

ANNUAL REPORT

OF THE

BOARD OF VISITORS

TO THE

UNITED STATES MILITARY ACADEMY

FOR

THE YEAR 1896.



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REPORT
 OF THE
 BOARD OF VISITORS
 TO THE
 UNITED STATES MILITARY ACADEMY
 FOR THE YEAR 1896.

To the Secretary of War, the President of the Senate, and the Speaker of the House of Representatives:

The following report of the Board of Visitors, appointed in pursuance of section 1327, Revised Statutes, to the United States Military Academy at West Point, N. Y., June, 1896, is respectfully presented.

The persons constituting the Board are named below:

APPOINTED BY THE PRESIDENT OF THE UNITED STATES.

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| 1. Hon. M. E. INGALLS..... | Cincinnati, Ohio. |
| 2. Dr. JOSEPH D. BRYANT..... | New York, N. Y. |
| 3. Hon. T. H. CLARK..... | Montgomery, Ala. |
| 4. Gen. JAMES H. WILSON..... | Wilmington, Del. |
| 5. Hon. HIRAM W. GARWOOD..... | Bastrop, Tex. |
| 6. Prof. W. WHITMAN BAILEY..... | Providence, R. I. |
| 7. Hon. ALBERT W. GILCHRIST..... | Punta Gorda, Fla. |

APPOINTED BY THE PRESIDENT OF THE SENATE.

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| 8. Hon. GEORGE GRAY..... | Wilmington, Del. |
| 9. Hon. WILLIAM J. SEWELL..... | Camden, N. J. |

APPOINTED BY THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

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| 10. Hon. GEORGE W. STEELE..... | Marion, Ind. |
| 11. Hon. ROBERT G. COUSINS..... | Tipton, Iowa. |
| 12. Hon. GEORGE B. MCCLELLAN..... | New York, N. Y. |

All of the members except Mr. Garwood reported at West Point, and after a temporary organization elected Gen. James H. Wilson president, Senator Sewell vice-president, and Professor Bailey secretary.

The following committees were appointed:

Appointments and examinations.—Messrs. Cousins, Clark, and Sewell.

Discipline and instruction.—Messrs. Gray, Gilchrist, and Clark.

Armament and equipment.—Messrs. Steele, Garwood, and Sewell.

Buildings, grounds, and lights.—Messrs. McClellan, Bryant, and Wilson.

Fiscal affairs, supplies and expenditures for cadets.—Messrs. Ingalls, McClellan, and Gray.

Hygiene and athletics.—Messrs. Bryant, Bailey, and Gilchrist.

The examinations and exercises were conducted from day to day in the usual manner, and revealed the fact that the high standard of instruction, discipline, and proficiency which have always prevailed at the Military Academy have been fully maintained.

Every facility that could have been desired was offered for an examination of the administrative and academic departments of the institution, for the inspection of the grounds and buildings, and for obtaining a correct knowledge of the instruction and discipline of the cadets. Officers on duty at the Academy were detailed to accompany and assist the committees in their investigations. The Superintendent and his staff, as well as the professors and instructors, showed them every attention and gave them all necessary facilities for the performance of their duty. Every question, no matter to whom addressed, was fully and fairly answered, and every subject pertaining to the efficiency of the institution was thoroughly investigated and discussed.

Special attention was given to the requirements for admission into the Academy, and also to the curriculum of studies prescribed for the cadets.

While education has generally advanced throughout the country with its growth in population and prosperity, the standard of admission has not been materially raised since the foundation of the Academy. The Board of Visitors, after careful consideration of the subject, were unanimous in the opinion that the present requirements are not sufficiently comprehensive, and that in view of the course to be mastered after admission, elementary algebra should be added; but this can not be done under the present system without an act of Congress authorizing it. With the view of keeping the standard of admission abreast with the progress of education at large, and with the standard of admission to other educational institutions, the Board therefore recommends that section 1319, Revised Statutes, fixing the present standard of admission, should be repealed and a new section should be enacted, substantially as follows:

SEC. —. Appointees for admission into the Military Academy shall be examined in such subjects, at such times, and according to such regulations as may be prescribed from time to time by the Secretary of War, before they shall be admitted to the Academy.

This, it will be observed, will make the provisions for admission to the Military Academy conform substantially to those for admission to the Naval Academy, which are as follows:

SEC. 1515 (Rev. Stat.). All candidates for admission into the Academy shall be examined according to such regulations and at such stated times as the Secretary of

the Navy may prescribe. Candidates rejected at such examination shall not have the privilege of another examination for admission to the same class, unless recommended by the board of examiners.

This recommendation, it is believed, can be all the more safely adopted, because the first six months after admission may be fairly considered as a probationary period, in which special pains are taken to familiarize the new cadets with the prevailing methods of instruction and discipline, and to bring them into harmony with their environment.

The curriculum of studies and the methods of instruction and recitation seem admirably adapted to the exact and highly scientific education now required for army officers by all civilized nations. The time of the cadet is properly divided between rest, study, and recreation, and no trifling or waste of time is permitted. The system is the same for all, but inasmuch as the cadets are arranged in their classes from time to time according to their proficiency, and the amount of each subject and the minimum degree of proficiency required, are graduated from the head to the foot of the class, the burden of work is apportioned according to ability, and no injustice is done. While all are required to go over the same general course, and to give the prescribed amount of time to each study and exercise, all are not required to attain the highest degree of proficiency. Those in the higher sections cover more ground than those in the lower, and after graduating are assigned to the higher branches of the military service. In practice for many years, the system has been found to work well, and it is believed that the officers of our Army as a class are better educated than those of any other country, and are specially well fitted for active service in all branches of army work. It is largely due to this circumstance that the late General Upton, and many others who graduated well up in their class and were assigned to the artillery and the staff corps, served in the war of the rebellion with equal efficiency and distinction in the artillery, cavalry, and infantry, and that General Sheridan and others who graduated low in their class and were assigned to the infantry, served with equal or greater success in the cavalry, and even higher branches of the service.

The Board of Visitors found the grounds and buildings of the Academy and military post admirably cared for, in excellent condition, and generally well adapted to the purposes for which they are used.

The cadet barracks, an extensive and stately building of granite, contains ample accommodations, at the rate of two in a room for the average maximum strength of the corps, which is now 296. By the vacation of the rooms now used by officers and the dentist, and for the storage of trunks and other property, there would be sufficient accommodation for 384 cadets.

The rooms are well ventilated and heated, but it is worthy of observation that the system of lighting is capable of further improvement, without additional expense for plant, by the adoption of the recent improvements in the art of lighting by gas.

As the barracks and academic building are found to be ample for the accommodation of at least 88 more cadets, or two at large for each State in the Union, or one for each Senator, and the additional cost would be but slight, the Board recommends that an act of Congress should be passed, authorizing the nomination of one cadet by each United States Senator, in addition to those now nominated by each Member of the House of Representatives.

The new academic building designed by Richard M. Hunt, the late distinguished architect of New York; has been completed, with the exception of the clock tower, provided for in the original plans, but which would cost a considerable sum of money and would hardly improve the appearance of the building. This most excellent structure, as well as the new gymnasium, also designed by Mr. Hunt, are enduring monuments to his taste and ability. They are altogether admirable in design, materials, and stability. The cadet mess hall has been relaid with a tile floor, which adds to its cleanliness, but its walls are hung with portraits of distinguished officers, some of which are of questionable artistic merit. The Board of Visitors recommends that the Superintendent or the academic board should be vested with discretionary power to reject such portraits presented to the Academy as do not come up to the proper standard of excellence.

The library contains some 38,200 bound volumes and about 6,000 pamphlets. It is by far the largest and best military library in this country, and its value is almost priceless. The building in which it is housed has a very attractive exterior and a very unattractive interior, but it is damp and not fireproof, besides the library room itself is too small. Plans and estimates have been prepared for altering the present building and making it fireproof, and the Board recommends that the necessary appropriation should be made by Congress at the earliest possible day. The total estimated cost of these alterations is \$70,000.

The quarters for married and unmarried officers, recently provided for by Congress, have been completed and occupied, but three more sets for married officers are badly needed. It is estimated that they will cost \$8,000 per set, or \$24,000 in all.

The riding hall is too small for the proper instruction of the cadets, and the "leg guard" is old and rotten and should be renewed. The building should be much enlarged or replaced by a new one of proper size, but no plans having been prepared, the Board of Visitors can not submit an estimate therefor.

The stables, although old, are fairly lighted and ventilated, but they accommodate only 98 horses. The main building should be extended south 43 feet, by which room for 12 additional horses can be provided.

If 50 additional horses should be purchased, which the Board strongly recommends as necessary for the proper instruction of the cadets in cavalry and artillery tactics and exercises, the stables will have to be increased accordingly, but as no plans or estimates have been prepared, the cost of this improvement can not be stated at present.

Congress at its last session appropriated \$7,500 for a guardhouse at the south gate of the reservation, but the lowest bid which could be obtained therefor was \$8,600; hence, the appropriation should be increased \$1,100.

The cadet guardhouse is too small, and besides it is old and shabby. It should therefore be remodeled or torn down and a new one built in its place.

A small amount of grading and paving is needed around the new Academic building and a sidewalk should be laid from the south dock to the plateau above. These improvements, estimated at \$7,900, should be made as soon as the money is provided for them.

The hotel, built seventy years ago, is insufficient in size and accommodations and is badly arranged. The rooms are small, the furniture old and shabby, and the bedding and carpets are poor in quality and condition. The rent is \$2,000 per year, \$1,000 of which is allowed for repairs, but if the whole rent were applied to the betterment of the furniture and accommodations, the result would not then enable those who are compelled to go to West Point to find at the hotel such comfort as should be furnished in a building owned by the United States.

Obviously the house should be remodeled and refurnished, or it should be replaced by a new one, as experts may recommend after a careful examination. Plans and estimates not having been submitted, the cost of the necessary improvements can not be given in this report.

The barracks for the band and also for the enlisted and general-service men on duty at West Point are in good condition and are sufficient for the present, but the barracks for the engineer troops are inadequate for their proper accommodation and should be remodeled and extended. Those for the cavalry detachment, built in 1891, are a disgrace to the service. They stand near the cavalry stables under the side of a hill which is some 20 feet from the west end. They are badly ventilated, and in consequence of the wet rock on the north side and the wet earth under the floor, they are damp and chilly even on warm summer days. They are insufficiently provided with baths and washing facilities.

The Board of Visitors recommends that the present unsatisfactory condition of these barracks should be remedied without delay. The rock north of the barracks, for a distance of 25 feet at least, should be blasted and removed, in all about 1,800 cubic yards, at a cost of about \$2,000. The space under the ground floor should be excavated, drained, concreted, and properly ventilated from the inside, and the present inefficient exterior ventilators should be closed. New bath tubs should be provided, and the soapstone troughs now used by the men for washing should be replaced by 8 suitable lavatories. A wooden floor should be laid in the kitchen, the plaster ceilings, which are continually falling, should be replaced by iron ceilings, and the building should be painted both within and without.

The enlisted men's guardhouse is too small and is badly lighted and ventilated. It should be replaced by a new one.

The subject of the sanitary condition and needs of the entire post received the personal attention of a distinguished medical practitioner, a member of this Board, and his investigations were so thorough and have led to such important results, and the report prepared by him is so complete, that the Board not only concurs fully in its conclusions, but desires to have it and its accompanying documents published as a part of this report.

The cadet hospital is in excellent condition and generally well suited for its purposes, but the water-closets in the rear of each floor should be removed to the outside of the rear wall, additional bathrooms should be provided, and an operating room constructed in accordance with the requirements of modern surgery is absolutely necessary. The courtyard requires regrading, draining, and repaving.

It is estimated that the operating room will cost \$2,400. The other improvements at the hospital, it is estimated, can be provided for \$5,300.

It has been found by an expert, whose report is submitted with that of the committee on hygiene and athletics, that the water from the mountains impounded in the reservoirs which supply the post requires filtering before it can be safely used. The new reservoir should be completed, and this can be done at a cost of \$15,000. A properly constructed filter with a daily capacity of 500,000 gallons should be added as soon as possible. The Board is unable to state what this will cost, but believes it can be built for about \$25,000.

The following tabular summary of the approximate cost of carrying out the improvements herein recommended is submitted, with the further recommendation that the Secretary of War should cause the immediate preparation of the additional estimates, under the direction of the Superintendent, necessary to complete the table:

Reconstruction of library building	\$70,000
Completion of the new reservoir	15,000
Filtering beds (approximate)	25,000
Grading and paving about new academic building.....	5,300
Sidewalk from south dock to plateau	2,600
Three sets of officers' quarters, complete	24,000
Additional appropriation for guardhouse at south gate.....	1,100
Operating room at cadet hospital.....	2,400
Other improvements at cadet hospital	5,300
Total	150,700

To the foregoing should be added:

- Additions and improvements at the cavalry barracks.
- Extension and repairs of riding hall.
- Extension and repairs of stables.
- Remodeling and rebuilding cadet guardhouse.
- Improvement of the engineer barracks.

Improvement and grading at cavalry barracks.
 Rebuilding enlisted men's guardhouse.
 Remodeling or rebuilding hotel.

The Board desires to add that, while it does not wish to be understood as recommending immediate appropriations for any of the above-mentioned improvements, the cost of which has not yet been estimated and can not therefore be given, it entertains no doubt that they will be called for in the near future, and hence it suggests that proper plans and specifications and estimates therefor should be prepared under the supervision of the Superintendent, for the information of Congress, without unnecessary delay.

This Board renews the recommendation of several of its predecessors, that the senior assistant of the instructor in ordnance and gunnery should be granted the same pay and allowances as are now provided by law for the assistant professors of the other departments of instruction. This is obviously just, and should be authorized by Congress for the excellent reasons frequently stated before.

It also heartily concurs in the recommendation of previous Boards that the efficient services of Mr. Herman J. Koehler, sword master and instructor in gymnastics, should be rewarded by the rank, pay, and allowances of a first lieutenant in the Army. It recommends that the band at the Military Academy be increased to forty pieces, as has been frequently recommended before, and the reasons for which are fully set forth in several previous reports.

The admirable and eloquent address delivered to the graduating class by the Hon. Robert G. Cousins, who was, at the request of the Superintendent, designated by the Board of Visitors for that duty, is regarded as worthy of preservation and is made a part of this report.

In conclusion, the Board calls attention to the fact that the soldiers on duty at the Post of West Point are apparently efficient and perform the duties required of them in a satisfactory manner, but they are far from models in soldierly bearing and appearance. This probably arises from the circumstance that with the exception of the engineer company they are a detachment of what are known as "general-service men," who perform the duties of cavalry, infantry, and artillery, and have the care of the horses used for the instruction of the cadets. Inasmuch as this is a historic spot of great national interest, and therefore, as well as because it is the site of the Military Academy, it is frequently visited by foreign officers and travelers of distinction, it is suggested that a picked battalion of infantry, a squadron of cavalry, and a battery of horse artillery should be stationed on the reservation, which is amply large for their accommodation, if suitable barracks and stables were provided for them by Congress. The subject is worthy of further careful consideration, perhaps by a board of officers, which if convened should furnish plans and estimates for the necessary buildings and improvements.

With the improvements herein recommended, and which it is believed the Government can well afford to make, the Military Academy would be not only the best but the most complete school of the kind in the world, and this ought to be a matter of pride and satisfaction to every American citizen.

All of which is respectfully submitted for the Board by—

JAMES H. WILSON,
President.

WM. WHITMAN BAILEY,
Secretary.

JUNE 15, 1896.

REPORT OF COMMITTEE ON HYGIENE AND ATHLETICS.

Surely both nature and history have endowed West Point with potent influences well calculated to encourage the development of physical manhood and unalloyed patriotism in a remarkably unstinted manner. The influences of the magnitude and grandeur of nature's handiwork, supplemented by that of the records and objects of past patriotic endeavor can but inspire those who seek the benefits of the institution with high and noble resolves. Therefore the selection and proper maintenance of the place for the training of the country's military scholars is doubly wise, since it suitably emphasizes alike an appreciation of the principles of great physical and moral forces. However, the proper fruition of the influences of these inspiring examples requires the recognition and the wise support of those vested with legislative and executive control.

Sound bodies and established good health are quite as essential to mental attainment and practical outcome as are a befitting curriculum and wise military discipline. It is proper, we think, to keep in view the fact that the degree of practical human efficiency is measured quite as often by sound physique as by profound attainment. The committee examined carefully into the influences exercised by the matters properly coming before it for consideration.

THE DRAINAGE.

Little, indeed, can be suggested in the way of improvement in this regard. The high elevation above the Hudson River, the natural contour of the surface, and the sandy nature of the soil supply quite as fully as nature can the desiderata of good surface drainage. If but a brief though well-considered attention were given to the gutters and surfaces of the roadways at various parts of the post, the outcome would be conducive to good taste and add much to the comfort and convenience of many interested persons.

THE HOSPITALS.

The hospital for cadets is, with but few exceptions, admirably suited for the purpose. The water-closets in the rear of each floor of the hospital should be removed from the lavatory and placed outside of the contiguous walls of the building. This change will be in the interest

of good health and the maintenance of proper self-respect of those who are required to use them, and, moreover, will conform to the common requirements now practiced in the construction of such places. An increase in the capacity for bathing here is earnestly advised. In one small room, 9 feet 10 inches long by 4 feet 6 inches wide, on the top floor, is found a bath tub, water-closet, and washstand devoted to the use of ten men. Surely the mere mention of this fact will, for obvious reasons, lead to a correction of the abuse. In other respects the plumbing is suitably arranged, scientifically constructed, and appears to be in good order.

The operating room.—It will be noticed in the appended statement (Exhibit A) that modest estimates are made by Dr. Torney for the purpose of providing a suitable operating room. The statement contains no item of contemplated unwise expenditure. No request is made in this respect that is not of established significance in the construction of operating rooms in civil hospitals. No objection can be reasonably made to any of these items, unless it be by some one incompetent to judge of their necessity or who is wedded to the idea that soldiers need not receive the benefits of scientific surgical attainment. Inasmuch as the high standard of instruction in the numerous lines of service connected with the Post is the issue of wise thought and persistent effort, your committee fail to comprehend the wisdom of any obstruction directed to medical and surgical effort, except it be by those who, while glorifying the ingenuity of human device for slaughter, withhold encouragement of commensurate means of relief, and thus reduce the physical status of war to the plane of scientific barbarism. Certainly, since the teachings of this institution characterize the most superior methods of offensive and defensive conflict, should they not exemplify also the latest established means directed to the relief of the unfortunate agents of conflict?

In this connection the committee is constrained to renew the advice of the committee of 1894 that instruction in the elements of hygiene and prompt relief to the injured be introduced into the curriculum and made a recognized requirement of the institution. We are not inclined as yet to regard the course of study in this branch as taught by the medical department of the Navy (see Report of the Board of Visitors, 1894) as sufficiently practical to meet the demands of lay official requirements in time of action on a battlefield. As before advised, the medical officers only should instruct in these lines of usefulness, as they appreciate to the fullest extent the practical bearing of the instruction, and therefore can impress it in a manner true to the exigencies of an occasion.

The courtyard.—The courtyard in the rear of this hospital is badly drained, owing to defects in the grade and structure of the pavement. The present defective pavement should be removed and a suitable one provided to meet the demands of good hospital sanitation.

The soldiers' hospital.—Aside from the presence of the water-closets and urinals within the hospital building, and in a place that contributes in the fullest degree to their offensiveness, little indeed can be said except in commendation of this establishment. It is already advised by the medical officers that the closets and urinals be removed from within the building, and nothing should hinder a prompt compliance with this recommendation.

THE BARRACKS.

The barracks of the cadets are cleanly and as well ventilated as a seemingly wise attention to discipline will permit. The question of the proper degree and variety of light that will best conserve the power of the eyes of the cadets during study hours is one requiring prompt and judicious action. There seems to be no doubt of the fact that much gain can be made in this direction, and that the reward of the effort will be promptly beneficial to the cadets, and finally to the military service at large. The variety of the light, the device for its use, the proper color of the walls, etc., are matters to which should be given the best scientific consideration before final action is taken.

The water-closets, urinals, and baths of the cadets are adequate in all respects for the fulfillment of their intended purposes; and, too, the ventilation, light, and cleanliness of the place merit a high degree of commendation.

The gymnasium and its appointments and the method of teaching are excellent, as is bespoken by the zeal and physical development incident to the system of instruction.

The barracks of the cavalry.—From a sanitary standpoint, these barracks present the antithesis of a wise expenditure of the public funds. Imperfect drainage and bad ventilation cause dampness and noisome odors to pervade the building; defective urinals and plumbing are present; in fact, the entire building bears the impress of unsanitary misery. It is earnestly advised that the urgent requests for needed improvements made by the medical officer in charge of the Post be heeded before extended outlay in other directions is made.

The engineer barracks.—This building is an old, and therefore an imperfect, one, especially as relates to bad ventilation and unwise utilization of capacity. The committee on buildings, etc., has spoken of the inadequacy of the barracks in no uncertain manner, and this committee desires also to add the weight of its disapproval, and urges that changes consistent with those of more modern construction be made. The water-closet accommodations are not only sadly incomplete to meet their purposes properly, but are so located as to contribute unnecessarily to the inherent unsanitary aspects of the structure itself. The objectionable water-closets are mentioned here especially, in order not only to justify the demand for their change in location and structure

already made by the medical officer in charge, but also to hasten, if possible, the contemplated consummation of his recommendation in these respects.

"*Log Town.*"—These buildings are for occupation of soldiers and their families. The changes looking to improvement of this section, suggested some time since by the Superintendent, Colonel Ernst, are being carried into effect, and soon this unsightly and unsanitary feature of the Post will be eliminated.

The mess hall.—The building presents but a few sanitary defects. The yard in the rear of the building and the areas are badly paved and improperly drained; the pavement of the scullery is irregular, broken, and otherwise defective. These conditions cause unnecessary dampness from saturation of the soil with waste water and slops, and could be easily remedied with a limited expenditure. The waste pipes in the kitchen are defective, by reason of small size and improper direction.

THE DISEASES AT THE MILITARY ACADEMY.

The attention of the committee was called by the efficient medical officer in charge, Dr. Torney, early during the period of the visit to the repeated manifestations of malarial fever. The following tables, compiled by Dr. Torney at the request of the chairman, need no explanation, and illustrate the prevalence of malaria more forcibly than words can do:

No. 1.—Comparative compilation of the cases of malarial fever occurring in cadets and officers from June 1, 1895, to June 1, 1896, with temperature and rainfall records.

Month.	Mean maximum temperature.	Total rainfall.	Intermittent.	Remittent.	Typhoid.	Ephemeral.	Total.
1895.		<i>Inches.</i>					
June	82.60	2.63	0	0	0	2	2
July	76.16	6.86	9	1	0	9	19
August	83.80	3.42	64	0	0	10	74
September	80.10	1.16	54	17	0	0	71
October	58.15	4.22	16	4	0	0	20
November	50.60	5.58	6	3	0	6	20
December	41.80	4.20	1	0	0	21	22
1896.							
January	31.36	1.19	0	0	0	9	9
February	36.70	4.46	0	0	0	0	0
March	38.50	12.02	0	2	0	22	24
April	61.70	1.98	24	3	1	30	58
May	76.30	2.89	70	0	0	0	70
Total			243	35	1	109	388
June 8			17	0	0	0	17

As will be seen, the foregoing cases relate only to the cadets and officers. The ephemeral fevers do not appear to depend on malaria, as they bear no direct relation with its presence and are not controlled by the same remedial agencies as are the malarial fevers. The single case of typhoid fever could not be traced to a definite cause, and as every

precaution was taken during its presence, and none appeared thereafter, the cause can not be regarded as of local origin. The pronounced and increasing number of the malarial cases is suggestive of the presence of some active means of infection in the drinking water, the air, or in both. A comparative compilation of disease of the preceding year was made, with the following result:

No. 2.—Comparative compilation of the cases of malarial fever occurring in cadets and officers from June 1, 1894, to June 1, 1895, with temperature and rainfall records.

Month.	Mean maximum temperature.	Total rainfall.	Intermittent.	Remittent.	Typhoid.	Ephemeral.	Total.
1894.							
	°	<i>Inches.</i>					
June	82.23	2.08	2	0	0	2	4
July	86.45	1.04	2	0	0	18	20
August	81.74	1.86	2	0	0	14	16
September	77.10	6.30	1	0	0	17	18
October	63.84	6.25	1	0	0	20	21
November	(^h)	4.08	0	0	0	32	32
December	36.41	2.92	0	0	0	14	14
1895.							
January	30.64	0.90	0	0	0	8	8
February	28.25	1.60	0	0	0	7	7
March	40.80	3.80	1	0	0	5	6
April	58.13	6.87	2	0	0	28	30
May	70.96	3.53	0	0	0	17	17
Total			11	0	0	182	193

* No thermometer.

The so-called ephemeral exhibitions were numerous, but they did not resemble malarial fever in any significant regard. At all events, the condition appeared to the special committee as of great importance, and, therefore, it was brought to the attention of the Board of Visitors at a special meeting called for that purpose, to which the Superintendent, Colonel Ernst; the medical officer, Dr. Torney, and the engineer, Captain Lusk, were invited to be present and take part in the discussion of the subject. It appeared that the matter had been under the consideration of these officers before this, and that measures of prevention had been taken, but without any practical result. The examination of the sources of the water supply and the inadequate means of filtration, taken in connection with the increasing malarial record of the cadets, seemed to the Board of Visitors as indicating quite clearly that prompt measures were necessary in order to establish any relation between a known cause and an effect so decidedly indicated. It was therefore moved and carried that the chairman of the sanitary committee be directed to communicate at once with the Secretary of War regarding the matter, and that the Secretary himself be notified to this effect by the Board of Visitors.

The following is an extract from the letter to the Secretary of War:

Finding, upon careful examination, that the water system and supply requires renovation and enlargement, we recommend that an investigation be made by the

War Department, and an estimate be secured and submitted to the next session of Congress for the amount necessary to furnish a healthful, adequate, and permanent water supply.

Resolved, That Dr. Joseph D. Bryant be, and he is hereby, requested, on behalf of the Board of Visitors, to communicate with the Secretary of War in regard to the sanitary condition of the United States Military Academy, with a view to the immediate adoption of means to remove the conditions that now affect, unfavorably, the health of the Post.

In accordance with the direction of the Board of Visitors, the chairman called at once on the Secretary of War, and was assured by him that the matter would receive prompt attention.

Almost immediately, Charles Smart, major and surgeon of the United States Army, a gentleman whose experience in such matters especially fitted him for the purpose, was designated to examine and report upon the question as soon as possible. His comprehensive report, bearing the date of June 21, certainly justifies the wisdom of the prompt provision for temporary effort at relief, and emphasizes the importance of the necessity of a higher grade and completer method of treatment of the drinking water in the future.

The report of Major Smart is so exhaustive, and the recommendations so wise, that the committee feel that nothing better can be done than to submit it in full, with the urgent advisement that its recommendations and the indorsement of C. H. Alden, Assistant and Acting Surgeon-General, be promptly and fully complied with. (Exhibit B.)

The chairman of the committee is assured already by the Secretary of War that directions are given for the carrying into effect of the subsidiary recommendations of this report. The chairman regards it proper to inform the committee that in a recent conversation (July 13) with Dr. Torney the chairman was informed that no abatement in the malarial diseases had as yet taken place. The prompt action of the War Department in causing the investigation of the matter, and the carrying into effect so soon of the only present local means of relief, should be regarded as an earnest of further and more decided efforts in this respect in the near future. Certainly the people of the various sections of the country, who earnestly meet the legal permission to send their best young men for education in the means of the country's defense, have the right to expect that every precaution will be taken by their guardians to preserve their health during the time of their befitment for the military service. In fact, the proper instillation of the principles of loyalty and patriotism in the minds of these young men requires that they shall be given the same care and protection during the incubative stages of their military career that the people of the country will demand of them as the nation's champions in times of war.

It is proper to say in this connection that malarial fevers prevail to a greater or less extent among the people of the villages located above and below West Point. But it is likewise true that the majority of these people are permanent residents, and therefore constantly exposed

to the indigenous malarial influences of these places, while at West Point scarcely more than a month or so is sufficient time for malarial outbreak in many of those who are new to the place and have not before this experienced an attack. The notion that the incoming cadets are already infected with the disease, and that the high order of sanitation of the place begets the outbreak, is inconsistent with the fact that this disease is quite liberally distributed among the members of the respective classes.

Ice is often polluted on account of the impurity of the source of production, and therefore it should not be used for drinking purposes when taken from such sources unless its purity shall have been determined by proper analysis.

As was aptly pointed out by the committee on hygiene, etc., of the Board of Visitors of 1895, the drinking water and milk should be above suspicion. No elements of alimentation are so commonly used as these, and none are so open to the influences of pollution. The approach of disease through these channels is insidious in the extreme degree, and it can not be regarded as a sufficient attention to duty to correct the errors after the harm is done. On the contrary, the possible occurrence of disease should be anticipated and forestalled by wise sanitary forethought and liberal expenditure.

The committee believe it to be both wise and just to direct the attention of the Board of Visitors to that which appears to be an improper discrimination made against the chief medical officer of the Post regarding the comparative amount of his official remuneration. It appears that the demands of the legitimate social and military courtesies of the place on the officers require an expenditure on their part which is much in excess of their salaried ability to meet in a manner consistent with the high status of the Post and the necessary regard for self-preservation. In order that these demands may be met wisely and justly, the great majority of the officers are accorded by Congress the pay of the next higher in rank. Although here the official duties of the medical officer are comparatively onerous, indeed, and albeit the social and military courtesies bear with relatively equal weight on him, yet he has been thus far denied the assistance accorded to his colleagues for this purpose. The committee believe that no distinction should be made in the relative remuneration of those who bear equal burdens in the service, and express the hope that the present injustice to the chief medical officer of the Post will be remedied in the future.

The committee can not close this report without the acknowledgment on their part of the uniform courtesy and earnest cooperation in their efforts of all in authority in the War Department, both at West Point and at Washington.

JOSEPH D. BRYANT, M. D.
ALBERT W. GILCHRIST.
WM. WHITMAN BAILEY.

EXHIBIT A.

WEST POINT, N. Y., *June 26, 1896.*

SIR: In compliance with your request, I respectfully submit the following estimate of the funds required for the construction of a proper operation room in the cadet hospital:

Removing floors, walls, and ceiling.....	\$50
Concrete filling for floor.....	80
Tile floor.....	400
Lining walls with enameled brick.....	850
Blocks and tiling for ceiling.....	450
Iron beams, window casings, and sash, with plate glass for windows.....	250
Iron frame and sash for skylight.....	200
Water connections and washout trap.....	60
Sieman's gas burner, with connections.....	50
Total.....	2,390

It is proposed to convert the southeast room of the third floor into an operating room, and in its reconstruction to make it conform to all the requirements of modern surgical method in the treatment of diseases and injuries.

There is not now in this hospital a place suitable for the performance of surgical work under strict aseptic and antiseptic conditions, and in accordance with the high standard of excellence which surgeons now strive to attain in the repair of injuries and operation wounds. The speedy construction of an operating room is so very necessary that it is urgently recommended that the appropriation for the purpose above indicated be made available upon the passage of the Military Academy appropriation bill for the fiscal year ending June 30, 1898.

Very respectfully.

G. H. TORNEY, M. D.,

Major and Surgeon, U. S. A., Surgeon.

JOSEPH D. BRYANT, M. D.,

Chairman of Committee on Hygiene and Athletics.

EXHIBIT B.

WAR DEPARTMENT, *Washington, D. C., June 21, 1896.*

SIR: In accordance with orders conveyed in letter from your office, dated June 16, 1896, I left Washington, D. C., on that date and passed the four days immediately following—June 17–20, inclusive—in investigating the prevalence of malarial fevers at the United States Military Academy, West Point, N. Y., and the sanitary condition of the Post as bearing upon this prevalence.

The medical reports of West Point show that during the calendar year 1895 there were 172 cases of malarial fever among cadets and 115 among officers and soldiers. These numbers are equivalent, respectively, to rates of 595 and 298 per 1,000 of strength, and may be compared with 74, the average rate of the Army for that year, and with 35 for the cadets and 44 for the officers and soldiers, as the rates per 1,000 of strength for the calendar year 1894.

This increased prevalence in 1895 assumed a greater importance when it was found from recent medical records that there is a prospect of a largely increased malarial rate for the coming season. In 1895, notwithstanding its high rate, the malarial influence did not begin to manifest itself until July, while this year these manifestations began much earlier. The first case of the present year was recorded on March 30, and from that date to June 18, 132 cases have been taken into the cadet hospital for treatment, and a similar malarial prevalence has been experienced by the officers and soldiers of the military post.

From July 6, 1895, to June 18, 1896, the medical register of the cadet hospital shows the occurrence of 282 cases of intermittent fever, generally quotidian in type, and 28 cases of remittent fever, 2 of which were fatal. The daily details of this malarial record are submitted in Table A, appended, but the prevalence by months may be here stated as follows:

Month.	Intermittent.	Remittent.	Total.
July 6-31, 1895.....	10	0	10
August, 1895.....	64	0	64
September 1895.....	54	16	70
October, 1895.....	16	3	19
November, 1895.....	6	8	14
December, 1895.....	1	0	1
January, 1896.....	0	0	0
February, 1896.....	0	0	0
March, 1896.....	2	0	2
April, 1896.....	26	1	27
May, 1896.....	70	0	70
June 1-18, 1896.....	33	0	33
Total.....	282	28	310

The duration of the intermittent attacks averaged three days; of the remittents, ten to twenty days. The intermittents presented the characteristic symptoms of what is popularly known as chills and fever, a chill more or less severe followed by stages of febrile reaction and perspiration, with a tendency to a recurrence of these phenomena, which recurrence was generally prevented by the free administration of quinine. I verified the diagnosis of several of these cases under treatment in the cadet hospital during my stay at West Point, and determined the presence of the plasmodium malarie by microscopical examination of the blood. No case of remittent fever was under treatment during the period of my stay, but the thermographic charts of the cases on record were submitted to me, and from an examination of these charts I have no hesitancy in accepting the cases so recorded as cases of remittent malarial fever.

If the sickness indicated by the above statements had been additional to the regular sick rate of the Post, the increased sickness in the command would have attracted prompt attention; but these malarial fevers took the place of the influenzas and catarrhs of the winter season, and of the ephemeral fevers, tonsillitis and pharyngitis of the early spring, one set of febrile diseases subsiding as the other became prevalent. Table B, appended, shows how influenza prevailed in the winter months, yielding to ephemeral fevers as the weather became milder, and these to malarial fevers as warm weather set in. The ephemeral fevers of the early spring and late autumn had the duration of the intermittents, and oftentimes it was difficult in individual cases to distinguish the character of the disease by its mere symptomatology. The presence of the plasmodium in the blood or the efficiency of quinine as a remedial agent determined in these cases, as a rule, the diagnosis of malarial as distinguished from ephemeral fevers. In fact, these ephemeral fevers assumed a character of malarial periodicity as the warm season advanced, but with no ordinarily great increase of the general sick rate over that which would have been recorded from the ephemeral fevers alone. During the present season, however, 70 cases of intermittent fever recorded in May, as compared with 16 cases of ephemeral fever with no malarial cases in the corresponding month of 1895, could not fail to attract attention to the marked change in the character and prevalence of these febrile attacks.

It was found, however, by a reference to the medical records of West Point that the prevalence of malarial fever in the spring and autumn has been within limits a constant recurrence, and even that its prevalence to such an extent as was experienced in 1895-96 has not been unique in its history, for in the year 1880 there were recorded 121 cases among the officers and soldiers and 56 cases among the cadets, equivalent to rates per 1,000 of strength of 528 and 209; respectively. Table C, appended, gives the number of cases recorded annually from 1880 to 1895, inclusive,

among the officers and soldiers and among the cadets. From this table it will be observed that in every year during the period stated there was recorded a certain number of malarial cases.

I did not pursue the history of malarial fever at West Point beyond 1880, as this year furnished a general prevalence at the Post nearly as great as that given by the calendar year 1895. In 1880 the average prevalence of malarial fevers in the Army as a whole was much greater than it is now—186 per 1,000 of strength, as compared with 74 in 1895. This decrease is certainly due in great part to the abandonment of posts in notoriously unhealthy, i. e., malarial, localities, but no small part of it must be credited to the greater care given of late to the drainage, sewerage, and water supply of the malarious posts that continue to be occupied. It was my privilege to meet Col. C. T. Alexander, of the Medical Department, during my visit to West Point. This officer was post surgeon at the Military Academy during the endemic prevalence of the fever in 1880. Its occurrence then, however, did not impress him as constituting any unusual condition, fresh, as he was, from service in connection with more serious developments of malarial poisoning at Western posts. (See Table D for a daily and monthly summary of the cases among cadets in 1880.)

While the records of the Post show that the causes of malarial fever have affected officers, soldiers, and cadets every year during the spring, summer, and autumn, and that in certain years these causes have been more malign than in others, it was found that a similarly varying prevalence and intensity affected not only the families of officers and enlisted men and other civilians at the Post, but the residents of the civil settlements in the vicinity. In the village of Highland Falls, for instance, a certain number of cases occur every year during the period of prevalence at the military post, and at the present time there is a greater prevalence in the settlement than is usual so early in the season of the year. This was reported to me by Dr. Brown, the health officer of the village, who informed me also that only a small number of the cases that occur come under medical observation, as the people are so familiar with the disease and its remedy. The pharmacist of the village corroborated this by the information that the call for quinine this year was already quite considerable.

This extended prevalence indicates that the cause or causes of the fevers are not to be found in any unsanitary condition which is local or peculiar to any of the persons quartered on the military reservation. And, as a matter of fact, there is little in the nature of unsanitary conditions to be found at this station. In the language of the surgeon of the Post: "The ordinary conditions affecting the health of the individuals residing on the reservation are almost ideal, as they are well housed, well clothed, and well fed. The disposal of the refuse of the Post is made under proper supervision, and with the exception of small quantities of waste water occasionally thrown on the ground by the members of the families of enlisted men and officers' servants is satisfactory. The drainage of the land is very good, and the sewerage system ample and complete."

The few points that might be instanced as susceptible of improved condition are well known to the local authorities, who have remedial measures under consideration. The most notable of these are the damp site of the barracks of the cavalry detachment and the musty and unventilated state of the space underlying the flooring. Fevers have occurred at several of our military posts where this subfloor space has become damp and foul from organic decay in the absence of free communication with the external air, and where the warmth of the interior of the building has drafted up this soil air through the seams of the flooring. In the present instance, however, the flooring is sound, and the greatest care is taken of the condition of the underlying space consistent with the original faulty construction, but no care can prevent the soil from becoming saturated with moisture in rainy weather and continuing damp for a long time afterwards. It is suggested that the site be drained, the surface concreted and asphalted, and the subfloor space freely ventilated.

The causation of malarial fevers, according to our present knowledge, is associated with that fermentation in the soil which gives rise to the growth of vegetation. The conditions essential to this fermentation are (1) organic matter in the soil, (2) moisture, and (3) a temperature of 60° F. There are few soils so poor as not to have enough organic matter for vegetable growth in the presence of the other essential factors, and there are few places in the United States that do not have at some season a sufficiency of moisture in the soil to permit of this fermentation if the needful temperature is present; so that this fermentation which renders possible the germination of the annual vegetation depends practically on the occurrence of a temperature of 60° F. With a luxuriantly growing vegetation this soil fermentation is harmless to man, but in the absence of a vegetation corresponding in luxuriance to the energy of the fermentation malarial fevers are developed among the people of the locality; hence the malarious character of certain sandy and barren tracts and of lands where the vegetation has been wilted or destroyed by overflow.

In the Tropics the dry season is healthy, but as soon as the first rains fall malarial fevers occur and continue until the surface of the country is covered with vegetation. During the vigorous life of the tropical vegetation there are few fevers, but as soon as this life wilts and decays at the close of the fruiting season malarial fevers again appear and continue with virulence until the advent of the dry season, when the soil, sun dried and hard baked, ceases to ferment. In temperate climates medical observers have for ages back been accustomed to recognize spring and autumnal malarial fevers which correspond with those tropical fevers that occur, respectively, at the beginning and at the close of the rainy season. If in the spring we have the coincidence of organic matter and moisture in the soil with a temperature of 60° F., but without a corresponding luxuriance of vegetable growth, there will be an occurrence of malarial fevers among the people. If the advance of the seasonal temperature is slow, giving ample time for the growth of vegetation to keep up with the energy of soil fermentation, the season will be healthy, but if the onset of warm weather be sudden and early, so that the temperature of 60° F. prevails in advance of vegetation, the season will be unhealthy.

An examination of the malarial records of the United States Academy at West Point for the years back to 1880, in connection with the meteorological records of the Post for the same years, shows that in 1880 and in 1896 there has been this sudden and early onset of warm weather in the spring. In the former year the mean temperature rose from 49° for April to 66° for May, and in the latter from 50° in April to 64° for May. On the other hand, in the years characterized by comparative absence of malarial fevers at West Point the advance of the warm season has been slow, as in 1891 and 1894, when the mean temperature for May was in both seasons only 48° F., and the malarial prevalence among the cadets equivalent to only 43 and 35 per 1,000 of strength. In Table E, appended, the spring temperatures for 1880 to 1896 are given in this connection.

Correspondingly, in the autumn, if the warm weather is prolonged after the decadence of the annual vegetation, the season proves a sickly one.

Again, if at any time the vegetable growth which is natural to the surface becomes destroyed or if the relation between the vegetation and the soil fermentation be in any way disturbed, there will be malarial developments, as when new ground has been cleared for agricultural, engineering, building, road-making or other purposes. Nothing of this kind has recently been done at West Point, so that the present prevalence of malarial fevers must be regarded as in great part due to the climatic conditions. The harmful resultant of these climatic conditions was until lately regarded as an exhalation from the soil, a miasm, an influence, impalpable, gaseous, or ethereal, but since the discovery of the plasmodium in the blood of affected individuals the essence or germ of the disease must be a particular substance susceptible of growth like any other mass of amœboid protoplasm under suitable conditions.

It must be remembered, however, that malarial fevers are by many sanitarians regarded as propagated by means of surface-water supplies. The evidence on which

this belief is founded is strong. Such fevers have occurred on only one ship of a fleet, which ship was the only one of the fleet supplied with bad water. Malarial fevers prevail in nonmalarial districts when the water supply is surface water drawn from a locality where soil fermentation is active; and more convincing than all is the acknowledged fact that malarial fevers have ceased in localities notoriously insalubrious when the surface-water supply has been replaced by a pure, filtered water from deep wells. The life history of the plasmodium malariae, which is recognized by the medical profession as the cause of periodic fevers, has not been followed outside of the human body, but that its history is connected with soil fermentation, as above stated, seems certain, and there appears, therefore, no reason for supposing that it may not be washed from the soil by surface waters. It is particulate, and therefore separable by filtration. Thus the immunity of certain people who use deep-well water may be accounted for, and thus we may predicate of certain others that they would be less affected by these fevers were their water supply filtered.

The only troops unaffected by malarial fevers at West Point in the autumn of 1895 were commands temporarily stationed there for target practice. They came from the posts in New York Harbor, and remained usually from ten days to two weeks. Their camp was supplied with water from the Post's system, but their drinking supply was usually obtained from a spring near their camp. Moreover, it has been observed by the medical officers on duty at West Point that families of officers at the Post have suffered less than others on the reservation, and this comparative immunity is credited to the greater care given by these families to boiling or filtering the water used as a supply for drinking.

The water supply of the Post is derived from three sources in the highlands back from the river, but all these waters are of the same general character. They fall upon a rich organic soil, the quality of which is amply demonstrated by the luxuriance of the vegetable growth which clothes its surface. In winter and spring two streams, the Cascade and Crows Nest, which make a steep descent from the highlands, suffice for the supply of the Post. Their waters are collected at present in a reservoir (the Delafield), from which they are in part passed through a filter before distribution. In summer these two sources fail, when recourse is had to the supply from Round Pond, a large basin of somewhat dark-colored water, which, when required, is led by conduit to the Delafield reservoir. The filter bed covers 1,400 square feet, and consists of gravel with only 1 foot of sand on top.

If filtration were properly carried on through this bed, its daily capacity would not exceed 70,000 gallons; but double this quantity of water is usually passed through it, the filtration being correspondingly insufficient. About one-third of the water supply of the Post is distributed without passing through the filter. I made an analysis of water from the Cascade, Crow's Nest, Round Pond, and Delafield Reservoir, and of that which had passed through the filter, the results of which are given in Table F, appended. The waters of the Crow's Nest and Cascade gave better results on analysis than that of the Round Pond, and better than that of the reservoir into which they were flowing, an anomaly explained by the fact that at the time the reservoir contained some of the Round Pond water. The filtered water showed an improvement over that taken directly from the reservoir. Chemically, all of these are fair samples of upland surface waters, free from any suggestion of typhoid fever infection, but open to the suspicion of malarial possibilities, which attaches, as above stated, to such waters.

In 1879 and 1880, while examining water supplies in the Southern States in connection with the prevalence of yellow fever, my attention was attracted to the frequency with which certain low forms of life were found in the microscopic examination of the sediment of such surface waters and foul cistern waters as had been suspected of causing remittent fevers. These lowly microscopic forms consisted of small transparent and colorless masses of jelly-like protoplasm presenting more or less sluggish amoeboid movements. They are known to microscopists as rhizopods, and vary in form from the amoeba and difflagia with thick protrusions from their mass to others

with fine ray-like filaments. So constantly since then have I found these appearances in waters which on other grounds were considered to be of doubtful quality that I would hesitate to authorize the use of any water containing them. They are present in the surface waters constituting the West Point water supply. These waters are clear and particularly free from visible suspended matters or sediment. The amœboids might escape detection in them, if looked for only in the trace of sediment which collects in twenty-four hours at the bottom of a vessel of this water, but they may readily be separated for microscopic observation by means of the centrifugal action of a rotary machine.

The hematozoon of malarial fever is a minute plasmic body similar, apparently, in constitution to these amœboids of the water, but whether they are correlated is unknown. This adds, however, to the argument on behalf of an efficient filtration of suspected surface waters.

In so far as the malarial fevers now prevailing at West Point are caused by climatic conditions or by the presence in the air of some product of soil fermentation induced by climatic conditions, there is nothing to be said that is not already well known to medical men and to most people who have been residents of malarious districts. The regulation of diet, exercise, etc., need scarcely be mentioned, as these are essentials of the curriculum and discipline of the Military Academy. The upper floors of dwellings should be used as sleeping rooms in preference to the lower floors. Necessarily the cadets when in camp are more exposed than when in barracks. The exposure is minimized by the excellent drainage of the site, the flooring of the tents, and the raised bunks. Orders have been issued to prevent lying out on the grass at night, which, it is understood, was in sultry weather the custom of some of the cadets. All unnecessary exposure to the night air, and particularly when fasting, should be avoided. Hence the recommendation of the surgeon that hot coffee or hot milk be issued to the guard reliefs between sundown and sunrise is a judicious one. Breakfast should be served as soon as possible after reveille. It has been ordered that breakfast shall precede sick call during the present encampment, which ends August 28, but as the season of remittent fevers is always prolonged through September and sometimes through October, it would be well to continue the early breakfast hour after the camp is broken up. The remedial and prophylactic virtues of quinine, Fowler's solution, and other antiperiodics may be used under the direction of the local medical officers.

As to the condition of the water supply, purification by filtration is considered imperative. At the present time work is in progress on a reservoir for the collection of the running waters of the Cascade and Crow's Nest streams during the season of their free flow, with additions when necessary from the Round Pond. The reservoir is intended to hold 75,000,000 gallons, and when finished will give the Post a water supply assured as to quantity. It should be assured, as well, as to quality. It should be filtered before distribution, not so much for the improvement of its chemical character as for the removal of the amœboids or of the particulate cause of the periodic fevers which is more or less intimately associated with them. In the United States we are not so careful of the purity of our water supplies as are the people of Europe, and, in consequence, we have an excess of typhoid, malarial, and so-called typho-malarial fevers. The laws of Germany direct specifically the filtering of all surface waters before they are delivered for public consumption. In England and continental Europe the filter bed is an integral part of the water system when the water is not from naturally filtered spring or deep-well sources. In many sanitary matters we are a generation behind the people of Europe, and in this matter of pure-water supplies we are especially backward. The city of London has had filtered water for more than two generations.

In this country we build basins, really for storage, and assume that the sedimentation which takes place in them and the chemical purification which is understood to be a result of continued storage will give a satisfactory purity. This assumption is seldom, perhaps never, warranted. If warranted anywhere it would seem that the

new reservoir at West Point would give the garrison of that Post a strong claim to the warranty, for the reservoir will admit of sedimentation and storage for a period of eight months, giving ample time not only for the settlement of clay, sand, and other mineral particles but for the destruction of all dead and decaying organic matters by the bacteria of nitrification. From it we would get a supply of satisfactory purity as determined by chemical analysis, but it would continue to contain the same malarial possibilities which it possessed as it ran down the mountain ravines into the reservoir. This may readily be proved. The water of Round Pond has not been drawn upon to any extent for the use of the Post since last summer. It has been sedimenting and improving by nitrification and accumulating by the excess of rainfall over evaporation from the surface during the past eight months, yet the amoeboid forms which I have described were found in water taken from below the surface of this pond at a point near its center (reached by boat) where the water was 20 feet deep. Filtration as practiced in Europe and as preached by the sanitarians of this country is the only known general remedy in a case of this kind.

There are methods of mechanical or rapid filtration by which the water is forced, under pressure, through sand in iron cylinders, and the filtering sand is washed every few hours by a reversal of the current. Usually in these systems a solution of alum, iron, or other coagulant of albuminoid or protoplasmic matter is added to the water prior to its entrance into the cylinders. A mechanical "plant" of this kind will transform a Potomac River turbidity into a liquid that is beautifully clear and sparkling. Many small towns, chiefly in the Southern States, have adopted this method of rapid filtration, and two years ago Davenport, Iowa, established water-works of this kind, and is well satisfied with the results. Sanitarians generally, however, do not feel sure of the efficiency of rapid filtration, as there have been few bacteriological examinations of the unfiltered and filtered waters. Moreover, in the opinion of engineers, the slow or natural filter beds, as built originally in England and as now used in all European cities, are cheaper in the long run.

I therefore urge on behalf of the future healthfulness of the United States Military Academy that there be constructed a filter bed on the English model in connection with the reservoir intended for the future water supply of the Post. The present requirement of the garrison is said to be about 333,000 gallons daily, but in works of this kind present construction should provide for a probable extension of service. The filter beds should therefore have a capacity of 500,000 gallons daily. To permit of this they should have an area of one-fourth of an acre and should contain 6 feet of filtering material, broken stone, gravel, and sand, the last screened to 1 or 2 millimeters in diameter. They should be underdrained to draw off the filtered water into a distributing basin, and be provided with proper facilities for the inflow of the water from the reservoir. They should also be housed or otherwise well protected from the frosts of the winter season. The sand should constitute 3 or 4 feet of the thickness of the filtering layer, and in process of cleansing the surface it should never be scraped down to less than 2 feet. The depth of water on the beds should be regulated so that the filtration should be uniform and not much in excess of 2 gallons per square foot per hour, or 500,000 gallons as the daily output. The waters to be filtered are so freely oxygenated that there would be no need to let any part of the bed lie fallow for aeration. Filtration would therefore be continuous, and there is so little clay or other substance of a choking character in the water that the filter would run for many weeks at a time without the need for any material scraping of the surface sand.

The cost of such a filter bed depends on local conditions, and we have little experience of this kind in the United States. In Europe the average cost is known to be \$45,000 per acre for open beds, with one-third added for covering when protection is needful. The filter bed $2\frac{1}{2}$ acres in extent recently constructed at Lawrence, Mass., cost \$67,000, but no housing was given to the bed. At Ilion, N. Y., the 3,040 square feet of filter cost a little over \$7,000, and the two beds at Hudson, N. Y., aggregating

32,000 square feet, cost about \$55,000. From the figures it is assumed that a properly protected filter of 500,000 gallons capacity could be constructed at West Point for about \$25,000, but the able engineer officers at this station are better able than myself to give precise figures.

I would urge, however, that whatever the estimated cost, an allotment be made or an appropriation secured from Congress to enable this work to go on in connection with the work on the reservoir now in progress. A large expenditure for the collection and storage of a water supply should always be supplemented by that percentage of increased expenditure which will purify the water and protect the health of the community in the future; otherwise a bad bargain for the community will be made by the official who authorized the large expenditure without the supplemental increase.

But this work, if allotted or appropriated for, looks only to the future, and the improvement of present conditions has to be considered. To meet the exigencies of the present time, the living albuminoids of the water used for drinking must be destroyed by boiling or by chemical means, or be removed by filtration.

Boiling is efficient in destroying the potency of malarial and other disease germs in water, but it leaves the water flat and unpalatable. It is difficult to get men to drink this boiled water when they can get other water more conveniently by turning a spigot. Distilled water produced by attaching a condensing coil to the ice machines supplied by the Medical Department to certain posts has been used with advantage, but this makes the drinking water supply dependent on the ice production, and is, therefore, expensive. But the experience gained in this way has shown the lessened prevalence of malarial fevers at posts in Texas, where the condensed water has been used.

Chemical means involving the coagulation of the protoplasm by alum, iron, or other germicides would no doubt be efficient; but our experience in these methods has been limited merely to coagulation as an accelerant of subsidence or as a preliminary to filtration in particularly turbid waters.

No doubt attaches to the efficiency of filtration after distribution of the water, provided the filtration is properly conducted. By filtration is meant not merely the removal of visible turbidity, but the removal of the germs that require the microscope or bacteriological methods for their discovery. The efficiency of certain porcelain cylinders has been demonstrated. In the French military service much benefit has been derived from their use at posts where an unfiltered supply is delivered. Surgeon-General Sternberg appears to have acknowledged the value of filtration through similar cylinders of American manufacture by the purchase and issue of a number for use in post hospitals. I would therefore recommend that instead of boiling or condensing the water for use in the cadet and company quarters these filters be issued and used until the post water supply is perfected by the completion of the permanent system above mentioned.

So far as the cadets are concerned, Colonel Ernst has informed me that he can and will provide them with water filtered through the Pasteur-Chamberland, or Columbia filters, purchased from the mess fund, and that orders will be issued that no water for drinking will be used except that which has been so filtered and provided. He has, however, no fund from which to purchase similar filters for the other members of the garrison. I therefore recommend that efficient filters be provided by the Quartermaster's Department for the company barracks and officers' and soldiers' quarters in such numbers as to give each person 1 gallon a day, and that when such provision is made, the use of unfiltered water be strictly prohibited. Until then the use of boiled water, cooled and aerated by pure ice, should be encouraged. The water of the spring near the barracks of the cavalry detachment might be utilized also, pending the arrival of a supply of filters. This spring might indeed obviate the necessity for the use of filters in the barracks and quarters in its vicinity. It might be used so far as it goes as a source of supply until filtered water can be distributed from the perfected water works.

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If the recommendations of this report be carried into effect I feel confident that the epidemic of fever cases, which at present promises to be in excess of that prevalent for many years back, will be lessened materially, and that although the climatic conditions may be favorable to the development of malarial fevers, in future years the Post will have no such record hereafter as has been registered during the present spring.

In conclusion I desire to express my thanks for courtesies received and for information and valuable assistance to Col. O. H. Ernst, Corps of Engineers, Superintendent of the United States Military Academy; Maj. George H. Torney, surgeon; Capt. James L. Lusk, Corps of Engineers, and Capt. J. B. Bellinger, quartermaster.

I have the honor to be, respectfully,

CH. SMART,
Major and Surgeon, United States Army.

The ADJUTANT-GENERAL,
United States Army.

TABLE A.—Cases of malarial fever on the records of the cadet hospital from July 6, 1895, to June 18, 1896.

Date.	Intermittent.	Remittent.	Date.	Intermittent.	Remittent.
1895.			1895.		
July 6.....	1		Sept. 21.....		1
11.....	1		23.....		3
12.....	1		24.....		1
15.....	3		26.....	1	
24.....	2		27.....		2
30.....	2		29.....		1
			30.....		3
Total.....	10		Total.....	54	16
Aug. 1.....	3		Oct. 1.....		1
2.....	1		2.....	1	
4.....	1		4.....	1	
5.....	1		8.....	3	
10.....	1		11.....	1	
11.....	1		13.....	3	
12.....	2		14.....	1	
15.....	3		14.....	1	
17.....	2		15.....	1	
19.....	1		16.....	1	
20.....	6		17.....	1	
21.....	2		20.....	1	
22.....	6		21.....		1
23.....	2		22.....	1	
24.....	2		23.....		1
26.....	5		31.....	1	
27.....	1		Total.....	16	3
28.....	1		Nov. 1.....		1
29.....	5		3.....	1	
30.....	5		4.....	1	
31.....	13		5.....		2
Total.....	64		6.....	2	
Sept. 1.....	4		7.....		1
2.....	9		11.....	1	1
3.....	8		12.....		1
4.....	2		14.....		1
5.....	2		18.....		1
7.....	1		20.....	2	
8.....	1		Total.....	6	8
9.....	6		Dec. 9.....		1
10.....	2		1896.		
11.....	6		Mar. 30.....		2
12.....	4		Apr. 2.....		1
13.....	2		3.....		1
14.....	1	1	21.....		1
16.....	1		22.....		2
17.....	3	1			
18.....	1	1			
19.....		1			
20.....		1			

REPORT BOARD OF VISITORS TO U. S. MILITARY ACADEMY. 27

TABLE A.—Cases of malarial fever on the records of the cadet hospital from July 6, 1895, to June 18, 1896—Continued.

Date.	Intermit- tent.	Remit- tent.	Date.	Intermit- tent.	Remit- tent.
1896.			1896.		
Apr. 23.....	1		May 24.....	4	
24.....	3	1	25.....	3	
25.....	3		28.....	2	
26.....	1		29.....	1	
27.....	5		30.....	1	
29.....	3		31.....	1	
30.....	5		Total.....	70	
Total.....	26	1	June 1.....	2	
May 1.....	1		2.....	1	
3.....	2		3.....	1	
4.....	4		4.....	2	
6.....	2		5.....	4	
7.....	2		6.....	2	
8.....	4		7.....	3	
9.....	2		8.....	1	
10.....	6		9.....	4	
11.....	5		10.....	1	
12.....	1		11.....	2	
14.....	4		12.....	2	
15.....	2		13.....	1	
16.....	1		14.....	2	
17.....	4		15.....	1	
18.....	7		16.....	1	
19.....	4		18.....	3	
20.....	1		Total.....	33	
21.....	3				
23.....	3				

TABLE B.—Prevalence of influenza, ephemeral and malarial fevers at West Point Military Academy from March 1, 1895, to June 18, 1896.

Date.	Ephemeral fevers.	Malarial fevers.	Influenza.
1895.			
March.....	4	1	19
April.....	28	2	2 ²
May.....	16	0	0
June.....	2	0	0
July.....	9	10	0
August.....	10	64	0
September.....	0	70	0
October.....	0	19	0
November.....	6	14	0
December.....	21	1	0
1896.			
January.....	8	0	54
February.....	0	0	56
March.....	22	2	1
April.....	30	27	1
May.....	0	70	0
June 1 to 18.....	0	33	0
Total.....	156	313	133

TABLE C.—Malarial fevers at West Point. Admissions per 1,000 of strength.

Year.	Soldiers.	Cadets.	Year.	Soldiers.	Cadets.
1880.....	528	209	1888.....	168	56
1881.....	268	117	1889.....	130	162
1882.....	43	52	1890.....	71	82
1883.....	50	61	1891.....	21	43
1884.....	129	155	1892.....	24	169
1885.....	119	298	1893.....	18	173
1886.....	72	178	1894.....	44	35
1887.....	125	95	1895.....	298	595

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TABLE D.—Prevalence of malarial fevers among cadets at the United States Military Academy in 1880.

Date.	Cases.	Date.	Cases.
Mar. 8	1	Sept. 8	2
Apr. 9	2	12	1
24	1	15	1
25	1	17	1
Total	4	21	1
May 1	1	29	2
2	1	Total	8
4	1	Oct. 6	1
7	2	13	1
10	1	17	1
19	1	Total	3
21	1	Nov. 7	1
27	1	13	1
28	1	15	1
Total	10	18	1
June 2	1	20	1
4	1	22	1
5	1	23	1
6	1	27	1
7	1	30	2
10	1	Total	10
15	1	Dec. 3	1
16	1	19	1
21	1	20	1
Total	9	22	1
July 3	1	Total	4
22	1	During the year	56
26	2	Annual rate per 1,000 of strength	209
Total	4		
Aug. 2	1		
6	1		
27	1		
Total	3		

REPORT BOARD OF VISITORS TO U. S. MILITARY ACADEMY. 29

TABLE E.—Spring temperatures and rainfall at West Point.

Month.	Temperature.			Rainfall.	Month.	Temperature.			Rainfall.	
	Max.	Min.	Mean.			Max.	Min.	Mean.		
1880.	°	°	°	<i>Inches.</i>	1889.	°	°	°	<i>Inches.</i>	
April.....	60	36	49	3.5	April.....	57	36	46	4.6	
May.....	80	52	66	1.2	May.....	72	48	60	3	
June.....	86	58	72	1.7	June.....	78	55	66	3.3	
1881.					1890.					
April.....	57	32	45	.4	April.....	57	33	45	3.9	
May.....	77	47	62	4.8	May.....	63	45	56	5	
June.....	78	49	63	5.4	June.....	81	54	62	4.6	
1882.					1891.					
April.....	53	34	49	2	April.....	46	35	40	2.7	
May.....	66	41	53	6	May.....	53	43	48	1.9	
June.....	83	54	70	5	June.....	64	52	58	2.5	
1883.					1892.					
April.....	55	36	45	3.3	April.....	57	39	48	1.1	
May.....	70	46	58	2.7	May.....	69	43	56	4.8	
June.....	85	63	74	4.3	June.....	84	55	69	3.6	
1884.					1893.					
April.....	57	37	47	2.3	April.....	59	37	48	3.2	
May.....	70	46	58	3.8	May.....	70	50	60	3.2	
June.....	83	53	68	2.5	June.....	81	59	70	1.3	
1885.					1894.					
April.....	59	36	47	3.3	April.....	51	25	38	1.4	
May.....	67	45	56	1.9	May.....	62	33	48	2.9	
June.....	80	56	68	3.6	June.....	72	50	61	4.5	
1886.					1895.					
April.....	62	40	51	3.5	April.....	58	37	48	6.8	
May.....	69	49	59	4.2	May.....	71	41	56	3.5	
June.....	76	53	65	3.6	June.....	83	61	72	2	
1887.					1896.					
April.....	55	35	45	2.3	April.....	62	39	50	2	
May.....	77	47	62	1.5	May.....	76	51	64	(1)	
June.....	79	55	67	6.3						
1888.										
April.....	No record.			2.7						
May.....				6.2						
June.....				1						

¹ Not recorded.

TABLE F.—*Analysis of West Point waters, June 19, 1896.*

[The figures represent parts per 100,000 of the water.]

	Free ammonia.	Albuminoid ammonia.	Oxygen required.
Crows Nest.....	0.001	0.0095	0.233
Cascade.....	.0005	.0105	.193
Delafield.....	.001	.016	.207
Filtered water.....	.002	.012	.153
Round Pond.....	.003	.027	.220
Spring near cavalry barracks.....	.002	.007	.120

All these waters, except the last two, had a faintly yellow tint; the Round Pond water was notably darker than the others; the spring water clear and colorless. They contained but little more chlorine than is to be found in cistern or rain water.

[First indorsement.]

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
June 27, 1896.

Respectfully forwarded to the Adjutant-General of the Army.

This report of Major Smart may be briefly summarized as follows: Malarial fevers occur at West Point every summer, but in 1895 and this summer there was a large and sudden increase. It prevailed to about the same extent in the summer of 1880. This unusual prevalence is probably due to the sudden and early onset of hot weather, favoring rapid and abundant development of the malarial parasite. The marshy flats along the river near West Point are favorable fields for their growth. Malarial fevers are more prevalent than usual this season in the vicinity of West Point and in other places for the same cause. The sanitary condition of the Post is excellent and in no way responsible.

Major Smart, however, attaches great importance to the agency of drinking water from surface sources as one of the channels through which the malarial germ gains access to the human system, and recommends that the entire water supply of the post be purified by filtration and that filter beds be constructed in connection with the new reservoir. Their construction requires time and a considerable outlay, and as an immediate measure he advises that small or household filters be at once provided for all the water used at the Post for drinking.

The construction of filter beds must be left for future consideration, but as it is of the first importance that no suspicion of impurity should attach to the drinking water, it is recommended that Major Smart's recommendation as to immediately filtering it be carried out.

It is further recommended that if malarial fevers should increase this season to a very serious extent the cadets be immediately removed for the summer to some location at the seashore or in the mountains, not far distant, where malaria is known not to exist. As they are already in camp, this could be effected without delay. It is suggested that preliminary arrangements be made so that the transfer could be made promptly, if decided on.

C. H. ALDEN,

Assistant Surgeon-General, U. S. A., Acting Surgeon-General.

The views herein expressed by Maj. Charles Smart, surgeon, are approved by the Secretary of War, and action will be taken by the Superintendent of the Military Academy in accordance with the recommendations submitted.

The Quartermaster's Department will furnish, upon the requisition of the Superintendent, the efficient filters that may be needed for the company barracks and officers' quarters.

GEO. D. RUGGLES,
Adjutant-General.

ADJUTANT-GENERAL'S OFFICE, July 8, 1896.

ADDRESS OF HON. ROBERT G. COUSINS, M. C.

In the first place I wish to make my acknowledgments for the distinguished compliment of being designated to address you on this occasion. One day shortly after my arrival here, when I was beguiled to that historic summit known as "Crow's Nest," these generous and gallant members of the Board of Visitors, who prefer the pleasures of these fascinating environments to the anxious hair pulling that usually attends the evolution of an impromptu speech, concluded to offer me upon the altar of a distinguishment which naturally belongs to some dignified gentleman, such as a United States Senator, a general, or a railway president. [Laughter and applause.]

In view of the fact currently reported that a large number of the graduating class have contracted pressing engagements [laughter], and, in the words of a distinguished soldier and statesman, "I shall not detain you long." [Laughter.]

As has been declared by most of my predecessors who have spoken for previous boards of visitors, "This is historic ground." [Laughter.] If there is any doubt on that question, it can be settled by reference to any standard history of the United States. I have also verified the statement by several consultations and diligent investigation at the club. [Merriment.]

I can say to the Superintendent and members of the faculty that the present Board of Visitors have made faithful examinations of the various departments of the institution, of the buildings and grounds, and of fiscal affairs. They have looked into your method of treating conic sections, and have reveled in the equations of the parabola and hyperbola and asymptote, and have even gone so far as to test, with due precaution, the drinking water of the institution, which seems to have been entirely overlooked by previous boards. [Great laughter.]

In regard to the course of instruction in the Academy, it hardly seems possible to conceive of one more appropriately adapted to the purpose. It has been urged by some that the course is too extended and severe, but the fact that you are graduating, with efficiency and thoroughness, a class of over seventy members who have the mental ability to pass examination ordeals with such brilliancy that even the wisest and severest looking members of successive boards tremble in their shoes for fear that some question may be asked them in the presence of the class, and with such physical agility that they can ride most any number of horses at the same time, either forward or backward, shows that the course of study is within the mastery of the average cadet. [Applause.]

On the other hand, it is sometimes asserted that the curriculum is not sufficiently comprehensive and that there are subjects taught in other institutions of the world that are not here. While that is true, there is probably no institution in the country in which the student masters a greater or more practical course of study within the same period of time. And I think it will be quite generally conceded that a soldier, even though he be required to master but two languages, ought to be permitted to graduate with at least one lung. [Laughter and applause.]

Upon the whole, I congratulate the members of the faculty of this institution, which was the first and dearest ward of the nation and which is now the pride of our country, upon the excellence of your devoted labors. And I congratulate the country upon the practical achievements of the institution.

And now, gentlemen of the class of '96, my fellow bachelors, I am glad of the opportunity afforded me of making your acquaintance in this manner. If I can be remembered by all of you with as high esteem as you have made me feel for you by the excellence of your manly and scholarly accomplishments, I shall be most fortunate indeed.

There are, I believe, seventy-three of you. Your number of failures has been low. Your grade or standard of merit is high. Therefore you expect much of yourselves. He is greatest who makes all that is possible out of himself. As Emerson advised, "Insist upon yourself." There is no power within the heavens above that would, or in the earth beneath that can, ever defeat a combination of integrity and industry.

You have graduated. That is to say, you have been getting ready to do something. But to merely graduate is not to become a lawyer or a doctor or a soldier. A young man was once seen wading around in a pond of cold water. Someone asked him what he was doing there. He replied that he was catching cold and getting hoarse so he could sing bass at a funeral. [Laughter.] I trust that your preparation here has been more pleasant and profitable, but academies and colleges and universities do not make lawyers and doctors and mechanics and engineers and generals any more than a pond of cold water makes bass singers. They simply prepare men to make something of themselves. Goethe once said, "A chip burns because it has the right kind of stuff in it." As a general rule men succeed for the same reason that a chip burns.

Success, however, may depend upon two conditions, ability and circumstances. Sometimes there is a latent ability that civil life does not awaken.

The people of Carondelet, Mo., who bought wood of an ordinary looking man, with trousers in his boots and wearing an old felt hat, something over a quarter of a century ago, had no idea that that man's funeral would be conducted by the United States of America, and that belts would be taken off of wheels and factories be as silent as the grave at the hour of that wood hauler's burial. Those who sold hides to a

tanner near Galena, Ill., just before the civil war, had no idea that in honor of his funeral, Westminster Abbey would resound with the echoes of a special hymn, and that the sweetest soloist on earth would go from Paris unto London, like a bird of song, to send her matchless, mournful melody across the wide, sad sea, from continent to continent. And yet such was the honor finally paid to him who, a graduate of this institution, had not yet known renown at 37 years of age.

The secret of that man's success was silence, thought, intensity, thoroughness, persistence.

* * * * *

The warfare of the future shall be solved largely by intelligence. The terrible engines of destruction already make the old-time charge impracticable. Before your light battery, which I saw perform to-day, the Old Guard of Napoleon would be useless. Let no future soldier think of riding into glory at the head of a brilliant charge. The plume will do for dress parade, and the diadem shall belong to the brow of scientific thought.

One of the greatest problems for the future is the protection of great cities. The control and defense of a great metropolis is a larger problem for the modern soldier than the former conquering of a continent. What are you going to do if the lights of New York City should be suddenly put out? What military scientist can solve the problem of the pandemonium that would exist in utter darkness with a formidable foe at hand? Given the problem of a great metropolis in absolute darkness and her waterworks destroyed, what military engineer will announce a solution that will save the city and its million souls from sword and flame and dynamite?

Such are the problems for the modern student of military science.

* * * * *

Even as long ago as our civil war military success depended more upon the solution of great and intricate problems than upon the brilliancy of dashing charges and spectacular movements. The civilization of eighteen hundred years waited with breathless silence upon the siege of Vicksburg. A century of hope was thinking out a way to cross a river with no place to embark and no place to land. Through the weary nights of doubt and disappointment Slavery and Liberty were peering through the gloom, watching the feet of the worn and weary soldiery of America trying to find a place to stand. The heights were guarded by the caanon of the enemy. The swamps had no bottom. Contagion joined the weird procession. Malaria marched with the boys. Sometimes success must crawl. The Army of the Tennessee did everything. They dug, they trenched, they crept, they swam. They could not afford the luxury of night, so they carried candles to light them through the water and the gloom; but they never yielded. They had a leader and that leader had a purpose. He was a part of human progress—a fixed, determined man.

Doubtless all of you may have in mind the character of some great soldier as worthy of your study and your emulation. France will tell you now of an emperor who spent his lifetime trying to subdue mankind, and almost touched that pinnacle where he might have stood and said "I am monarch of the world." But the Waterloo of his destiny came, and the man whose ambition it was to chain the world became himself a slave in the midst of the murmuring sea. The proud Corsican, whose cradle was an island, dreamed that his sword would one day span the globe, and he awakened from his dream of despotism only to find himself banished from his own dominions to that sad sea island which became his grave. [Applause.]

In some future day I can hear Columbia saying to the world, "America had a son whose ambition it was to free and not subdue mankind. He drew his sword and the chains fell from a race. He said 'Surrender,' and the greatest rebellion of all history was compelled to hear his voice. He was lifted by a grateful people to the highest place of civil honor in the world. Then, in the evening of his great and useful life, he traveled round the globe and brought the proffered honors of the world and laid them at his country's feet. And when he died Labor let her hammer fall and Mammon locked the doors of trade—the world with silent tread followed a single bier." Such was Grant, the great American who left the flag of the Republic over a united country. [Great applause.] For your emulation I commend his patient character and great ability, and in your charge our common country trusts her flag. [Applause.]

For more than a quarter of a century of peace your evening gun has sounded to that flag its salutation of a loyal people, and fluttering on the melody of patriotism it has been given to your vigilance and faithful keeping in the nighttime, only to be lifted on Old Glory's staff to greet the morning sun and to command the willing homage of the world. [Applause.]

Wherever your commissions may direct you, you will hear that evening salutation, and sometimes when in your memory you hear the patriotic melodies of these dear old days of school life they will be mingled with the familiar voices of your messmates—and maybe with some more tender voice—and there will come into your eyes a mist of tears, and through it all, and through the mystic glimmer of the years, you will always, always see the emblem of your country, the matchless banner of the stars. [Great applause.]

Interwoven with the memory of things that are the nearest and the dearest to your hearts that flag will color all your friendships with the lasting blue of true fidelity and its red will fire your courage with unconquerable ardor. Your honor and your manhood shall keep its purity and be forever typified by that banner's stainless white, and looking to its stars your minds shall contemplate the power and majesty and unity of all the States—our nation. [Long-continued applause.]