in taking up the work out west.

It is, of course, important to remember that, as I have shown, the more advanced the case the more essential it becomes to prescribe climatic change.

A word may be useful regarding the cost of caring for patients properly in an institution in the west. I am referring, of course, to private patients who invariably insist on certain things which might be eliminated without damage to the scientific régime in a truly charitable institution. Our institution is in no sense commercial, but is organized to pay for maintenance, the plant itself being an endowment. We have found it impossible to

afflicted with tuberculosis. It seems to us very practical, indeed, to mention these financial details, for so many, about 50 per cent., of the people sent west are utterly unable to cope financially with the conditions found on their arrival. To live outside an institution and to have all the essentials of a proper environment, including medical attention, is even more expensive, and often disastrous, for to save money, patients, when left to themselves, will eliminate things of vital importance to their welfare.

I might mention that 60 per cent. of all our cases have been far advanced, a class which in the east is practically barred from institutional treatment. It is certainly a question if the time and money spent on these far-advanced cases is justified in the light of actual results obtained under the most favorable conditions, namely, 13 per cent. of apparent cures and 30 per cent. of arrests, leaving at least 30 per cent. to die within a comparatively short time, and probably most of the remainder within ten years. This is an academic and not a practical question, for when put to it few will submit to having a money value placed on their lives. It resolves itself into this: Cure in tuberculosis is probable inversely as the square of the lung tissue involved; the more advanced the case, the greater the necessity of high altitude treatment, the longer the time required to effect a result, and consequently the more money needed by the patient, for, where an incipient

may recover in from five to six months, a far-advanced patient will require a year or more to make even a relative recovery. It may be granted, I think, that we are not devoting so much attention to this matter as an inducement for the practitioner to keep tuberculous people at home until they have become far advanced, although we are free to admit that the greatest pleasure we have is to observe the slow return to health of some at least of these so-called hopeless patients. From our point of view they are quite the most desirable class of patients; for they see and know the necessities of the situation and are more than willing to devote the time to getting well. It is rarely necessary to do battle with them to keep them long enough under treatment to obtain a substantial result, as we often must with the incipients.

So far, in submitting proofs of the value of high altitude climates in tuberculosis, I have confined my argument to statistics. Of course, I can not but recognize, however, that the final decision will rest on statistical evidence carefully compiled and scientifically interpreted. Let us, however, for the moment, turn our attention to a collection of perfectly well-established facts, hardly less important to consider than those already studied. Time will not permit more than a glance at

the difference between the sun and shade temperature of 1 degree F. for every rise of 235 feet.

3. Asepticity of freedom from pathogenic germs, as proved by the researches of Pasteur and others. The effect of mountain air on the organs and functions of healthy and sick persons has been ascertained by repeated and careful observations to be as follows: The skin is tanned by the solar rays, and, according to Dr. Bowles, principally by the ultraviolet rays in the attenuated atmosphere. The circulation is at first quickened, the heart's impulse becomes more powerful, but the pulse rate at the end of six or eight weeks falls to normal, or even below normal. The respiration is at first quickened, but after a similar interval it gradually slows and is reduced to normal, or below normal. The breathing becomes deeper, the inspiration longer and the expiration more complete, and thus is explained the slowing of the respiration. At first there is reduction of the blood pressure, and in the amount of urea excreted by the kidneys, but more carbonic acid and water are eliminated by the lungs. When acclimatization is complete, the urea appears in full quantity in the urine, and the blood pressure again increases.

Accompanying and exactly coinciding with the reduction in the pulse and respiration the thorax expands in several directions, causing an increase in circumference at various levels of from one to three inches or more, also an augmentation of the spirometric record and increased mobility of the chest walls. The thoracic expansion is caused by the greater physiologic activity and development of the lungs due to rarefaction of the air.

TABLE 11.—RESULTS OF DIFFERENT CLIMATES COMPARED AFTER WILLIAMS

	Number of Patients.	Average Residence, Months.	First Stage.	Second and Third Stages.	Results.							
					General.				Local.			
					Bilateral Affection.	Improved.	Stationary.	Worse.	Arrest.	Improved, including Arrest.	Stationary.	Worse.
High altitudes	247	12	65	35	37	83	2	14	42	55	10	9
Sea voyages	65	3	65	37	37	77	..	21	7	53	10	33
Riviera	210	9	59	41	36	65	10	24	5	36	17	45
British climates	292	9	58	42	42	63	8	28	2	23	20	41

the different factors of a good climate for tuberculosis, and the rôle each fills, and some, of necessity, we shall be compelled to overlook entirely. It is curious how a work of genuine merit is sometimes completely forgotten, and how a succeeding generation must rediscover it and learn it all over again. This is true of the epoch-making paper of Sir Herman Weber, read in London in 1869, which resulted in the use of the high altitudes of the Alps in the treatment of tuberculosis from that day to this. Sir Herman Weber had his predecessors, of course; among the most notable were Lowhard, Archibald Smith and Jourdanet, who, some of them, many years before, had advocated high altitude in tuberculosis. Weber stated that altitude from 5,000 feet up was the one important factor in climatic treatment, and if that were provided we need not argue over other things, humidity, rainfall, etc., which "may modify but do not hinder the effects of altitude."

Williams of London, than whom there is no greater living English authority in the treatment of pulmonary tuberculosis and who has employed high altitude in his practice for the past forty years, states:

The characteristic effects of mountain climate are:

1. Diminished barometric pressure and consequent rarefaction of the atmosphere.

2. Diathermancy of the air, or the increased facility by which the sun's rays are transmitted. This, as the late Dr Denison of Denver was the first to show, causes an increase in

This is recognized by the measurements alluded to above and by the physical signs; for the respiratory sounds are heard over a larger area in the thorax than is usual, and thoracic expansion is further proved by the wearer's clothing becoming too tight around the chest. More oxygen is consumed by the blood and more carbonic acid gas is given off. These changes in the thorax and its contents in visitors to the mountains are exemplified more fully in the mountain races; for the Indian of the Andes, the hill tribes of the Himalayas, the guide and chamois hunter of the Alps have all enormous chests and are characterized by great respiratory power.

Dr. Williams states, as well, that of all his consumptive patients those treated in high altitudes yielded the most favorable results, and, what is more important, the fewest relapses. He gives the results in about 850 cases as follows: treated in high altitudes, 83 per cent. improved, as against 63 per cent. in England, which, as will be remembered, represents about the difference between the Loomis Sanatorium and our own work. Dr. Williams further states:

In no country can the high altitude treatment be more effectively carried out than in the United States, where the tract of high-lying land is of vast extent and where altitudes of from 5,000 to 10,000 feet are available and being situated in temperate latitude, present a great choice of climate.

All these facts in regard to the effect of high altitudes in consumption have been confirmed over and over again; there is hardly anything in medicine better sub-

stantiated. They have a right to take their places among the established contributions to our art and science. Let us not be deafened by the loud blasts of the trumpet of anticlimax, which has been so strenu-

altitude causes complicated changes in the blood itself, as well also as an increase in hemoglobin, but further studies are required to elucidate them.

At this point I can not resist the temptation of pointing out the scientific advantages which would accrue from the establishment of a special laboratory at a selected spot in the Rocky Mountains for the study of effects of high altitudes on human beings, both sick and well.

PHAGOCYTOSIS IN RELATION TO ARNETH'S CLASSIFICATION OF NEUTROPHILES *

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If the experience of perhaps most workers who have written on the subject is to be accepted, the opsonic index as a means of diagnosis and especially as a therapeutic guide is far from satisfactory.

Disregarding the possibility that much of this adverse criticism is due to incomplete mastery of detail, there still seems good theoretical ground for not accepting some of Wright's earlier views on the question. In disregarding the leucocyte entirely he seems to have done wrong, since various observers have called attention to the variability of phagocytic activity by leucocytes obtained from various sources—in certain stages of infection and in artificially induced leucocytosis. But as far as I can determine no one has offered a satisfactory explanation for this varied activity.

Diagrams, after Theodore Williams, showing increased chest girth after sojourn in high altitudes. The solid lines show girth before, and dotted lines girth after stay in high altitude.

ously blown the past few years, and try not to forget what has been done by scholarly workers in Europe to prove the place of climate in tuberculosis. In imagination let us turn our eyes to the Alps, and there in the snow and ice and among the tall pines see the multitude of sanatoria for consumptives which dot the mountain sides and realize that Europe believes in altitude and climate in tuberculosis.

I should not leave this subject of altitude until something has been said of the results of our blood-pressure studies. I can not give all the details of this investigation, but can briefly indicate the results. It is positively known that coincident with improvement in tuberculosis there is a rise of blood pressure, and this phenomenon occurs, of course, in any altitude. Dr. Thayer of Baltimore recorded the blood pressure in a large number of consumptives and found it to average 100 mm. of mercury, showing conclusively the influence of tuberculosis in lowering blood pressure. Granting that Dr. Thayer's figures are correct, it becomes clear that continued residence in a high altitude tends to raise the blood pressure, after the primary fall has been recovered from. Among 350 of our patients, the average blood pressure in all classes is 130 mm. of mercury. Thus, we may have stumbled, for aught we know, on one at least of the specific reasons why high altitudes are beneficial in tuberculosis. Continued residence in a high

Neutrophiles, drawn from the microscopic field. Figure below each neutrophile expresses the average number of staphylococci ingested by the corresponding cell in a series of 9 bloods, aggregating 1,200 neutrophiles.

Believing that Arneth's classification¹ of neutrophiles in conjunction with the phagocytic power of the neutrophile might throw light on this question, I made the following study:

Phagocytic tests were made with the blood of various patients presenting considerable variation in the number of cells belonging to the different classes of Arneth, and the average number of organisms ingested by the cells of each class was observed, in order to determine if constant relative phagocytic power existed for each class of cells.

* From the Laboratory of the Pottenger Sanatorium

1. Arneth: Die neutrophilen weissen Blutkörperchen bei Infektionskrankheiten, 1904; Die Lungen Schwindsucht, 1905.