

WEST POINT IN 1835 (LOOKING SOUTHEAST).

From an old print.

THE ACADEMIC HISTORY OF THE MILITARY ACADEMY, 1802-1902.

By Colonel SAMUEL E. TILLMAN,

Professor of Chemistry, Mineralogy, and Geology, U. S. Military Academy—U. S. Military Academy, 1869.

*THE UNITED STATES MILITARY ACADEMY; WEST POINT:
1802-1902.*

*Here, where resistlessly the river runs
Between majestic mountains to the sea,
The Patriots' watch fires burned: Their constancy
Won Freedom as an heritage for their sons.
To keep that Freedom pure, inviolate,
Here are the Nation's children schooled in arts
Of Peace, in disciplines of War; their hearts
Made resolute, their wills subordinate
To do their utmost duty at the call
Of this, their Country, whatso'er befall.
Broadcast upon our History's ample page
The records of their valiant deeds are strown.
Proudly their Alma Mater claims her own.
May she have sons like these from age to age!*

E. S. H.

June, 1902.

A.



INFANTRY CAPTAIN, 1813.

THE legal existence of the Military Academy as a defined institution permanently located dates from March 16, 1802, when Congress empowered the President to organize and establish a Corps of Engineers and enacted "that the said corps when so organized shall be stationed at West Point, in the State of New York, and shall constitute a military academy," and "that the principal engineer, and in his absence the next in rank, shall have the superintendence of the said Military Academy, under the President of the United States, and the Secretary of War is hereby authorized, at the public expense, under such regulations as shall be directed by the President of the United States, to procure the necessary books, implements, and apparatus for the use and benefit of the same institution." It seems proper

that the birth of the Military Academy should date from this period, because thereafter those Cadets who completed the course of instructions and were found qualified received certificates of proficiency and were recommended for promotion in different arms of the Service.

The act above referred to, establishing a Corps of Engineers and constituting it a military academy, provided for an engineer with the rank of major and two assistant engineers with the rank of captain, and authorized the President to make such promotions in the corps as he might deem fit, so as not to exceed 1 colonel, 1 lieutenant-colonel, 2 majors, and 4 captains, 4 first and 4 second lieutenants, the whole corps not to exceed 20 officers and 10 Cadets. The act also provided that there should be attached to the Regiment of Artillerists, which was provided for, 40 Cadets. Major Jonathan Williams was made head of the Corps of Engineers April 1, and on the 8th of the following July he was appointed lieutenant-colonel. The assistant engineers were Captain William A. Barron, who, like Williams, was transferred from the Regiment of Artillerists and Engineers, and Captain Jared A. Mansfield, who was appointed a captain of engineers on May 3 in order to become an instructor at West Point. Major Williams, as head of the Engineer Corps, became the legal superintendent of the Military Academy, but he did not take station at West Point until July 3, 1802.

Mr. George Baron, the teacher of mathematics in the embryo school as it existed in the autumn of 1801, was dismissed the service in February, 1802. As senior officer of engineers present, Captain W. A. Barron attempted to resume instruction in April. In May and thereafter he had the assistance of Captain Jared A. Mansfield, who had just been appointed to the corps.

On July 4 Major Williams, the head of the corps, joined his two senior assistants at the Academy, and during the summer occasionally took part himself in giving certain practical instruction. The presence of Colonel Williams at the Academy, and his personal assumption of command on this date (4th of July, 1802) may be considered as the formal opening of the Academy.

The Military Academy which provided the officers who fought the Mexican and civil wars dates from the act of 1812. Its graduates were all educated alike; were subject to the same discipline, and were assigned to all arms of the service. Until the year 1866 the Superintendent was by law an engineer officer, reporting directly to the chief of his corps, who was an *ex officio* inspector of the Military Academy. Colonel Thayer was Superintendent from 1817 to 1833. General Totten was a member of the Board of Visitors five times during this period (1819, 1821, 1822, 1826, and 1828). In 1838 he became Chief of Engineers and inspector, and so continued until 1864. For forty-seven years the Academy was thus held to a single consistent general policy.

A great amount of detailed historical information in regard to the different departments of the Academy since its formation was prepared by the respective heads of these departments in 1896 and will be found in the report of the Superintendent for that year. Owing to its source and manner of preparation this information has been made full use of in the present chapter. In some cases only a few omissions were necessary to fit the matter for present purposes; in others, besides omissions, it has been found necessary to rearrange the order of much of the data. The facts and statements, however, remain those of the respective heads of the departments as prepared in 1896, in so far as the substance of the statements is concerned. All the sketches have been brought up to the date of 1902.

Before introducing these detailed departmental histories it has been deemed advisable to insert a general outline of certain points of academic organization, administration, and interest which are not specially referred to in these histories.

NUMBER OF CADETS.

The grade of Cadet was first established by the law of May 9, 1794, two Cadets being allowed to each company of the Corps of Artillerists and Engineers.

By subsequent acts an increased number was authorized, but only 9 had been appointed up to the act of March 16, 1802. This act provided for 10 Cadets of engineers and 40 of

artillery. The act of April 12, 1808, provided for 156 Cadets additional to those already permitted. The act of January 11, 1812, provided for 104 in addition to the numbers above given.

By the act of April 29, 1812, the possible number that might be appointed was limited to 250 in addition to those of engineers. This act also, by direct implication, gives the Academic Board the authority to confer degrees, by using the words: "when any Cadet shall receive a regular degree from the academic staff."

By the act of March 1, 1843, the number of Cadets was limited to the number of Representatives and Delegates in Congress and one from the District of Columbia by the following words: "That each Congressional and Territorial district shall be entitled to have one Cadet at the Academy at one time, which Cadet must be a resident of the district." This act also provided "that nothing in this section shall prevent the appointment of an additional number of Cadets, not exceeding 10, to be appointed at large." At the time of the passage of this act the number of Representatives and Delegates in Congress was about 220. During the civil war the requirement as to "residence in the district" was not complied with, and appointments from the Northern States were made to represent Southern districts, but this custom was stopped by legislative action in 1865-66. For a long time the law of 1843 was construed to permit the President to have only 10 Cadets at the Academy at the same time, but about 1866 or 1867 it was interpreted to permit him 10 appointments annually, and he did for a time have more than 10 Cadets at the Academy at one time, but by the act of June 11, 1878, the number was specifically limited to 10 at one time. By the act of June 6, 1900, the number of Cadets was increased by allowing 2 additional from each State and 10 annually to the President. The maximum number of Cadets now (1902) permitted at the Academy is 492.

APPOINTMENT OF CADETS.

Cadets have always been appointed by the President. Originally these appointments were, in large part, suggested to

the President through the Secretary of War, his information of the candidates coming from various sources. The desire for more equal representation of the different portions of the country at the Academy led to the suggestion of candidates by the Representatives in Congress. By 1843, when the number of Cadets was limited to the number of Representatives and Delegates in Congress, it had become quite the general custom for these Representatives to suggest to the Secretary of War the names of candidates for cadetship. Since the act of March 1, 1843, this custom has been almost uniformly followed. The increased number of Cadets permitted to the States (two each) by the act of June 6, 1900, are nominated to the Secretary of War for appointment by the United States Senators from each State. Since the President, through the Secretary of War, always follows the recommendations of the Senator or Representative, it is usually considered that the Congressman makes the appointment, and it has become his privilege to name the Cadet when a vacancy for the district or State occurs at the Academy.

LEGAL STATUS OF CADETS.

The legal status of Cadets was undetermined for some twenty years after the founding of the Academy. At first it was held that they could sit upon courts-martial; then it was held that they could not, and that they could not even be tried by courts-martial. In 1819 this latter question was referred to the Attorney-General of the United States for his opinion. He held that the Cadets constituted "part of the land forces of the United States and that they have been constitutionally subjected to the Rules and Articles of War and to trials by courts-martial." Notwithstanding this opinion, the court whose action had called it forth adhered to the adverse view; however, the view of the Attorney-General was accepted by the then President and his successor in office and has been ever since the law in regard to Cadets. The present view is in accordance with this interpretation, and a Cadet is a warrant officer in the military service of the United States, this rank being the second highest non-commissioned rank.

REQUIREMENTS OF CANDIDATES FOR ADMISSION.

Certain requisites for admission to the Academy were prescribed by the War Department, May 18, 1810, but they were not adhered to.

By the act of April 29, 1812, it was provided that each candidate should be "well versed in reading, writing, and arithmetic." These requisites remained the same until July 22, 1866, when a knowledge of English grammar, United States history, and geography was added. March 2, 1901, it was enacted by Congress that "appointees shall be examined, under regulations to be framed by the Secretary of War, before they shall be admitted to the Academy, and shall be required to be well versed in such subjects as he may from time to time prescribe."

Under this enactment the Secretary of War prescribed that the candidates should be well versed in reading, writing, spelling, English grammar, English composition, English literature, arithmetic, algebra through quadratic equations, plane geometry, descriptive geography, the elements of physical geography, especially the geography of the United States, United States history, the outline of general history, and the general principles of physiology and hygiene."

The examination for admission in 1901 was the last held under the old requisites of 1812-1866.

By virtue of authority conferred by the act of March 2, 1901, above referred to, the Secretary of War in November, 1901, authorized the Academic Board to accept certain certificates of qualification in lieu of an examination in the prescribed subjects. The following are the conditions of these certificates:

First: The properly attested examination paper of a candidate who receives his appointment through a public competitive written examination covering the range of subjects prescribed for admission.

Second: The properly attested certificate of graduation from a public high school or a State normal school in which the course of study, together with the requirements for entrance, shall cover the range of prescribed subjects.

Third: The properly attested certificate that the candidate is a regular student of any incorporated college or university, without condition as to any of the prescribed subjects.

EXAMINATIONS FOR ADMISSION.

From 1818 to September 1, 1901, all candidates admitted to the Military Academy had to pass a preliminary examination. From the former date until 1870 the examinations were oral. Since 1870 they have been in writing. Until 1892 the examinations were all held at West Point; since that date they have been held at various selected points throughout the country. All written examinations have been so conducted that the personality of the candidate was unknown to the examiners.

A portion of the class entering in 1902 were admitted without examination, upon certificates in accordance with the newly enacted paragraph of Academic Regulations, making possible admission by certificate, above referred to.

Up to 1892 the entrance examinations were held in the first half of June, or about the end of August, though occasionally candidates have been examined later—as late as November 1.

From 1892 to 1901 one examination has been held in March, and effort has been made to avoid entrance examinations after June 1, but the effort has not been successful, and other examinations have been held both in July and August. In 1902 the first examination for admission was fixed for May, but subsequent examinations were also held in this year.

Examinations toward the close of and after the Cadet encampment have been deemed objectionable by the academic board for fifty years, but efforts to avoid them have not been entirely satisfactory.

INSTRUCTION AND EXAMINATIONS AFTER ADMISSION.

From 1802 to 1817 no definite or consistent system of instruction or examinations was pursued. Examinations previous to entrance were not uniformly required, Cadets were not arranged in distinct classes, definite courses of study

were not prescribed, and regular examinations were not held. With the advent of Major Thayer as Superintendent there soon followed the organization of the Cadets into a battalion and a separation into classes and division of classes into sections, according to proficiency in studies, with transfers from one section to another; weekly class reports of daily progress, the system and scale of marking, which is still followed, and the publication of the annual register. He brought about the introduction of Boards of Visitors, which had been authorized by the academic regulations of 1816. The curriculum of studies was made definite, improved, and extended. Entrance examinations for candidates were made invariable; and semi-annual examinations were established for the Cadets, commencing on the 1st of January and June yearly. These semi-annual examinations were conducted before the entire Academic Board. This method was pursued until about 1839, when it was concluded to divide the board into two committees. Examinations before the divided board were abandoned in 1842 and return made to a committee of the whole board. The whole board then continued to sit as a single committee for examinations until 1857, when it was again, for some of the classes, divided into two committees for examination purposes. This arrangement continued from 1857 to 1873. In 1874 and 1875 all examinations were by whole board; from 1876 to 1882 the arrangement was the same as from 1857 to 1873. From 1882 the classes were examined by two committees. This arrangement continued until January, 1900, when examinations by department committees was established for the January examinations and by class committees for the June examinations. At the same time any department in which all recitations on general review were had in writing, was authorized to exempt all Cadets from examinations who were, in the opinion of the Department, proficient in the course, except for certain classes at the June examinations.

The semiannual examinations were conducted orally until about 1881, after which no Cadet could be declared deficient without a written examination. After 1882 the method of examinations, written or oral, was left to the discretion of the

head of the department concerned. The division of classes into sections was instituted in 1818, but the small size of sections into which classes are now divided for all departments was not reached until 1860-65. Since this date the number of Cadets in the section has been substantially the same as now. The manner of conducting a recitation; testing the Cadet's knowledge of the subject recited upon, and imparting instructions have followed the same lines since 1820; in recent years, since 1880, however, much more instruction has been given, more assistance rendered Cadets, and much greater stress laid upon the practical applications of the principles taught in connection with the theories.

This tendency has gradually increased from 1880 to the present time, so that academic exercises now involve more practical application of principles than ever before. The manner of reciting and the exercises of the section are given in the detailed histories of the departments.

SCALE OF ACADEMIC MARKING.

Immediately upon the advent of Major Thayer as Superintendent of the Academy, he instituted a scale of marking which has been adhered to ever since. Upon this scale a perfect recitation receives a mark of 3.0; good is represented by 2.5, indifferent by 2.0, bad 1.5, very imperfect 1.0, and complete failure 0.0. These daily marks are made upon the Cadet's daily section-room work and upon certain practical work during his entire career at the Academy. The summations of the daily marks obtained by Cadets during the study of a particular subject, in general represent their relative proficiency in the subject.

WEIGHTS ATTACHED TO SUBJECTS OF INSTRUCTION AND CLASS STANDING.

Each subject of study has attached to it an assigned weight, these weights being fixed by the Academic Board. The weights give the relative values attached by the Academic Board at different periods to the different subjects as part of the military curriculum. The weights employed for the

different subjects in the general merit roll of the first class are here given at intervals of twenty years from 1820.

| | 1820 | 1840 | 1860 | 1880 | 1900 |
|-----------------------------|------|------|------|------|------|
| Engineering | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Natural philosophy..... | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Mathematics | 2.0 | 3.0 | 3.0 | 3.0 | 4.0 |
| Drawing..... | 1.0 | 1.0 | 1.0 | 1.0 | 1.25 |
| French | 0.5 | 1.0 | 1.0 | 1.0 | 1.50 |
| Chemistry | | | | | |
| Mineralogy and geology..... | | 2.0 | 1.5 | 1.5 | 2.25 |
| Tactics: | | | 1.0 | .75 | |
| Infantry | | | 1.5 | | |
| Artillery..... | 1.0 | | 1.5 | | .75 |
| Cavalry..... | | | | 1.0 | |
| Conduct | 1.0 | | | 2.0 | 1.25 |
| English: | | | | | |
| Ethics | | | .50 | | |
| Geography | | | .50 | | |
| History | 1.0 | | | | 1.0 |
| English | | | | | |
| Rhetoric..... | | 2.0 | .50 | | .50 |
| Ethics | | | | | |
| Law | | | 1.50 | 1.50 | 1.50 |
| Logic | | | 1.0 | | |
| Law | | | 1.0 | | |
| Grammar | | | 1.0 | | |
| Ordnance..... | | | 1.0 | | |
| Gunnery | | | | 1.0 | 1.50 |
| Spanish | | | 1.0 | .75 | .85 |
| Practical engineering..... | | | | | .45 |
| Military efficiency..... | | | | | 1.30 |
| Military deportment..... | | | | | .20 |

The standing of a Cadet in any one subject has always been arrived at from a consideration of the sum of the marks received in that subject coupled with any other considerations that the officers who teach the subject deem may have had influence upon the mark so received.

In the great majority of cases the standing in a particular subject is shown by the sum of the marks received in that subject, but in particular cases, for sufficient reasons, the marks are departed from, and in such case the standing does not strictly accord with marks. Such departure is made only when it is the opinion of the Board that exceptional causes have operated and that injustice would be done by adhering strictly to the marks in deciding standing. The general standing of a Cadet, or the standing in the class when all the subjects pursued during the year or term are considered, is determined by adding together the "proportional parts" which

each Cadet receives in each subject. The "proportional parts" in each subject were, up to 1896, obtained as follows: The Cadet who came out (No. 1) head in a particular subject received as his proportional part the total weight assigned to that subject. The Cadet who came out last in the subject, or foot, received for his proportional part one-third of this weight. Each other Cadet in order of standing, in the particular subject, received his proportional parts through the use of a "common difference" term, which term was subtracted in succession from the "proportional part" of the Cadet next above, the first subtraction being made from the proportional part of No. 1; or the "common difference" term might be added in succession, beginning with the proportional part of the last Cadet.

The "common difference" term was, of course, obtained by dividing the difference between the proportional parts of the Cadet standing first and the one standing last by a number one less than the number of Cadets in the class. Since 1896 the proportional parts in any subject have been obtained by giving to the Cadet who stands 1 in the subject, for his proportional part, the total weight assigned to the subject as before; each other Cadet then receives the same proportion of this total that his marks in the subject bear to marks received by No. 1.

DEPARTMENTS OF THE ACADEMY.

The professorships of mathematics, engineering, and natural philosophy were created by the act of April 29, 1812, though the two subjects first named had been taught from 1802. Some instruction in natural philosophy was given prior to the creation of the professorship. Although drill regulations were taught to a greater or less extent from the founding of the Academy, the department of tactics may be considered to date from September 15, 1817, when the Cadets were organized into a battalion and Lieut. G. W. Gardiner was temporarily detailed to command it; the position of Commandant of Cadets was not known to the law until the regulations of 1825. The department was not recognized by law until July 12, 1858.

The subjects pertaining to the department of chemistry were taught from October, 1820, but the professorship was not established until July 8, 1838. The professorship of drawing was established August 8, 1846, though drawing was taught from 1803. The department of modern languages came into existence June 30, 1882, in consequence of an act of Congress passed June 23, 1879. This department now embraces the study of French, Spanish, and English. French was taught from 1803; the professorship of French was created August 8, 1846. Spanish was taught from September 1, 1856; the professorship was established February 16, 1857. The study of English subjects was first introduced about 1820 and embraced general history, moral philosophy, national and political law. English grammar was introduced in 1839. The study of English was discontinued in 1867 and reintroduced in 1877. In 1878 it was placed under charge of the professor of French, and remained in his charge when the French department, in 1882, absorbed the Spanish department and became the department of modern languages.

The professorship of history, geography, and ethics was created by the act of April 14, 1818. The study of law grew up in this department between 1820 and 1830, being first introduced in 1821. The instruction in law remained under this professorship until 1874, when under the act of June 6, 1874, it was placed in charge of one of the judge-advocates of the Army.

History was first given attention at the Academy in the department of history, geography, and ethics and was introduced in 1820, probably by lecture only. It was discontinued almost immediately and reintroduced in 1856. It was again discontinued in 1862 and reintroduced in 1883.

By the act of February 18, 1896, the professorship of history, geography, and ethics was discontinued and the subject of history was transferred to the department of law. Up to 1842 the instruction in practical and military engineering was given by the department of engineering. The first instructor of practical engineering was appointed in August, 1842, and in 1844 he became a member of the Academic Board. From 1817 to 1856 the department of ordnance and

gunnery was part of the artillery branch of the tactical department. In 1857 it became a separate and distinct department.

ACADEMIC BOARD.

The Academic Board since 1818 has consisted of the Superintendent and heads of the different departments of instruction, the instructor of ordnance and gunnery being the last addition to the Board, in 1857.

BOARD OF VISITORS.

Provision was made for a Board of Visitors to the Academy in the regulations of 1816, but regular attendance of these visitors was not established until the advent of Major Thayer, 1817. The army regulations of 1821 prescribed that the June examinations should be held in the "presence of the Board of Visitors." The first appropriation for defraying the expenses of the Board of Visitors was made in March, 1828. From 1815 to the present time boards of visitors have annually visited the Academy and reported their observations.

SUPERINTENDENTS.

From the founding of the Academy to 1866 the Superintendents of the Academy were all engineer officers. Since that date they have been taken from different branches of the service. The names of the Superintendents, rank at time of appointment, and length of service as such are given below.

Superintendents of the United States Military Academy.

| No. | Name. | Army rank when appointed. | Term of service. | | Remarks. |
|-----|----------------------------------|--|----------------------------|----------------------------|-----------|
| | | | From— | To— | |
| 1 | Jonathan Williams | Major, Corps of Engineers | Apr. 15, 1802 | June 30, 1803 ^a | Resigned. |
| 2 | do | Lieutenant-colonel, Corps of Engineers | Apr. 19, 1805 ^a | July 31, 1812 | Do. |
| 3 | Joseph G. Swift | Colonel, Corps of Engineers | July 31, 1812 | Mar. 24, 1814 | Relieved. |
| 4 | Alden Partridge | Captain, Corps of Engineers | Jan. 3, 1815 | July 28, 1817 | Do. |
| 5 | Sylvanus Thayer | do | July 28, 1817 | July 1, 1833 | Do. |
| 6 | René E. De Russey | Major, Corps of Engineers | July 1, 1833 | Sept. 1, 1838 | Do. |
| 7 | Richard Delafield | do | Sept. 1, 1838 | Aug. 15, 1845 | Do. |
| 8 | Henry Brewerton | Captain, Corps of Engineers | Aug. 15, 1845 | Sept. 1, 1852 | Do. |
| 9 | Robert E. Lee | do | Sept. 1, 1852 | Mar. 31, 1855 | Do. |
| 10 | John G. Barnard | do | Mar. 31, 1855 | Sept. 8, 1856 | Do. |
| 11 | Richard Delafield | Major, Corps of Engineers | Sept. 8, 1856 | Jan. 23, 1861 ^b | Do. |
| 12 | Peter G. T. Beauregard | Captain, Corps of Engineers | Jan. 23, 1861 ^b | Jan. 28, 1861 | Do. |
| 13 | Richard Delafield | Major, Corps of Engineers | Jan. 28, 1861 | Mar. 1, 1861 | Do. |
| 14 | Alexander H. Bowman | do | Mar. 1, 1861 | July 8, 1864 | Do. |
| 15 | Zealous B. Tower | do | July 8, 1864 | Sept. 3, 1864 | Do. |
| 16 | George W. Cullum | Lieutenant-colonel, Corps of Engineers | Sept. 8, 1864 | Aug. 28, 1866 | Do. |
| 17 | Thomas G. Pitcher | Colonel Forty-fourth Infantry | Aug. 28, 1866 | Sept. 1, 1871 | Do. |
| 18 | Thomas H. Ruger | Colonel Eighteenth Infantry | Sept. 1, 1871 | Sept. 1, 1876 | Do. |
| 19 | John M. Schofield | Major-general, U. S. Army | Sept. 1, 1876 | Jan. 21, 1881 | Do. |
| 20 | Oliver O. Howard | Brigadier-general, U. S. Army | Jan. 21, 1881 | Sept. 1, 1882 | Do. |
| 21 | Wesley Merritt | Colonel Fifth Cavalry | Sept. 1, 1882 | July 1, 1887 | Do. |
| 22 | John G. Parke | Colonel, Corps of Engineers | Aug. 28, 1887 | June 24, 1889- | Do. |
| 23 | John M. Wilson | Lieutenant-colonel, Corps of Engineers | Aug. 26, 1889 | Mar. 31, 1893 | Do. |
| 24 | Oswald H. Ernst | Major, Corps of Engineers | Mar. 31, 1893 | Aug. 21, 1898 | Do. |
| 25 | Albert L. Mills | First Lieutenant, First Cavalry | Aug. 22, 1898 | ..... | ..... |

NOTE.—The selection of the Superintendents of the Military Academy was confined to the Corps of Engineers from the establishment of the institution, March 16, 1802, till the passage of the law of July 13, 1866, which opened it to the entire Army. By the act of June 12, 1858, the local rank of colonel was conferred upon the Superintendent.

^a Major Williams resigned June 20, 1803, on a point of command, and pending its settlement until April 19, 1805, when he again returned to service as Chief Engineer, no permanent Superintendent of the Military Academy was appointed, the command devolving upon the senior officer of the Corps of Engineers present for duty.

^b Brevet Maj. P. G. T. Beauregard, Corps of Engineers, by order of John B. Floyd, Secretary of War, relieved Colonel Delafield, January 23, 1861, from the superintendency of the Military Academy, but was himself displaced five days later, January 28, 1861, by direction of the succeeding Secretary of War, Joseph Holt, the command again devolving upon Colonel Delafield.

PUNISHMENTS INFLICTED AND REWARDS BESTOWED UPON
CADETS.

The punishments instituted for Cadets for inattention to and neglect of duty and disregard of regulations have been substantially the same throughout the history of the Academy—they are both positive and negative. To the positive class belong—first, “demerits” (given for delinquencies of all sorts), which affect the class standing of Cadets; second, enforced physical exercise, generally designated as “extra” or “punishment duty;” third, “confinement to quarters” or to “limited areas” or to “light prison;” fourth, punishments inflicted by courts-martial.

The negative punishments are such as result in a deprivation of privileges, and are generally accompanied by one or the other of the positive punishments. All offenses can be punished by the Superintendent, except such as may involve dismissal; these are adjusted by courts-martial.

The punishments which are imposed by the Superintendent follow very quickly upon the offenses, being always announced within two weeks of the commission or omission and put into execution immediately thereafter.

The rewards to Cadets have generally resulted from the absence of the positive and negative punishments, by which absences the Cadet has more leisure or more time to study, and because of which his class standing is or may be improved; these are but the fruits of proper conduct. Rewards have also for a long time taken the more direct form of leaves of absence for short periods at Christmas.

In 1866 the then Superintendent for a short time adopted another positive form of reward. A limited number of medals was given in the different classes for class standing, and special chevrons, with increased privileges on the post, to Cadets who avoided demerits. Since 1899 a much more extensive system of reward has been adopted, based upon the number of demerits received by Cadets during the previous month. Under this system three grades of conduct are established for each class, and each grade carries with it many privileges not permitted to the lower grades, the privileges likewise

being different for the different classes. The privileges under the present system of "grades" are far more extended than have ever before existed at the Academy. They are based entirely upon conduct, as shown by the demerits received. The system of grading is shown in the appended table.

GENERAL ORDERS, } HDQRS. U. S. MILITARY ACADEMY,
 No. 4. } *West Point, N. Y., February 17, 1900.*

Paragraphs 327 and 328, Regulations U. S. Military Academy, are hereby amended, to take effect April 10 next, to read as follows:

"327. On the 10th of each month the Cadets shall be divided into three conduct grades, according to their conduct record for the last calendar month during which each shall have been present.

"For the first and second grades the following number of demerits must not be exceeded:

| Class. | Number of demerits per month. | |
|-------------|-------------------------------|---------------|
| | First grade. | Second grade. |
| First..... | 3 | 7 |
| Second..... | 3 | 7 |
| Third..... | 4 | 9 |
| Fourth..... | 5 | 10 |

"Those Cadets whose demerit exceeds the number allowed the second grade will constitute the third grade.

"328. The privileges attached to the several grades shall be as shown in the table herewith."

By order of Colonel Mills:

W. C. RIVERS,
First Lieutenant, First Cavalry, Adjutant.

FIRST GRADE.

FIRST CLASS.

1. Immunity from ordinary punishments.
2. May visit hotel, under usual restrictions, during release from quarters or camp.
3. May visit the quarters of officers or of families on the post during release from quarters or camp; also Saturday evening.
4. Leave (by permit) to accept invitation to dine on the post any day in camp; in barracks on Saturday or Sunday or on holidays or the evening preceding holidays.
5. Riding privileges, under usual restrictions.
6. May visit library to read at any time when open, reporting departure and return during call to quarters.

7. In camp:
 - (a) Rowing privileges, under usual restrictions, by reporting departure and return.
 - (b) Cadet limits from reveille to tattoo.
 - (c) Leave (by permit) to accept invitation to visit or dine in the vicinity once each week (Saturday or Sunday or holiday); time not over 6 hours, and to end not later than 11.30 p. m. on Saturday and tattoo on Sunday or on holiday.
 - (d) If in the first grade for 4 of the 6 months beginning December 1 and not below the second grade either of the other 2 months, may apply for leave of 3 days, including a Sunday, if money accounts warrant it.
8. In barracks:
 - (a) Leave (by permit) to accept invitation to visit or dine in the vicinity once each month (Saturday or Sunday or holiday); time not over 6 hours and to end not later than tattoo on Saturday and evening call to quarters on Sunday or on holiday.
 - (b) May apply for leave of not over 27 hours at Thanksgiving, if money accounts warrant it.
 - (c) If in the first grade for 4 of the 6 months beginning June 1 and not below the second grade either of the other 2 months, may apply for leave of not over 75 hours at Christmas, if money accounts warrant it.

SECOND CLASS.

1. Riding privileges, under usual restrictions.
2. Leave (by permit) to accept invitation to visit or dine in the vicinity once for each 3 months in this grade (Saturday or Sunday or holiday); time not over 6 hours and to end not later than tattoo on Saturday and evening call to quarters on Sunday or on holiday.
3. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening; or accept (by permit) invitation to dine on the post on Saturday or Sunday, or on holidays, or on the evening preceding holidays.
4. If in first grade for 2 of the 3 months beginning September 1 and not below the second grade the other month, may apply for leave of not over 75 hours at Christmas, if money accounts warrant it.

THIRD CLASS.

1. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening; or accept (by permit) invitation to dine on the post on Saturday or Sunday, or on holidays, or on the evening preceding holidays.
2. In camp:
 - (a) Cadet limits from 9 a. m. to tattoo.
 - (b) Leave (by permit) to accept invitation to visit or dine in the vicinity once each month (Saturday or Sunday or holiday); time not over 6 hours and to end not later than 11.30 p. m. on Saturday and tattoo on Sunday or on holiday.
3. In barracks:
 - (a) Leave (by permit) to accept invitation to visit or dine in the vicinity on holidays or to visit or dine with parents in the vicinity once for each 3 months in this grade (Saturday or Sunday); time not over 6 hours and to end not later than tattoo on Saturday and evening call to quarters on Sunday or on holiday.
 - (b) If in the first grade for 4 of the 6 months beginning June 1 and not below the second grade either of the other 2 months, may apply for leave of not over 75 hours at Christmas, if money accounts warrant it.

FOURTH CLASS. *a*

1. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening; or accept (by permit) invitation to dine on the post on Saturday or Sunday, or on holidays, or on the evening preceding holidays.
2. In barracks: Leave (by permit) to accept invitation to visit or dine in the vicinity with parents on holidays; time not over 6 hours and to end not later than evening call to quarters.

SECOND GRADE.

FIRST CLASS.

1. Immunity from ordinary punishments.
2. May visit hotel, under usual restrictions, during release from quarters or camp.
3. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening; or accept (by permit) invitation to dine on the post on Saturday or Sunday, or on holidays, or on the evening preceding holidays.
4. Riding privileges, under usual restrictions.
5. In camp:
 - (a) Rowing privileges, under usual restrictions, by reporting departure and return.
 - (b) Cadet limits from 9 a. m. to tattoo.
 - (c) Leave (by permit) to accept invitation to visit or dine in the vicinity once each month (Saturday or Sunday or holiday); time not over 6 hours and to end not later than 11.30 p. m. on Saturday and tattoo on Sunday or on holiday.
 - (d) If average monthly demerit for the 6 months beginning December 1 is not greater than the number allowed for second grade and if not below second grade more than 1 month, may apply for leave of 24 hours, to begin Saturday afternoon, if money accounts warrant it.
6. In barracks:
 - (a) Leave (by permit) to accept invitation to visit or dine in the vicinity once for each 3 months not below this grade (Saturday or Sunday or holiday); time not over 6 hours and to end not later than tattoo on Saturday and evening call to quarters on Sunday or on holiday.
 - (b) If average monthly demerit for the 6 months beginning June 1 is not greater than the number allowed for second grade and if not below second grade more than 1 month, may apply for leave of 48 hours at Christmas, if money accounts warrant it.

SECOND CLASS.

1. Riding privileges, under usual restrictions.
2. Leave (by permit) to accept invitation to visit or dine in the vicinity on holidays, or to visit or dine in the vicinity with parents once for each 3 months not below this grade (Saturday or Sunday or holiday); time not over 6 hours and to end not later than tattoo on Saturday and evening call to quarters on Sunday or on holiday.
3. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening; or accept (by permit) invitation to dine on the post on Saturday or Sunday, or on holidays, or on the evening preceding holidays.

a To be divided into grades for the first time September 10. In camp: Cadet limits from 1 p. m. to retreat.

THIRD CLASS.

1. Leave (by permit) to visit or dine with parents in vicinity on holidays; time not over 6 hours and to end not later than evening call to quarters.
2. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening; or accept (by permit) invitation to dine on the post on Saturday or Sunday, or on holidays, or on the evening preceding holidays.
3. In camp: Cadet limits from 9 a. m. to retreat.

FOURTH CLASS.

1. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening; or accept (by permit) invitation to dine on the post on Saturday or Sunday, or on holidays, or on the evening preceding holidays.

THIRD GRADE.

FIRST CLASS.

1. May visit the quarters of officers or of families on the post during release from quarters or camp on Wednesday afternoon and Saturday afternoon; also Saturday evening.
2. May (by permit) visit the hotel or accept invitation to dine on the post only under special circumstances.
3. In camp: Cadet limits from 9 a. m. to retreat.

SECOND CLASS.

1. May visit the quarters of officers or of families on the post during release from quarters or camp on Saturday afternoon; also Saturday evening.
2. May (by permit) visit the hotel or accept invitation to dine on the post only under special circumstances.

THIRD CLASS.

1. May (by permit) visit the quarters of officers or of families on the post or hotel or accept invitation to dine on the post only under special circumstances.
2. In camp: Cadet limits from 1 p. m. to retreat.

FOURTH CLASS.

1. May (by permit) visit the quarters of officers or of families on the post or hotel or accept invitation to dine on the post only under special circumstances.

B.

HISTORY OF THE DEPARTMENT OF MATHEMATICS.

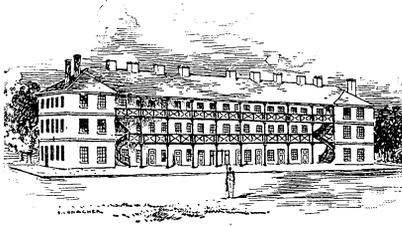
Instruction in mathematics was given at West Point to a few Cadets of the Artillery and Engineers assembled there in 1801, by Mr. George Baron, who was a civilian, appointed teacher of arts and sciences January 6, 1801. He was dismissed the service February 11, 1802.

The Military Academy was legally instituted by act of Congress March 16, 1802. Capt. Jared A. Mansfield, Corps of Engineers, was appointed acting professor of mathematics May 3, 1802, and Capt. W. A. Barron received a similar appointment July 6 of the same year. In this subject at this time the instruction was limited to "the elements of geometry and algebra, with the use of surveying instruments." Captain Mansfield gave instruction in algebra and Captain Barron in geometrical demonstration, and Major Williams, the Superintendent, in the use of instruments. Captain Mansfield was relieved from duty as acting professor of mathematics at the Academy in November, 1803. Captain Barron was acting professor of mathematics until February 14, 1807, when he was succeeded by Ferdinand R. Hassler, who served in this capacity until December, 1809. He was assisted during the years of 1808-1809 by Lieut. Alden Partridge. Hassler resigned February 14, 1810, leaving the department of mathematics in charge of Captain Partridge. Partridge had been assistant professor of mathematics since 1806, and was continuously on duty in this department until April, 1813, with the exception of portions of the years of 1810, 1811, and 1812, when he was on leave. Under the act of Congress approved April 25, 1812, reorganizing the Army, a professorship of mathematics was provided for.

On April 13, 1813, Captain Partridge was appointed to the professorship, which he held until September, being then transferred to the department of engineering and being succeeded on September 1 by Andrew Ellicott, who was professor of mathematics until his death, August 25, 1820. He was succeeded by Captain David B. Douglass, Corps of Engineers, who held the position until May 1, 1823. Charles Davies succeeded Professor Douglass, and was professor of mathematics from May 1, 1823, to May 31, 1837. Professor Davies was a graduate of the Academy of the class of 1815 and was the principal assistant professor of mathematics from 1816 to 1821. Professor Davies was succeeded by Albert E. Church, who was professor of mathematics from June 1, 1837, to March 30, 1878. Church was a graduate of the Academy of the class of 1828; he was an assistant in the department under



THE NORTH BARRACKS (LOOKING NORTHEAST).
ERECTED IN 1817; DEMOLISHED IN 1851.



THE SOUTH BARRACKS (LOOKING SOUTHWEST).
ERECTED IN 1815; DEMOLISHED IN 1849.



THE ACADEMY (LOOKING SOUTHEAST). ERECTED IN 1815
DESTROYED BY FIRE FEBRUARY 19, 1838.

EARLY WEST POINT.

Davies for seven years before he was appointed to the professorship. E. W. Bass, a graduate of the class of 1868, was appointed professor of mathematics as successor to Church in April, 1878. He occupied the position until his retirement, November, 1898, and was succeeded by Wright P. Edgerton, the present head of the department and a graduate of the class of 1874. Bass, before his appointment as professor, had been an officer of the Engineer Corps and had served for six years as an assistant in the department of natural philosophy.

Edgerton before his appointment was an officer of artillery, and had served for ten years as an assistant in the department of which he is now the head. The first acting professor of mathematics, Mansfield, was later surveyor-general of Ohio and the Northwest, and in 1812 was appointed professor of natural and experimental philosophy. Acting Professor Hassler had been director of a geodetic survey of Switzerland, and after his service at the Academy became Superintendent of the U. S. Coast Survey. Professor Ellicott was a member of the National Institute of France. He laid out the city of Washington, ran the boundaries of the District of Columbia, and was frequently employed in determining State boundaries. He was for forty years one of the most prominent scientific men of the country. Professor Douglass was a strong character and a good mathematician, and after three years' service as professor of mathematics he was appointed professor of engineering.

Professor Davies is especially well known because of his series of text-books. His Legendre and Bourdon, with revisions and modifications, continued in use at the Academy for sixty years.

Professor Church taught mathematics at the Academy for forty-eight years. His character and capacity left a strong impress upon the Academy, and his text-books were almost as widely known as those of Davies. His text-books at the time they were written were without doubt the best in this country. His Calculus appeared in 1842, Analytical Geometry in 1851, Trigonometry in 1857, and Descriptive Geometry in 1865.

The professors since Church, Bass and Edgerton, are still living (1902) and well known to recent graduates.

In the early days of the Academy the mathematical course of study was included in Hutton's *Compendium of Mathematics*, and included arithmetic, logarithms, algebra, geometry, trigonometry, land surveying, and conics. Descriptive geometry was first introduced at the Academy in 1817 by Professor Crozet, which is believed to be the earliest study of this subject in America. About the same time the study of calculus was introduced.

The division of classes into smaller sections, with more liberal use of the blackboard, began at the same time, these beneficial changes being inspired by Major Thayer.

The blackboard had been used long before this and was a favorite method of Mr. George Baron, who was the civilian teacher of the Academy. Mr. Baron gave to Cadet Swift, in the autumn of 1801, "a specimen of his mode of teaching at the blackboard." Under the régime of Thayer, who became Superintendent in 1817, Hutton's *Compendium* was soon found insufficient and was discontinued in 1823. In 1825 the text-books in use were:

First year.—Algebra: *Complement des Elémens d'Algèbre*, par Lacroix; Lacroix's *Elements of Algebra*. Geometry: Legendre. Trigonometry: Translation from Lacroix, from Lacroix and Bezout, by Professor Farrar.

Second year.—Descriptive geometry, conic section: Crozet's *Treatise on Descriptive Geometry and Conic Sections*. Perspective, shades, and shadows: Crozet's treatise on same. Analytical geometry: Biot. Fluxions: *Traité du Calcul*, par Lacroix.

In 1831 Lieutenant Ross, assistant professor of mathematics, translated M. Bourdon's *Algebra*, which was immediately adopted as a text-book and became the foundation of Davies's *Bourdon*. About this time Professor Davies began writing a series of text-books, which were adopted as they appeared, so that by 1839 all the text-books used in the course were by him, as follows:

Algebra, Davies's *Bourdon's Geometry*, Plane and Spherical Trigonometry, Davies's Legendre, *Descriptive Geometry*, Shades, Shadows, and Perspective, *Surveying*, *Analytical Geometry*, *Calculus*.

From 1839 until 1843 the text-books remained the same, and they give a fair impression of the mathematical course. The

following is the answer of the Academic Board, given in 1843 to certain criticisms of the course of instruction made by a board of officers of which General Scott was president. It is interesting as showing the objects and views of the Board at that time:

The Academic Board believe that one of the most important objects of the Academy is to subject each Cadet, previous to his promotion to a higher grade in the Army, to a thorough course of mental as well as military discipline, to teach him to reason accurately, and readily to apply right principles to cases of daily occurrence in the life of a soldier. They are satisfied that a strict course of mathematical and philosophical study, with applications to the various branches of military science, is by far the best calculated to bring about this end, and that the present scientific course at the Academy, the result of the experience of many years, is in its main features such a course.

They are aware that many of the Cadets, as is the case with most of those who pursue a scientific course at other institutions, will have little occasion to make practical applications of the many mathematical formulæ which they meet, and that they may have passed over certain problems without thoroughly understanding their meaning in all their points. Still, if the course has been carefully taught, the reasoning faculties will have been strongly exercised and disciplined and a system and habit of thought acquired which are invaluable in the pursuit of any profession and as desirable for the infantry or dragoon officer as for any other officer in the service. The officer whose mind has thus been disciplined and who is not forgetful of the duty which he owes to the Government that has furnished him with opportunities so valuable, will acquire facts and information in whatever station the interests of the service may place him. The discipline and system he will acquire at an early age only, and nowhere so well as during his term of service at the Academy.

In 1843 Davies's Calculus was replaced by Church's, and in 1852 Davies's Analytical Geometry was superseded by that of Church; but the course of study, with slight modifications and extensions, remained the same. The following extract, with a few unimportant omissions, from a report made by Professor Church in 1860 to a committee of inquiry, shows the extent of the course and methods employed at that time:

U. S. MILITARY ACADEMY, *July 31, 1860.*

SIR: In accordance with the request contained in your note of July 18, I have the honor to submit the following replies to the questions proposed by the commission instituted by the act of Congress of June 21, 1860:

1. The subjects taught in my department are algebra, geometry, trigonometry, mensuration; descriptive geometry, with its applications to spherical projections; shades, shadows, and perspective; analytical geometry, differential and integral calculus, and surveying.

Algebra.—The course of algebra comprehends all of the fundamental operations, involution and evolution; transformation and reduction of fractions and radical quantities; theory and solution of equations, including those of the higher degrees; ratios and proportions; summation of series; nature, computation, and use of logarithms.

This course is studied by the fifth class and occupies the time from the 1st of September to the 1st of January.

The first section of the class is, in general, required to study all contained in the text-book now in use—Davies's Bourdon's Algebra. The lowest section omits many of the more difficult discussions and examples, the amount studied being less than two-thirds of that required of the first section.

The intermediate sections in this, as in other subjects, omit more or less, according to their capacity and progress.

Geometry.—The course of geometry comprehends plane geometry, geometry of volumes, and spherical geometry—nine books, as in the text-book, Davies's Legendre. The entire course is required of every section of the fifth class, commencing after the close of the January examination, about the 10th of January.

Trigonometry.—The course of trigonometry comprehends the deduction and analytical investigation of all the important trigonometrical formulas; the nature, construction, and use of the various trigonometrical tables; and the solution of all cases in plane and spherical triangles.

The entire course is required of every section of the fifth class.

Mensuration.—The course of mensuration comprehends the mensuration of the various plane geometrical figures and volumes; and, with the exception of two or three problems omitted by the lower section, is required by the entire fifth class. It is studied immediately after trigonometry, and is acquired in two or three lessons.

Descriptive geometry.—The course of descriptive geometry comprehends the representation of lines and surfaces on planes; the classification and mode of generation of lines and surfaces; the construction of their tangent lines and planes; the intersection and development of surfaces; the construction of spherical triangles, of spherical projections, of the shades and shadows of various objects and their perspectives.

* * * * * * *

In this course, as in the algebra, many of the more difficult problems are omitted by the lowest and other sections, studying not much more than half of that required by the first.

Analytical geometry.—The course of analytical geometry comprehends the construction of algebraic equations; solution of determinate problems; determination and discussion of the equations of the right line,

plane, and conic sections; discussion of the general equation of the second degree, involving two or three variables; determination of loci, etc.

* * * * *

Calculus.—The course of differential and integral calculus comprehends the elementary principles and rules, with their application to maxima and minima; the drawing of tangents, curvature of curves, their rectification, quadratures, cubatures, construction, and discussion of the properties of curves and surfaces.

* * * * *

Surveying.—The course of surveying comprehends the principles and practice of common land surveying, different methods of platting and calculating the surveys, trigonometrical surveying, measurements of heights and distances, use of instruments in platting, surveying, etc.

The entire course is required as in the text (Davies's Surveying), with the exception of a small portion relating to geodetic surveying, omitted for one or two of the lower sections. Fourth class commences this course immediately after completing the differential and integral calculus and finishes it about the 7th of May, when the mathematical course for the year is reviewed, preparatory to the June examination.

* * * * *

II. For the purpose of instruction and recitation in the mathematical department, each class is divided into convenient sections of from ten to fifteen members each. Two of these sections are instructed daily by one of the assistant professors, under the general supervision of the professor. Every member of each section is, if possible, required to daily explain, at the blackboard or wall slate, one or more propositions of the lesson given out on the previous day, and is thoroughly examined by questions on a portion or all of it.

Points not well understood are carefully explained by the instructor or professor. Each pupil is also expected to make known all difficulties with which he may meet, to the end that they may be at once removed and a thorough understanding of each lesson in order thus obtained. For the purpose of testing this understanding various practical examples illustrating the principles of the course are required to be worked by the pupil at the blackboard or slate.

The head of the department is also required to pass the hours of recitation in visiting two or more of the sections, and is constantly occupied in explanations of the principles of the course and their applications, either to the entire section by a familiar conversational lecture or in particular explanations of the more difficult points to individuals.

* * * * *

III. The only practical instruction given in my department, except the exercise in the practical solution of examples and problems, is the instruction in the drawing of problems in shades, shadows, and perspectives, and the instruction on the field in surveying. In this latter branch each section of the fourth class is sent into the field, in charge of its proper

instructor, during the hours of morning recitations, in the months of April and May, whenever the time can be spared and the weather will permit.

* * * * *

It is desirable that more time should be given to this practice, as well as to the instruction in drawing.

IV. From three and a half to four hours should be given daily by the Cadet to render him thoroughly proficient in the prescribed lessons of the mathematical course.

* * * * *

No student should be required to prepare himself by previous study for recitation in more than two distinct subjects a day, particularly when one of them is scientific; and each lesson, as far as possible, should be recited before it is necessary to begin the study of the other.

* * * * *

By 1866 Church's Trigonometry, Descriptive Geometry, Spherical Projections, Shades, Shadows, and Perspective had replaced the corresponding work of Davies.

On March 30, 1878, the long and valuable career of Professor Church was brought suddenly to an end by his death. For nearly forty-one years he had served as professor of mathematics. For forty-eight years he had taught mathematics at the Academy. From the time of his entrance to the Academy in 1824 until his death in 1878, a period of nearly fifty-four years, he was away from the Academy about two years.

Professor Bass succeeded Professor Church April 17, 1878, and in 1879 proposed the following resolution with regard to the studies of the mathematical department, which was adopted by the Academic Board:

Resolved, That the following changes in the order of instruction of the several branches of the mathematical course be adopted by the Academic Board:

1. That the instruction in surveying be transferred from the third-class to the fourth-class course, and to follow immediately after trigonometry.
2. That the instruction in analytical geometry shall follow immediately after surveying in the fourth-class course, and be continued in the third-class course until finished.
3. That the subject of descriptive geometry shall follow immediately after analytical geometry.
4. That the accurate construction, with a right-line pen, of the various problems in shades and shadows, linear perspective and isometric

projections, now under the direction of the mathematical department, be discontinued, and that the same shall hereafter form a part of the course in the department of drawing. The time for making such drawings to follow, as nearly as possible, the termination of the study of the principles relating thereto in the department of mathematics.

* * * * *

The Academic Board of the U. S. Military Academy respectfully recommend to the honorable Secretary of War that Chauvenet's treatise on the Method of Least Squares be authorized as a text-book to be used in the mathematical course. The grounds for this recommendation are that knowledge of this branch of mathematics is required in the subsequent course of philosophy in this Academy and in the reduction of observations in general which officers of the Army are frequently required to make, especially in geodetic and astronomic measurements. The proposed text-book is believed to be the best separate publication on the subject.

In 1880 there was introduced as part of the course in algebra for the upper portions of the classes a short course on determinants, the subject-matter having been prepared by Lieut. J. G. D. Knight, then assistant professor in the department. In 1887 Peck's *Elementary Treatise on Determinants* replaced Knight's. In 1888 *Elements of Trigonometry*, by Lieutenant Ludlow, was substituted for Church's *Trigonometry*. In 1891 the *Theory of Errors and Method of Least Squares*, by W. W. Johnston, was substituted for Chauvenet's. During the years 1887, 1889, and 1893 different portions of Church's *Differential Calculus* gave place to chapters prepared by Bass, and in 1896 Church's *Differential Calculus* was entirely replaced by that of Bass. The chair of associate professor of mathematics was established in 1893 and First Lieut. W. P. Edgerton, of the Second Artillery, was appointed to the place.

In 1898 Professor Bass, on account of serious trouble with his eyes, was, at his own request, placed upon the retired list and was succeeded by Professor W. P. Edgerton.

Upon the recommendation of Professor Edgerton, February, 1899, Church's *Analytical Geometry* was replaced by C. Smith's *Conic Sections and Solid Geometry*. In February, 1900, Church's *Integral Calculus*, Davies's *Bourdon Algebra*, and Davies's *Surveying* were, respectively, replaced, upon the recommendation of Professor Edgerton, by Murray's *Integral*

Calculus, C. Smith's *Treatise on Algebra*, and J. B. Johnson's *Theory and Practice of Surveying*; and Peck's *Determinants* were discontinued.

In consequence of a revision of the academic curriculum, which goes into effect September, 1902, practical surveying and the use of surveying instruments was transferred from the department of mathematics to that of practical engineering. By the same revision the mathematical department yielded forty days (giving one hundred and eighty hours) to the department of modern languages. This time given by the mathematical department was extracted from the last half of the third-class year.

Beginning with the academic year of September, 1900, Professor Edgerton introduced an important change in the order of instructions of the fourth class. Algebra and geometry had before this date been taught in the order named, to completion of each; after this date the two subjects were studied simultaneously, with recitation in each on alternate days. In February, 1901, descriptive geometry was transferred from the fourth to the third class course, this subject being replaced in the fourth class by an equal number of lessons in conic sections. The recitations of the third class were made to alternate between conic sections and descriptive geometry. Professor Edgerton also in 1900 adopted the method of having all recitations on general reviews in writing, and thereafter, in accordance with the authority of the Academic Board, "at the semiannual examinations of both classes, at the intermediate examination of the fourth class, and at the annual examination of the third class all members who have shown themselves proficient in the written reviews are exempt from term examinations."

ORGANIZATION OF THE DEPARTMENT.

The organization of the department consists of the head of the department, Professor W. P. Edgerton; the associate professor, Captain Charles P. Echols, and the requisite number of instructors, which varies with the size of the third and fourth classes.

DIVISION OF DUTIES.

The head of the department, as the title implies, has control of the entire department, apportions its work among the instructors, exercises a general supervision of both classes under his instruction, prepares and conducts the examinations of the classes, is responsible for all property belonging to the department, and is the channel through which must pass all reports and official communications relating to departmental affairs.

DESCRIPTION OF SECTION ROOM, RECITATION, ETC.

The description of a section room and recitation, etc., given for the mathematical department applies in a great degree to all the departments, especially to the departments of natural philosophy and engineering. In some of the other departments, in which the manner of conducting the recitations, etc., are materially different, the differences will be noted under said departments.

The section rooms occupied by the department of mathematics are on the second and third floors of the curtain of the Academy building. All are practically of the same dimensions, 22 by 23 feet, height of ceiling 11 feet, and each is lighted by two large windows. Upon the walls, in oak frames, their surfaces flush with the face of the frames, are twelve or fourteen slates, usually 4 feet by 3 feet 6 inches. When the wall spaces are long and unbroken, four or five of these slates are in a single frame; elsewhere they are framed singly or in pairs. They are all known by the generic name of "blackboards." From the lower part of each frame projects a shallow chalk tray, having at its bottom still shallower drawers, and above each drawer a galvanized wire grating. The chalk crayons and erasers, when not in use, are kept on the grating in the tray, while the dust which these implements always generate falls into the drawers below and is removed periodically. Still below the chalk trays are brass racks to support rulers and pointers.

On a platform, usually between the windows, is the

instructor's flat-topped desk, with a blackboard for his use behind it. Each member of a section is provided with a separate desk and chair, the latter of oak, the former having a sloping oak top, with a shallow receptacle beneath for books, resting on iron supports similar to those of a sewing machine.

ASSIGNMENT OF SEATS.

Seats are assigned by the instructor to members of a section in the order of their rank in the section, and usually in such manner that the section marcher shall be placed nearest the door.

NUMBER OF CADETS IN A SECTION.

Sections belonging to the upper parts of a class generally comprise eleven or twelve members, while the lower sections have but eight or ten. This difference in size between the upper and lower sections is to enable the instructor having the latter, to devote to each member a larger share of his personal attention.

In each section room is posted a copy of the regulations given below, from headquarters of the Academy:

1. The instructor shall be present when the section enters the room.
2. On entering the recitation room each Cadet shall proceed to the seat assigned to him and stand "attention" until the section marcher makes his report.
3. The section marcher shall enter the recitation room after the section, closing the door if the instructor be present; but in case he be absent the section shall be seated, the section marcher shall keep the door open, preserve order in the section, and at the end of two minutes report to the senior officer of the department present for instructions.
4. As soon as the report is made each member shall be seated and immediately record the next lesson, which shall be written on a blackboard or otherwise indicated by the instructor.
5. Each Cadet shall bring to the recitation room a lead pencil and only such books as may be indicated by the head of the department. Before anyone is called up for recitation the members of the section should ask for any information concerning points in the lesson which they have not been able to comprehend after diligent application, or should make any pertinent statement respecting lack of preparation.
6. The members of the section called up shall take boards in order as directed and write their names on the right-hand upper corner.

7. When prepared to recite, each Cadet shall provide himself with a pointer (in case one be needed), face the instructor, and stand "attention" on that side of his board farthest away from the central line of the room, unless otherwise directed. The pointer shall be held in the hand nearest the board and with the point down except when used to indicate work on the board.

8. Instructors shall require each Cadet to keep an upright, soldierly position of attention and to recite with deliberation, clearness, and correct language. Each Cadet while reciting shall, as far as practicable, face his instructor.

9. Instructors shall see that Cadets do not use their hands or pointers improperly, and shall endeavor to prevent them from acquiring any peculiar or nervous habits while reciting. They shall report any want of neatness in dress or appearance.

10. At the proper signal for dismissal the instructor shall cause all recitations to cease and immediately dismiss the section. For recitations terminating at 10.55 a. m., 12.53 p. m., and 3.59 p. m. the signal for dismissal is the recall sounded in the hall of the Academy building. For recitations terminating at 9.30 a. m., 12 m., and 3 p. m. the signal for dismissal is the assembly sounded in the area of barracks.

11. Upon the dismissal of the section the section marcher shall leave the room first and supervise the formation of the section outside.

12. Instructors shall report daily to the adjutant of the Academy, through the head of the department, all Cadets who have reported themselves as excused from recitation and any violation of regulations which may have come to their notice in the Academy building. Absences will be noted on the weekly class reports.

13. When an officer enters the section room the section shall rise and remain at "attention" until the officer be seated or otherwise indicate his pleasure. The instructor shall rise when the officer is senior to himself. At the discretion of a head of a department the compliment may be omitted when the officer leaves the room or reenters during the same recitation hour.

14. Instructors should bear in mind that the proper discipline of their section is largely determined by their own example and military bearing. Also, that the success of their instruction will depend in a great measure upon their patience, forbearance, and judicious assistance.

DESCRIPTION OF A RECITATION.

The 8 o'clock assembly having been sounded in the area of the barracks by the trumpeter, and the sections duly formed, each is marched by its section marcher to the proper room in the Academy building, where ranks are broken, caps hung on the hooks in the hall outside the door, and the members enter

the section room. The last to enter is the section marcher, who stands in the open door until the members of his section have passed to their desks, where each stands "attention." He then closes the door, faces the instructor, salutes, and reports "All are present, sir," or, "Cadet Blank is absent, sir," as the case may be. Occasionally this will be followed by a salute from some member of the section, accompanied by the report, "I am excused from recitation, sir." The instructor returns the salute and the Cadets take their seats, while he notes in his section book the absence of Cadet Blank or the fact that "Cadet Dash is excused from recitation." In the latter event he prepares later a report—"Cadet Dash, reporting himself excused from recitation in mathematics"—signs his name as reporting officer and submits it to the head of the department, who in turn forwards it to the adjutant, in whose office the fact involved is verified by inspection of the morning report of the post surgeon. The members of the section open their text-books, glance at the board behind the instructor, where the limits of the next lesson are recorded, make a note of its extent, and of such corrections of and additions to the text as the instructor may now give them. The instructor then asks: "Are there any questions on the day's lesson?"

At this time any member of the section is at liberty to ask for an explanation of such part of the lesson as he has been unable to comprehend, for the method of solving problems that may involve its principles, or to inquire into any development or extension of these principles.

For the purpose of making clear to the section the points thus brought up for explanation the instructor uses his judgment as to the time he should consume. When going over the text for the first time great latitude is permitted the section. Its members are encouraged to bring before the instructor the difficulties they encountered in the text, of whatever nature they may be, and, moreover, the instructor voluntarily elucidates such important features of the lesson as to his mind may prove stumbling-blocks to his pupils. In this way it is customary to consume at least half an hour each morning, and frequently the whole recitation period of one and one-half hours is occupied for purposes of instruction only. On

the other hand, when reviewing the text the time given to explanation is reduced to a minimum. Only such questions are answered as pertain to subjects overlooked or neglected when passing over the text before. The Cadets at this period are expected to recite upon the subjects in the lesson or to show their knowledge of its principles by applying them in the solution of examples and problems. Having cleared up all doubtful points of the lesson the instructor calls upon Mr. Asterisk, who takes his place, at attention, in front of the instructor's desk.

The instructor then formally enunciates for him a subject in the lesson, as, for example, if in algebra: "Deduce a rule for extracting the n th root of polynomials," or "Discuss the four forms of the quadratic equation." If in the calculus: "Define a point of inflexion; explain how to obtain critical values of the variables and how to test these values." Having heard the enunciation of his subject, Mr. Asterisk goes to the board known as the "first front board," generally the one on the left hand opposite the instructor, writes his name on the upper right-hand corner of it, and proceeds to place upon it the formulas, equations, and intermediate mathematical work necessary for a clear and complete demonstration or deduction of the subject assigned to him. No other writing is permitted upon the board. No erasure is allowed except by permission of the instructor. Tables of logarithms must be used for all computations.

In the meantime three other members of the section are called upon in turn and in a similar manner sent to the next three boards, in order, on the right of the one already occupied, each to discuss a subject in the lesson of the day. Following these, other members are called, each is given a card or slip of paper containing the data of certain problems or examples involving applications of the principles of the lesson, and each takes his place at one of the boards still remaining vacant, known as "side boards," and proceeds to the solution of the problem given. Having sent to the boards as many members of the section as desirable, and this is usually all but one, the instructor then calls upon one of the remaining members, whom he questions upon topics of the lesson of the day.

As soon as any Cadet at the board has completed his work he takes a pointer in his hand, faces his instructor, and stands attention until called upon to recite. The instructor finishes questioning the Cadet on the floor, permits him to take his seat, and marks opposite his name in the proper column of the section book his estimate, computed to a scale of 3, of the value of the recitation just completed. He then calls upon Mr. Asterisk, who, in response, enunciates the subject given him as follows: "I am required to deduce a rule for extracting the n th root of polynomials," or, "I am required to discuss the four forms of the quadratic equation," etc., and after giving any necessary preliminary definitions and explaining the significance of the quantities entering assumed formulæ or equations, passes step by step from this assumed data to the required conclusion. Ordinarily the work is placed upon the board in the same order it has in the text, and the recitation follows quite closely the lines of the text, yet this is not required; but any correct demonstration is accepted, provided it is made in clear and logical form. The recitation ended, the instructor usually asks Mr. Asterisk a few questions relating to the salient points of his subject in order to test the thoroughness of his knowledge of it, or he leads the Cadet, by questions, to contemplate some development or application of the subject not indicated in the text. A similar process is followed with each of the other Cadets at the front boards, and then the instructor turns to those having problems or examples at the side boards.

When the instructor is satisfied that the problem or example given is one of which the answer is unknown to the pupil, it is customary to require merely a statement of the problem and the result, although when time permits the solution is explained from beginning to end. If errors are committed they are traced to their source. As each Cadet finishes his recitation the instructor marks its value in the section book, as has been described.

When the trumpet sounds recall in the Academy building the instructor dismisses the section as the last note ceases. It is then formed in the hall by the section marcher and

marched by him to the area of barracks, where it is finally dismissed. The foregoing description applies to a recitation in algebra, trigonometry, analytical geometry, or the calculus, and its main features to a recitation in any other branch of the mathematical curriculum.

When teaching plane and solid geometry each Cadet is sent to the board to establish one or more propositions in the day's lesson and, in addition, is given a so-called extra—a problem or application depending upon the principles included in the lesson. Each morning the same set of extras is used in each section throughout the class, with the object of testing all parts of the class uniformly. Figures illustrative of principles or used for purposes of deduction must be drawn free-hand, that is, without aid of ruler or string; but when a construction is required from given data the ruler and string must be used and the figure must be as accurately drawn as is admissible with the implements at hand.

In the course of descriptive geometry the data for constructions at the side boards are given out, and the problems are drawn to the scale marked upon the rulers and on the upper edges of the chalk trays. Colored crayons are largely used, but always in accordance with a scheme. Frequently the instructor allows all or the greater portion of his section to remain seated, gives them the data of certain problems, and requires their construction upon sheets. With this contingency in view each Cadet is required to appear in the section room provided with a properly sharpened drawing pencil and a pair of dividers. Each desk is supplied with a ruler and triangle for the use of the Cadet occupying it. Cadets at the front boards, who are employed in the deduction of principles or in the explanation of the problems embraced in the lesson, are not permitted to place letters or figures upon their constructions, but must make them clear to the instructor by the proper use of the pointer. Occasionally in the course of descriptive geometry proper, and much more frequently in its applications to shades and shadows and to perspective, the data for the construction of problems at the desks are hectographed upon a sheet, thus saving the time

that would otherwise be lost in assuming the given magnitudes and enabling the Cadet to concentrate his attention upon the portions of the construction requiring the application of the principles of the lesson.

VISITS OF HEAD OF DEPARTMENT.

At intervals the head of the department visits each section, the frequency of the visits depending largely upon the class under instruction and the subject taught. For example, the fourth class when studying algebra receives his constant attention, not only for the purpose of watching the progress of its members, but to see that they acquire the proper methods of recitation. This same class when studying plane geometry or surveying is visited less frequently, while the third class, which is then devoting its efforts to the calculus, demands a large share of supervision. As a rule a portion of each morning is consumed by visits to the section rooms, where the professor listens to recitations, questions the pupils, and gives such instructions as he deems proper.

The following extracts are from a critical review of the mathematical course and method of instruction in comparison with former years and with other institutions, advantages, defects, etc., which was made by Professor Bass in 1896:

Previous to 1881 the recitations and examinations in mathematics were almost entirely oral. Demonstrations predominated largely over applications. Believing that both were essential, I introduced more examples and exercises into the course, with improved results.

About the same time I became convinced that oral examinations alone, in which each student had as a rule a single subject, were very unsatisfactory. The Academic Board received insufficient data from the examination, and the student regarded it largely as a matter of luck. Furthermore, there was no record of the examination work for after consideration in cases where questions as to facts and fairness subsequently arose.

The present method of requiring in all cases of doubtful proficiency, after an oral examination, a written one, embracing subjects and applications throughout the course, was then adopted, obviating to a great extent the defects of the former method. Written examinations, however, soon developed the fact that the method of exclusive oral recitations was faulty. Written recitations were then introduced, especially during reviews, so that the necessary instruction upon advance should

not be interrupted. The result has been extremely satisfactory, and I believe that the present system of combining written recitations and examinations with the oral compares favorably with that employed in any other similar institution.

I am convinced that the successful students acquire a better understanding of the principles than formerly, and the percentage of failures has of late years diminished.

I have endeavored to sustain the high standard established by my distinguished predecessor, Professor A. E. Church, and to introduce such improvements as time and experience naturally suggest. For the future I have several important plans and propositions to submit.

In the first place, I believe that for a four years' course too much time is employed in learning the course in pure mathematics. The course for the lower sections has not been increased during the last fourteen years, and is considered the minimum necessary for the proper study of philosophy, engineering, ordnance and gunnery, and drawing. The greater portion of the first two years is now employed in the study of mathematics. In order to diminish the time required daily for lessons in mathematics, I purpose recommending that the present method of going three times over such subjects as trigonometry and integral calculus, which consists mainly of formulas, be reduced to two—that is, an advance and one review only. The daily lessons could thus be shortened and ample time secured for such applications as would instruct the student in the use of formulas not important for training the mind, and which, as a rule, are soon forgotten.

I recommend that the instruction in surveying be made almost entirely practical. The principles employed are those of geometry and trigonometry.

The data should be taken by the pupil in the field and plotted by him. The latter requires drawing instruments and facilities only to be found in the department of drawing, and the best methods of delineation are more readily and thoroughly taught in that department. I would, therefore, go once over some good treatise, as Johnson's or Gillespie's, using it more as a book of reference than a text-book. Afterwards I would turn the subject over to the department of drawing for the practical work. With no mathematical lesson to study, two or three hours in the morning could be devoted to field work, and the data could be plotted in the drawing academy in the afternoon. The instructors of the class in mathematics would, of course, be available for the field work. The graduate would then obtain a better knowledge of surveying instruments and methods, and the student would have to devote less time daily to the study of the subject.

With the increased facilities which the new Academy building affords for lectures and explanations to large portions of a class together, I am able to give more students the benefit of my knowledge and experience

upon the more important points, especially during the advance. These changes, with a little knowledge of algebra at admission to the Academy, which I am convinced must soon be required, will enable me to shorten the lessons throughout the two years, thus affording more time daily for other purposes.

The advantages of the methods of instruction employed here are numerous. The classes are divided into small sections of 10 or 12 each, so that each Cadet is generally called upon daily to recite or receive instruction.

Generally two or three subjects only are studied at the same time.

The student is cut off from those pleasures and outside attractions which divert his mind and prevent concentration of thought. Regular hours of study and recreation, combined with wholesome food, promote good health and enable the pupil to acquire the best mental results from his efforts. He is also surrounded by studious associates and has little or no temptation to idleness.

Correct habits of study are continuously impressed upon him.

Instruction is always freely given when necessary, but the importance of self-reliance in acquiring knowledge is inculcated from the day of admission to the day of graduation.

* * * * *

Sympathy for the weak and a desire to assist them naturally impels a professor to give much of his time and instruction to pupils who are really doomed from the first to disappointment and failure.

At least half of my instruction is devoted to pupils who do not graduate. If valuable, it seems as though the graduate should have the benefit of more of a professor's experience.

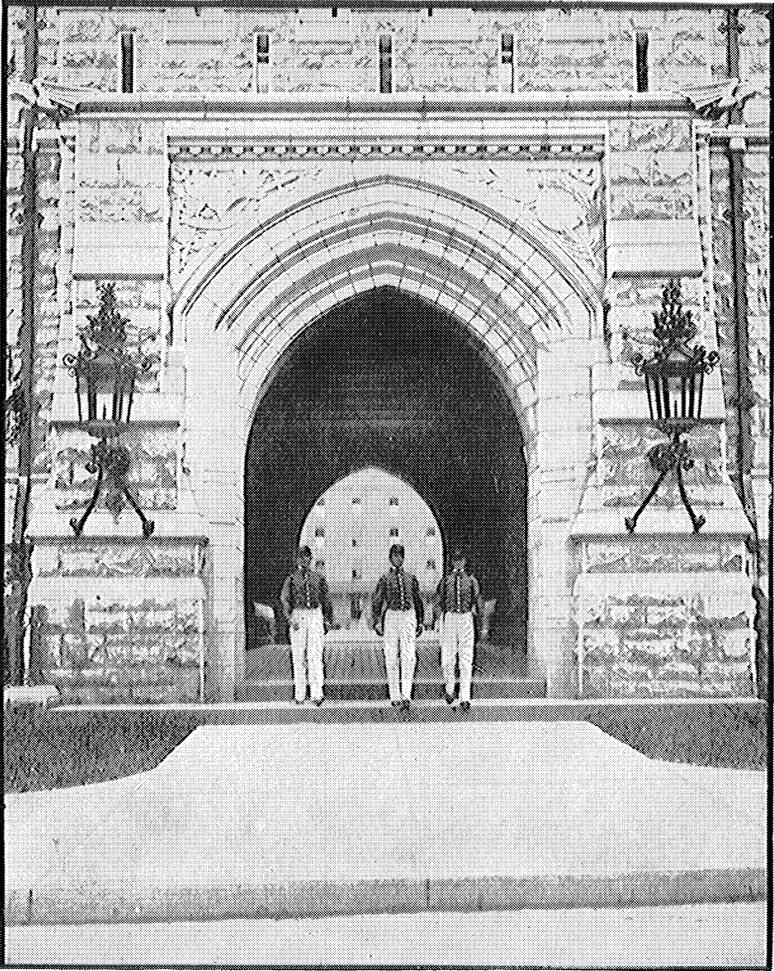
* * * * *

The object of this Academy is to furnish to the country a number of young men qualified in the fundamental principles of the science of war and fortification. While this science has advanced materially during the past quarter of a century, and the mathematical instruction has of necessity been extended to keep pace with the times, yet the necessary mathematics has a limit. The time available for its study is also fixed. Hence the mathematical instruction at West Point has assumed a conservative and moderate form of development.

* * * * *

The science of war in its broadest sense should form, direct, and fix the curriculum of this Academy.

I believe that for thoroughness of instruction upon the branches taught, for methods of imparting information, for instruction that sustains the interest of the student, for methods of developing correct habits of study and for acquiring knowledge quickly and accurately, there is no institution in any country which is superior to the U. S. Military Academy.



EAST SALLY PORT OF THE PRESENT (FOURTH) ACADEMIC BUILDING.

C (67)

I. HISTORICAL SKETCH OF THE DEPARTMENT OF NATURAL AND EXPERIMENTAL PHILOSOPHY.

[The following history and discussion relating to the department of philosophy was prepared by Professor Michie in 1896, for the annual report of the Superintendent for that year. The matter is here introduced without material change, only a few omissions having been made.]

The origin of the department is found in the act of Congress, April 29, 1812, reorganizing the Military Academy, where provision was made for one professor and one assistant professor of natural and experimental philosophy. From the time of the foundation of the Academy, in 1802, till the passage of this act, natural philosophy constituted no part of the course of instruction, although occasionally some of the more advanced students were taught mechanics and practical astronomy from Enfield's Institutes of Natural Philosophy.

Four professors have administered this department since its establishment, and its history can probably be best outlined by considering each administration in succession.

(a) *Lieut. Col. Jared Mansfield, Corps of Engineers, professor from October 7, 1812, to August 31, 1828.*—Mansfield, after graduating at Yale College, taught mathematics, navigation, and the classics at New Haven and at Philadelphia. For the purpose of securing his services at the Military Academy, he was appointed captain of engineers in the Army May 3, 1802, and from this date till November 14, 1803, he served as acting professor of mathematics. He was then detached to do duty as surveyor-general of Ohio and the Northwest Territory, in which occupation he was engaged until October 7, 1812; in the meanwhile he had resigned his army commission, July 23, 1810. Although his appointment as professor of philosophy occurred October 7, 1812, he did not enter upon his duties until April 10, 1814.

The regulations approved July 2, 1816, by Secretary of War Crawford, provided for "philosophy; embracing mechanics, hydraulics, pneumatics, optics, chemistry, magnetism, and astronomy."

Enfield's Institutes of Natural Philosophy appears to have

been the first text-book used in this department for instruction. Up to the summer of 1817 the instruction in philosophy was of the most elementary character, "not a few graduates leaving the Academy without having had any instruction whatever therein. The only apparatus in the professor's possession to illustrate his subject were a field transit and a clock."

In the fall of 1818 a treatise on mechanics, by Dr. Olinthus Gregory, of the Royal Military Academy, Woolwich, was introduced and taught to the first section of the class. It was apparently too difficult for the second section, for we find recorded: "Cadet W. Morris, at present of the third, but late of the second class (having been reduced on account of inability to proceed in Gregory), prayed to be restored to the second section of the second class on the ground that that section would hereafter study only *Enfield*, in which he gave assurances of capacity to succeed."

From this time on the class was so arranged that the better qualified men were placed in the first section and the others in the second section. The sections contained nineteen or twenty men each and recited two hours.

Owing apparently to the unsatisfactory progress made in the study of philosophy, a committee consisting of Professor Mansfield and Assistant Professor Douglass was appointed to revise the course. Their report approved, and adopted by the Academic Board April 19, 1819, was as follows:

First: The first section, as now organized, to study and review the mechanics of Doctor Gregory, embracing the subjects of statics, dynamics, hydrostatics, hydrodynamics, and pneumatics in the first volume, the practical considerations in the second volume, and the description and theory of some of the most important machines; this part of the course to commence on the 1st of September and end at the commencement of the winter examination of this class in January.

Second: The second section in the same time to go through with a corresponding, but more easy and familiar, course of mechanics, including hydrostatics, hydraulics, and pneumatics. The text-book for this purpose it has not been in the power of the committee as yet to decide certainly upon. They have reason to believe, however, that Parkinson's *Mechanics*, of which they have ordered a copy from England, will be found suitable, and they propose a temporary course out of the books now on hand until this point can be determined.

Third: From the close of the winter examination to the 20th of February following, sooner or later, both sections to study Hauy's Philosophy. This will comprehend the subjects of optics, electricity, galvanism, magnetism, and meteorology.

Fourth: The remainder of the academic year, with the exception of one month for reviewing, to be devoted by both sections to a course of descriptive, physical, and practical astronomy, omitting only the more profound parts in the course for the second section. On this subject the committee have hopes of finding a suitable text-book in Woodhouse's Astronomy, a copy of which will be examined as soon as it can be received from England, and reported on in season for the next class.

Fifth: Should the genius and capacity of the first section be such in any instance as to afford a redundancy of time, the committee propose to conduct them through the more valuable portions of Newton's Principia (Davis's edition).

On the 29th of January, 1820, the Academic Board adopted a definite course in philosophy based upon the treatise of Doctor Gregory, as follows:

Statics.—Equilibrium of forces; center of gravity; mechanical powers; strength and stress of materials; theory of arches.

Dynamics.—Principles of uniform and variable motion; laws of falling bodies; motion of projectiles in vacuo; vibrations of pendulum; central forces and theory of planetary motion; percussion, and the phenomena of rotation of bodies.

Hydrostatics.—The pressure of fluids; specific gravity; theory of the stability of vessels.

Hydrodynamics and hydraulics.—Theory of effluent fluids; principles for estimating the force, motion, and resistance of fluids; application of these principles to the construction of water mills and other hydraulic works.

Pneumatics.—Compression, density, and elasticity of air; theory of acoustics; constitution of the atmosphere and physical causes of winds, etc.; measurement of heights by the barometer; theory of pumps.

Machinery.—Application of philosophical principles in the construction of the steam engine, pile engine, etc., and to the construction of the powers and maximum effects of machines. Experimental investigation of the properties of heat; experimental investigation of the principles of common and galvanic electricity; experimental investigation of the principles of magnetism.

Optics.—General principles of light and colors; refraction and reflection of light; theory and use of lenses; construction of optical instruments—as telescopes, microscopes, etc.

Astronomy (descriptive and physical).—General account of the solar system and of the celestial and terrestrial spheres; motions of the earth

and the various appearances and vicissitudes arising from them; solution of problems on the globes; figure of the earth; equation of time; motions, phases, and irregularities of the moon; eclipses of the sun and moon; theory of the tide; physical causes of the motion of the planets, satellites, and comets, and determination of their orbits; the fixed stars; theory of the corrections arising from parallax, refraction, aberration, precession, and nutation.

Practical astronomy.—Application of spherical trigonometry to astronomy; use of instruments and tables; observations for time, azimuth, etc.; different methods of determining geographical points; application of astronomy to navigation, and the construction of maps.

The instruction in natural philosophy, like that in mathematics, will be proportional in extent, and in the manner of conveying it to the rank and capacity of the different sections, reserving always the more abstruse and profound operations under each particular head to the higher sections.

This was certainly a very comprehensive course for the time, and the text-book employed was a remarkably good one.

It seems, however, that it proved too difficult for the lower section, as Bridge's *Mechanics* was adopted January 22, 1824, for the lower sections. Professor Mansfield was much beloved and respected by the Cadets and deemed an efficient instructor. He was extremely nearsighted and of such a delicate structure as to convey the idea of decrepitude. His manner was very gentle, and as a professor he was by no means rigid. As an astronomical observer he was quite renowned, and he had been engaged, before coming to the Academy, in extensive surveys of boundary lines.

(b) *Edward H. Courtenay, second lieutenant of engineers, acting professor from September 1, 1828, to February 16, 1829, and professor from February 16, 1829, to December 31, 1834.*—The points of special importance to be noted during the administration of Professor Courtenay are that the text-books were of a very high grade, involving the use of the calculus, and thus permitting the adoption of the analytic methods of investigation in place of the geometrical, previously employed, and the evolution of a course especially adapted to the needs of a military education. Courtenay was peculiarly fitted for this task, for he was exceptionally able, erudite, and clear in his methods of instruction. It was extremely unfortunate for the interests of the Academy that the needs of his growing

family forced him to seek more remunerative employment, for it is certain that his remarkable attainments would have left their impress upon its course of instruction as strikingly as did those of his colleague, Mahan, in the engineering course.

(c) *William H. C. Bartlett, second lieutenant of engineers, acting professor from November 22, 1834, to April 20, 1836, and professor from April 20, 1836, to February 14, 1871.*—The administration of Professor Bartlett, extending as it did over more than thirty-six years, exhibits some abrupt changes of methods of instruction and of text-books, until about the year 1857, when the course had been crystallized to satisfy his conception of its scope and character. Bartlett's treatise on optics replaced Brewster's February 26, 1839, and Rochet's treatises on magnetism, electro-magnetism, and electro-dynamics replaced the "Library of useful knowledge," from which these subjects had been previously taught.

The "Programme of the course of instruction in natural and experimental philosophy," adopted by the Academic Board March 13, 1840, is essentially the same as the tables of contents of Courtenay's Boucharlat, Bartlett's Optics, Gummere's Astronomy, and the treatises of Doctor Rochet. Apparatus for the experimental illustration of the principles of natural philosophy was purchased from time to time, so that by the date of the establishment of the course referred to above, Professor Bartlett was enabled to give instructive experimental lectures to his classes. The Ertel transit instrument, 72-inch focal length, 52 lines (French) aperture, was ordered November 7, 1842, and after completion was mounted in the east tower of the new library and observatory building. Subsequently a Fitz equatorial and a Troughton mural circle were mounted in the middle and west towers, respectively, thus providing an excellent equipment for observational astronomy.

For more than thirty years, and up to the autumn of 1850, the philosophical course had been based upon a knowledge of the differential and integral calculus, but for some reason that does not appear Bartlett recommended a text-book which he had prepared, based upon Poncelet's work entitled "Synthetical Mechanics," to replace Courtenay's Boucharlat. This recommendation was approved and the book adopted September 6,

1850. It was considered by some members of the Academic Board as a lowering of the high standard heretofore maintained at the Military Academy in the scientific courses. When Bartlett's Optics and Acoustics was proposed as a substitute for Bartlett's Optics, September 13, 1852, the professor of engineering and the instructor of practical engineering submitted written papers in opposition to this change (see staff records, September 27, 1852), basing their objections upon the omission of the analytical methods of treatment and the use of the calculus in the new text-book. Notwithstanding these protests the Academic Board recommended the adoption of the book, and the War Department approved the action of the Board. The following resolutions, submitted by the professor of engineering, were made a matter of record:

Resolved, first: That the present Academic Board fully concur in the views and opinions expressed in a report of the Academic Board October 18, 1843, on the subject of the scientific instruction in the U. S. Military Academy, viz, "With these views, and in the firm belief that the Government, having the opportunity of securing from a large body of the youth of the country, ought and is disposed to fix a high standard of talent and attainments for those who would secure the important advantages resulting from a term of study at the Academy, the Board are unwilling to unite in any recommendation that a less extensive scientific course than the one now taught should be adopted for any of the Cadets."

Resolved, second: That in accordance with the spirit of the language above cited, the present Board regard the method of the higher analysis as the best means of treating most of the subjects embraced in the branches of mechanics, optics, etc., and regard them as indispensable elements in the composition of any text-books for instruction in these branches, to the end that such books may be, in the spirit of paragraph 11, U. S. Military Academy Regulations, "the class books best suited for instruction in the department of natural and experimental philosophy."

Resolved, third: That the attainments made by the Cadets in analytical geometry and the differential and integral calculus are sufficient to enable them to acquire understandingly the elements of natural and experimental philosophy as treated by these methods in the best text-books on these subjects.

Though no formal action was taken on this paper, it, in connection with the protests of those members of the Academic Board who had pronounced in favor of a higher standard,

undoubtedly had a strong influence in bringing about a marked change in the character of the text-books, for on the 29th of August, 1853, the Academic Board, on the recommendation of the professor of philosophy, adopted the following resolution:

Resolved: That it is hereby recommended to the Secretary of War to authorize the use of Bartlett's Elements of Analytical Mechanics as a text-book upon mechanics in the place of the one now in use, the reason for this recommendation being that in the new work the calculus is employed as the means of discussion, whereas in the old one the subject is treated mostly by the aid of geometry.

Gummere's Astronomy was superseded by Bartlett's Spherical Astronomy September 5, 1855, and this was the last change of text-books that occurred during Bartlett's administration, except to replace from time to time an old edition by a new one. A very important modification of the course was made, however, December 8, 1856, upon the recommendation of a committee of the Board by which the subject of electricity was transferred to the department of chemistry on the ground that "it was more immediately connected with chemistry than with the course where it is now taught, and in the expectation that in this way time may be found to make the present course of electricity more complete."

Professor Bartlett's long service at the Military Academy ended February 14, 1871, by his voluntary retirement at the age of 62 years. He left a permanent impress of his marked ability upon his course of instruction and enriched it with certain important characteristics that are certain to endure for many years. He possessed the rare faculty of perceiving essential and fundamental principles and of being able to formulate them by a mathematical expression of a single law from which the whole of analytical mechanics could be deduced. As early as 1853, in the preface to his work on analytical mechanics, he published this great generalization: "All physical phenomena are but the necessary results of a perpetual conflict of equal and opposing forces, and the mathematical formula expressive of the laws of this conflict must involve the whole doctrine of mechanics. The study of mechanics should, therefore, be made to consist simply in the discussion

of this formula, and in it should be sought the explanation of all effects that arise from the action of forces." This law is now generally recognized as that of the conservation of energy, and too much credit can not be given to Professor Bartlett for the clear perception which enabled him to anticipate by so many years the introduction of this great law of generalization in the course of instruction at the Military Academy before it was adopted in the schools. He considered this as his greatest contribution to the course of instruction, and in this opinion the great body of his pupils heartily concur. Professor Bartlett had the gift of being able to engage the respect and affection of his pupils. He was very happy in his illustrative lectures, which were known as "experiments," and which he employed mainly to fix principles in the minds of his pupils. His mind was essentially analytic in character, but at the same time capable of enlarged generalization. In his later years he discarded those geometrical methods of proof which so markedly characterized the earlier years of his teaching, replacing them wherever possible by analytic methods. He left his department well equipped with apparatus for experimental illustration of the principles taught in his course for that time, and his successor found nothing that needed immediate modification in the course.

(d) *Peter S. Michie, captain, Corps of Engineers, professor of philosophy from February 14, 1871, to the present time.*—The changes under the administration of Professor Michie were as follows:

On June 26, 1874, the ninth edition of Bartlett's *Mechanics* was adopted, as this edition contained important modifications which adapted it better to modern scientific usage, without sacrificing the excellent scientific treatment of former editions. Again, on June 10, 1876, Part 3 or *Mechanics of Molecules*, was authorized to be taught in place of the corresponding parts of the text in *Optics* and *Acoustics*.

A text-book on wave motion prepared by Professor Michie, relating to the principles of sound and light, was submitted to the critical examination of a committee of the Academic Board November 1, 1881, consisting of the professors of

French, engineering, mathematics, and chemistry. The favorable indorsement of this book by the committee resulted in the substitution of it for Bartlett's *Mechanics of Molecules* and the *Optics and Acoustics* for use with the second class in the spring of 1882.

Michie's *Elements of Analytical Mechanics* superseded the corresponding parts of Bartlett's (parts 1 and 4) June 21, 1886, and the second edition replaced the first August 29, 1887. Michie's *Hydrodynamics*, adopted November 7, 1887, replaced Part 2 of Bartlett's *Mechanics*, which latter book ceased from this time to be a text-book at the Military Academy. The third edition of Michie's *Mechanics* was adopted September 4, 1888, which was subsequently superseded by the fourth edition.

The adoption of Professor Young's *General Astronomy* to be used in connection with Bartlett's *Spherical Astronomy* was approved February 5, 1889; and finally that part of the latter book which had been retained was superseded by Michie and Harlow's *Practical Astronomy* April 30, 1891, and the latter by its second edition March 16, 1893. An addition was made to the course of instruction, by reason of these changes, in the following provision: "Practical instruction shall be given to the first class in the use of astronomical instruments and in making observations for time, latitude, longitude, and true meridian, from 9 to 10.30 a. m., and from 11.30 a. m. to 12.15 p. m., and on such nights as are favorable for observations from 8 p. m. to 10.30 p. m. on every week day from July 5 to July 31, both inclusive."

(2) The present course (1896) consists of—

(a) *Analytical mechanics*.—Text-book, Michie's *Elements of Analytical Mechanics*, divided into the subheads of mechanics of solids, of fluids, and theory of machines.

Wave motion, acoustics, and optics.—Text-book, Michie's *Elements of Wave Motion Relating to Sound and Light*.

General astronomy.—Text-book, Young's *General Astronomy*.

Practical astronomy.—Text-book, Michie and Harlow's *Practical Astronomy*.

In mechanics lectures are given as follows:

(a) Introductory to the science; its fundamental concepts, assumptions, and definitions.

(b) Parallelogram of forces; methods of resolving and combining forces; bodies under stress, etc.

(c) Parallel forces, couples, moments and their composition and resolution.

(d) Impulsions and impact.

(e) Acceleration and laws of constant forces.

(f) Rotary motion, angular velocity, and acceleration.

(g) Constrained motion, spontaneous axis, pendulums.

(h) Machines.

(i) Laws of the gaseous state.

(j) Hydrostatics, buoyant effort, etc.

(k) Hydrodynamics, flow of liquids, Torricelli's and Bernouilli's laws.

(l) Air and water pumps, hydraulic ram, etc.

In addition to these, one or more sections, or the whole class is frequently brought into the lecture room from the recitation rooms to have some particular illustration given, as the necessity arises.

(2) In sound and light the lectures are as follows:

(a) Methods of transfer of vibratory energy; properties of sound; vibrational numbers.

(b) Musical intervals, consonant and dissonant; diatonic and harmonic scales; sympathetic resonance.

(c) Scheibler's tonometer; analysis and composition of tones; use of Helmholtz's resonators.

(d) Harmonic overtones; velocity of sound in different material; organ pipes.

(e) Vibrations of plates, bells, strings, rods, etc.; Lissajous's curves.

(f) Theory of beats and resultant sounds; phenomena of interference.

(g) Graphical and optical methods of the study of sound.

(h) Introductory to light; pencils, beams, and formation of images through small apertures.

(i) Reflection and refraction of light by prisms, lenses, and reflectors.

- (j) Determination of focal distances; caustics; astigmatism.
- (k) Telescopes, microscopes, and the cameras.
- (l) The solar spectrum; color by dispersion and diffraction; absorption.
- (m) Fluorescence; achromatism; the rainbow.
- (n) Interference of light by Fresnel's mirrors; phenomena of diffraction.
- (o) Polarization by double refraction, by reflection, refraction, and by the Nicol prism.
- (p) Interference of polarized light and production of color.
- (q) Uniaxal and biaxal crystals, rotatory polarization and saccharimetry.

Hours of study, etc.: In the department of philosophy the lessons are so proportioned as to require from three to three and one-half hours of study for preparation for each lesson, and one and one-half hours for recitation in the section room. There are six recitations per week throughout the year.

3. ORGANIZATION OF THE DEPARTMENT OF PHILOSOPHY.

One professor, one assistant professor, and one or more instructors, depending upon the number of Cadets in the class. Each section contains not more than 12 Cadets, and each instructor has charge of two sections, thus requiring of him three hours' of personal instruction daily. To the assistant professor it is usual to assign the instruction of the first and last sections, and to the other instructors the remaining sections, according to their rank. In addition to the instructors above mentioned the officer in charge of the observatory conducts the instruction in practical astronomy, under the direction of the professor of philosophy.

EXAMINATIONS.

The character of the examinations, whether they are to be written or oral, has been left to the decision of the head of the department, and while written examinations have been tried in the department of philosophy, in the opinion of the present head the oral method is much the better when the method of instruction is considered. By this method his colleagues on the Academic Board are kept informed of the

progress of the department, the attainments of the instructors, and the thoroughness of instruction; besides these advantages, the opportunity of a close cross-examination upon doubtful points can be had and thus bring out the mental operations of the pupil, an advantage which a mere written test does not afford. In cases of doubtful proficiency the rule of the Academic Board is to subject such cases to a thorough written test after a doubtful oral examination. The subjects selected for an oral examination cover the entire course, and to make the choice impartial, they are drawn by lot by each Cadet as he is called up. The weight of each oral examination is equal to that of five ordinary recitations. To determine the relative standing of the class in each subject of the course, the following method is pursued: To the aggregate obtained on the advance and first review add double the marks of the general review, and to this add five times the examination mark. The standard for proficiency has of late years come to be considered to be two-thirds of the possible maximum, especially if this be reached on the general review.

CRITICAL REVIEW OF THE COURSE AND INSTRUCTION.

“The writer, when he was appointed a Cadet, was old enough to appreciate the value in mental training and the sound educational advantages derived from the methods of instruction pursued at the Military Academy. Graduating during the war, he found himself within a fortnight in charge of important military duties where he was thrown upon his own resources, and in every case he found that the methods of reasoning in which he had been trained here and the self-reliance which had been inculcated in him by the methods of study were sufficient to solve his problems to the satisfaction of his superior officers. Since those days he has had a long experience as a teacher, and has kept constantly in mind his own efforts as an ambitious young officer as well as the purpose of the Government in establishing this institution. He believes that the elements of character developed in the student by the course of instruction at the Military Academy are increased confidence in his own powers, reliance on his own

individual effort, and capacity to test accurately his sources of information. These elements in the development of a man are of essential importance in a profession where he may be called upon in emergencies to exercise self-control and to meet manfully unforeseen difficulties. To accomplish these purposes the daily tasks are made of the requisite length to demand all the study time allotted, and thus are secured the invaluable mental effort and discipline derived from hard study; second, the daily tasks made progressive, based upon accepted fundamental principles, continually exercise the reason, beget a growing confidence, and establish a belief in his ability to master every new difficulty; and finally, when the course is completed, the student finds himself equipped with a satisfactory knowledge of the essential principles of the branch of science, to which he may add by individual study without feeling the necessity of reconstructing his foundation. These the undersigned believes to be the true governing principles of all sound education. The course in philosophy has grown from the time of its first establishment, keeping pace with each new development of scientific truth and discarding that which could not stand the test of experience, and yet has always maintained a conservative character. It may be said, in conclusion that, taking into consideration the object of the Military Academy, it does not seem possible to suggest any material change in the methods of instruction, the subjects taught, or appliances of instruction that would prove of substantial benefit."

On February 16, 1901, Colonel Michie died, after thirty years' conspicuous service as the head of this department. Up to the time of his death and since 1896 no material changes have been made in the course of study or methods of the department. Professor Michie was succeeded by Captain William B. Gordon, Ordnance Department, March 27, 1901. At the time of present writing Professor Gordon has in view and under preparation certain material changes in the manner of presenting the principles of the subjects of his department and in the methods to be followed in the instruction. At the request of Professor Gordon the practical instruction

in the use of astronomical instruments has been transferred to the academic year, instead of being given during the summer encampment as heretofore. By the revision of the academic curriculum which goes into effect September, 1902, the department of philosophy yields about 6 per cent of its time to the department of chemistry. Captain Gordon is a graduate of the Academy of the Class of 1877, and prior to his appointment had served six years as assistant professor in the department, his last term of service having terminated in 1898.

D.

HISTORICAL SKETCH OF THE DEPARTMENT OF ENGINEERING

[The following historical sketch and discussion relating to the department of civil and military engineering were prepared by Professor Gustave G. Fiebeger in 1896 for the report of the Superintendent for that year. For use here certain omissions are made, but the sketch is not otherwise changed.]

Since the department has been under the charge of Professor Fiebeger he has prepared a new text-book on Civil Engineering to replace Wheeler's Civil Engineering and Mahan's Stone Cutting. This book will be published in the near future. In the military course he has written a new textbook to replace Wheeler's Field Fortification, and a pamphlet to replace Mercur's Permanent Fortification. Fortification drawing has been replaced by a more extended study of the art of war. For this purpose Mercur's Art of War has been temporarily replaced by Wagner's Organization and Tactics and Security and Information, which have been supplemented by pamphlets on Strategy and Notable Campaigns and Battles. In 1902 this course was extended by an annual visit to one of the great battlefields of the civil war, after a careful study of the same in the section-room. The field visited that year was Gettysburg.

The principal change which it is hoped to make in the future is the establishment of a testing laboratory for practical work to supplement the section-room work in civil engineering.



VIEW OF WEST POINT, 1854.

PART I.

Some time during the years 1795 to 1798, while the regiment of Artillerists and Engineers was stationed at West Point, Colonel Rochefontaine and Captain Rivardi, formerly of the French army, constructed a small model front of a fortification.

Upon the establishment of the Military Academy, by act of Congress dated March 16, 1802, instruction in military engineering began at once, and the elements of fortification were taught by the use of this model.

Until 1818 the instruction in military engineering was by means of lectures illustrated by the model above mentioned and by field exercises in practical engineering. The lectures were delivered by the Superintendent until 1808, by the teacher of French, Francis O. Masson, from 1808 to 1813, and after that by the professor of engineering.

The only text-book in use was a small pamphlet of 50 pages, translated from the French by Colonel Jonathan Williams, Corps of Engineers, the first Superintendent.

The department of engineering was established by an act of Congress of April 29, 1812:

SEC. 2. *And be it further enacted,* That the Military Academy shall consist of the Corps of Engineers and the following professors: * * * one professor of the art of engineering in all its branches, * * * and each of the foregoing professors shall have an assistant professor, taken from the most prominent characters of the officers or Cadets.

* * * * *

Under this act Captain Alden Partridge, Corps of Engineers, was appointed professor of engineering, September 1, 1813.

Captain Partridge graduated from the Military Academy October 30, 1806, and was assigned to the Corps of Engineers. He served at the Academy as assistant professor of mathematics November 4, 1806, to June 5, 1811; as principal assistant professor of same April 29, 1812, to September 1, 1813; as professor of engineering September 1, 1813, to December 31, 1816. Much of the time while he was professor of engineering he was also Superintendent of the Academy, and therefore gave little attention to the work of his department.

General Cullum, in his history, gives the following as the state of the instruction in engineering at this time:

Engineering was less attended to than French or drawing, the greater number of Cadets on graduating never having gone beyond the definitions to be found in Colonel Williams's little primer of 50 pages on the subject, which was their only text-book. Many Cadets scarce knew the difference between the ditch and the glacis of a fort save by the conventional colors adopted in their delineation. It is said that two Cadets were graduated in 1815 in the Engineer Corps whose studies never extended beyond Hutton's Trigonometry.

Captain Partridge was, on March 16, 1817, succeeded by Professor Claude Crozet, who had been assistant professor of engineering since October 1, 1816.

Professor Crozet was born in France and was educated at the Polytechnic School. He introduced descriptive geometry as a necessary preliminary to the proper study of engineering, made much use of the blackboard in demonstrations, and seems to have made use, as far as practicable, of the methods of the Polytechnic School in developing and teaching the course of engineering.

The work of all the departments in the Academy was at this time (1817) greatly aided by the reforms instituted by the new Superintendent, Major Sylvanus Thayer.

In 1818 there was introduced as a text-book in the department A Treatise on the Science of War and Fortification, by Colonel de Vernon, professor of fortification in the Polytechnic School, France, and translated by Capt. John M. O'Connor, U. S. Artillery. This excellent work was used until the introduction of the works of Professor Mahan. The original text had been submitted to the revision of a board of distinguished marshals and engineers, and then, by order of Emperor Napoleon I, was adopted as a text-book of the Polytechnic and Military School of France. It was in two volumes, with a volume of plates. The first treated of the science of war in general and field fortification; the second of permanent fortification, and in an appendix was given a summary of the principles and maxims of grand tactics and operations.

The staff records for 1819 indicate the method in which it was studied.

1. The class of the fourth year (the first in rank) to be divided for instruction in the military course into two sections, after the manner practiced in the other classes of the institution.

2. The first section to be instructed in the entire course of engineering, military science, and grand tactics in the book now used, and to be required to execute a series of drawings and plans connected with these subjects, this course to begin on the 1st of September of each year and to end on the 20th of March next ensuing, sooner or later.

3. The second section to be taught in connection with military science and grand tactics, field engineering only, the whole of which will be comprised in the first volume and appendix to the work.

The other books used in the course were in French, and probably used only as aids to a course of lectures or as books of reference. They were: *Program d'un Cours de Construction* par Sganzin, translated in 1827, and *Traité des Machines* par Hachette.

The regulations of 1821 indicate that at this time the professor of engineering taught some of the sections himself.

The professor of * * * engineering, in order to ascertain the proficiency of the sections intrusted immediately to the assistants and the manner in which they have performed their duty, shall occasionally, and in rotation when there are more than two sections, instruct the sections intrusted to his assistants, the period for which shall be fixed by the academic staff and reported to the War Department; and the assistant professor, when the professor has his section under instruction, shall take charge of the section usually under instruction of the latter.

Professor David B. Douglass on May 1, 1823, succeeded Professor Crozet, who resigned April 28, 1823.

Professor Douglass was appointed second lieutenant, Corps of Engineers, August 1, 1813. He served at the Academy as assistant professor of natural and experimental philosophy June 1, 1815, to August 29, 1820; as professor of mathematics August 29, 1820, to May 1, 1823, and as professor of engineering May 1, 1823, to March 1, 1831.

The records are not definite as to what was accomplished during his incumbency, but it appears that the instruction in civil engineering was much improved.

Professor Douglass resigned March 1, 1831, and was succeeded by Professor Dennis H. Mahan January 1, 1832.

Professor Mahan graduated from the Academy July 1,

1824, and was assigned to the Corps of Engineers. He served at the Academy as assistant professor of mathematics August 29, 1824, to August 31, 1825, and as acting professor of engineering September 1, 1830, to January 1, 1832. Between 1825 and 1830 he spent four years in Europe studying public works and military institutions, and was, during one of these years, a pupil in the military school of application for engineers and artillerists at Metz, France. The first work of Professor Mahan was to prepare a suitable set of text-books for his department; he temporarily supplied their places by lectures and his notes made while abroad.

The first record of a complete set of text-books is found in the register of 1841, and is as follows: Mahan's *Treatise on Field Fortification*, Mahan's *Lithographic Notes on Permanent Fortification*, Mahan's *Lithographic Notes on Attack and Defense*, Mahan's *Lithographic Notes on Mines and other Accessories*, Mahan's *Lithographic Notes on Composition of Armies and Strategy*, Mahan's *Course in Civil Engineering*, Mahan's *Lithographic Notes on Architecture and Stone Cutting*, Mahan's *Lithographic Notes on Machines* (for first section only). These books, frequently revised, constituted the basis of the course of engineering during the time of Professor Mahan. In 1848 he introduced Mahan's *Advanced Guard and Outposts*; in 1858, Moseley's *Mechanics of Engineering*, and in 1870 Mahan's *Industrial Drawing*.

The instruction was confined to the fourth, or first-class, year, except during the years 1858 to 1860. The classes of 1859 and 1860 studied civil engineering during the second-class year, and the class of May, 1861, had no instruction in civil engineering.

No records are available giving a description of the methods of instruction, etc., which were in use during the entire time of Professor Mahan. Professor Mercur states that in 1865-66, when he was a student, the classes were divided into sections of ten to twelve men each, each section receiving instruction for one and a half hours daily between 8 and 11 o'clock a. m. When engaged in drawing the entire class attended daily from 8 to 11 o'clock. Each section was under the immediate charge of an officer, usually of the Corps of Engineers, as

instructor. The professor visited the sections daily, listening to the recitations, asking questions, making such comments and remarks and giving such additional instruction as seemed to him necessary and desirable. By this means he gained a knowledge of the capacity of the instructors, their methods of teaching and marking, and was also able to compare the individual Cadets.

But few lectures were given by Professor Mahan, and these were restricted almost entirely to short descriptions of campaigns and battles, with criticisms upon the tactical positions involved. The greater portion of his oral and personal instruction was given to the Cadets during his visits to the section room.

The course of engineering drawing included the accurate construction of a number of problems contained in fortification drawing and stereotomy, drawings of a canal lock in plan, section, and elevation, and the plan, section, and elevation of a half front of fortification, Noizet's Method. The canal lock and Noizet's Method were finished as completely as time allowed, and the sections, slopes, etc., were usually tinted in water colors.

Upon the death of Professor Mahan, September 16, 1871, Professor Junius B. Wheeler was appointed September 29, 1871.

Professor Wheeler graduated from the Military Academy July 1, 1855; was first assigned to the cavalry and afterwards transferred to the topographical engineers. He served at the Academy as acting assistant professor of mathematics October 5, 1859, to April 27, 1861, and assistant professor of same September 5, 1861, to June 18, 1863.

During his incumbency the course and method of instruction established by Professor Mahan remained unchanged in its essential features. Professor Mahan's text-books were revised, new material added, and portions omitted. In engineering drawing roof and bridge trusses were substituted for the canal lock and other problems, and the Noizet front was slightly changed.

Professor Wheeler retired September 29, 1884, and was succeeded by Professor James Mercur September 29, 1884.

Professor Mercur graduated from the Academy June 18, 1866, and was assigned to the Corps of Engineers. He served at the Academy as acting assistant professor of natural and experimental philosophy August 31, 1867, to February 21, 1870, and as assistant professor in the same February 21, 1870, to July 31, 1872.

In notes left by him, Professor Mercur states that under his direction no radical change was made either in course or methods of instruction. He revised the text-books previously used to conform to modern engineering practice and the advance in the science and art of war. A description of his methods of instruction is found in parts 2 to 6 of this chapter.

Professor Mercur died April 21, 1896, and was succeeded May 26, 1896, by Professor G. J. Fiebeger, who was then a captain of engineers and was a graduate of the class of 1879.

As a lieutenant of engineers he served as assistant professor of engineering at the Academy from 1883 to 1888.

PART 2.

The course in the department of civil and military engineering is, as the name implies, divided distinctly into two parts, viz: Civil engineering, which occupies the first term of the Academic year, from September 1 to December 31; and military engineering and the art and science of war, to which is allotted the second term of the Academic year, from the completion of the semiannual examinations in January to May 31.

Throughout the course recitations in this department are daily on week days from 8 a. m. to 11 a. m., one-half of the class reciting from 8 to 9.30 and the other half from 9.30 to 11, except during the time allotted to engineering drawing, when the entire class attends from 8 to 11 a. m., with an intermission of about eight minutes at 9.30.

It is arranged that three hours of study in preparation for each recitation may be allowed and required.

Civil engineering, September 1 to December 31.—Text-books: Civil Engineering, Wheeler (John Wiley & Sons, New York, 1884), and Fortification and Stone Cutting,

Mahan (John Wiley & Sons, New York, 1893). The subjects treated in Wheeler's Civil Engineering are as follows, viz: Building materials, strength of materials, framing, masonry, foundations, bridges, roofs, roads, railroads, and canals. This text-book has received from time to time numerous corrections and additions, which are given to the Cadets in the form of printed sheets and pamphlets, with a view to keeping this course of instruction in accord with modern developments and methods in the science and art of engineering. At the same time, portions of the text that have become obsolete or which it is thought may be more satisfactorily presented have been omitted.

In this connection may be mentioned, besides minor corrections, a new treatment of the rolling load, also of the pressures sustained by retaining walls and of the loads on bridges and their effects. The subject of the graphical determination of stresses in framed structures is extended and improved, and there are issued to the Cadets the following pamphlets, viz: Rivets, Riveted Joints, Pin-connected Joints, and Riveted Girders; Instructions for Truss Computations, and Notes on the Determination of Stresses in Trusses. The first of these takes the place of similar subjects in the text; the other two are for reference and assistance in the solution of problems.

That portion only of Mahan's Fortification and Stone Cutting which relates to the latter subject (stone cutting) is included in the course in civil engineering.

Civil engineering drawing includes generally for the upper part of the class the computations and drawings for an iron or steel highway or railroad bridge and for the lower part an iron or steel roof truss. The time devoted to this drawing is from about November 20 to about December 11, or from eighteen to twenty working days.

The higher sections finish the text-book in civil engineering in 40 lessons in advance, while the lower sections take 42 lessons in the same subject. This enables the higher sections to devote more time to stone cutting than the lower, the numbers of advance lessons being $5\frac{1}{2}$ and 3, respectively, for the higher and lower sections.

This is the only difference in the courses of the upper and lower parts of the class, except that many subjects are more fully developed by the higher sections and that their problem in engineering drawing is more difficult.

When a class has advanced about 18 lessons in civil engineering, a lecture is delivered by the head of the department on "The materials of construction, the use of engineering formulæ, and the limitations and possibilities of the science of engineering." No other lecture is delivered during this course. The Cadets of the first class are, however, given an opportunity to examine the models and engineering apparatus in the model room, with their instructors, who explain the construction and operation of the structures shown.

Military engineering, January 1 to May 31, first class.—Text-books: Elements of Field Fortifications, Wheeler (D. Van Nostrand, New York, 1882); Mahan's Permanent Fortifications, Mercur (John Wiley & Sons, New York, 1894); Attack of Fortified Places, Mercur (John Wiley & Sons, New York, 1894); Elements of the Art of War, Mercur (John Wiley & Sons, New York, 1894); Fortifications and Stone Cutting, Mahan (John Wiley & Sons, New York, 1893), of which only that portion which treats of methods of fortification drawing is included in this course.

In addition to the above there are issued to the Cadets of the first class, by the department, pamphlets containing some twenty descriptions of battles, campaigns, and other operations of war, to be studied by the Cadets and used to illustrate the principles that are taught in the text-books. With the pamphlets are maps and plates showing the battle-fields and theaters of operations described in the pamphlet.

Under the head of field fortifications the subject-matter treated is as follows: General principles and definitions, profile, trace, kinds of field works and lines, size and garrison, construction, revetments, defilade, interior arrangements, ditch defense, obstacles, works on irregular sites, bridge heads, hasty intrenchments, attack and defense of field fortifications, communications, and transportation.

Permanent fortifications is treated under the following heads: Profile, open and covered defenses, communications, enceintes, outworks, advanced and detached works, retrenchments, systems and methods of fortification, existing German fortifications, detached forts, works on irregular sites, defilement of permanent works, accessory means of defense, seacoast defense, defensive organization of frontiers, progress of defensive methods, progress in methods of attack, modern construction in iron and steel.

In the attack of fortified places there is described, in part 1, blockade, surprise, assault, bombardment, siege works, including tools, etc., trenches, approaches, parallels, saps, etc.; tracing and construction of trenches and saps, siege batteries and magazines, siege operations, defense against a regular siege, siege parks, depots, etc.; and in part 2 (military mining) is given the nomenclature and theory of mines, galleries and shafts, ventilation, loading and firing, organization and tactics of mines, and demolitions.

The art of war is discussed under the following headings: Army organization and discipline, tactics, minor tactics in relation to logistics, grand tactics, minor operations, logistics, and strategy.

Recitations in this course begin each year about January 10 or 11, pursuant to an order from the Superintendent for the resumption of recitations after the completion of the semi-annual examinations, and continue daily, Sundays excepted, until May 31, except during the time devoted to fortification drawing, from about March 20 to about April 23, when the entire class attends in the engineering drawing rooms from 8 to 11 a. m.

This drawing consists in the application of the methods of fortification drawing to the construction of plan, sections, and elevations of a detached fort for an intrenched camp.

The time of recitation of a section in this course is divided and apportioned in the same manner as in the course in civil engineering, hereinbefore described, to which I would respectfully refer.

The course in military engineering is the same for all sections, except that some subjects are more fully developed by the higher sections than by the lower, and in fortification drawing the higher sections more nearly complete the sections and elevations of the work, whereas the lower sections usually finish only the plan.

At the end of the course a lecture has been delivered by the head of the department on the applications and use that may be made in the military service of the principles and methods taught in this course, with some remarks on courses of reading and study that may be profitably followed by graduates of the Military Academy. The descriptions of campaigns and battles were put in printed form in the pamphlet previously referred to to serve in lieu of lecture notes.

These are given out as a part of and in addition to the regular lessons, at the rate of one or two per week, depending on their lengths, and form subjects for recitation in the section room. An opportunity is given to the class to visit the engineering museum and model room under the supervision of their instructors, who explain the models and apparatus and answer the questions of the Cadets concerning them.

PART 3.—ORGANIZATION OF DEPARTMENT—NUMBER OF INSTRUCTORS—DIVISION OF DUTIES.

The department of civil and military engineering is organized as follows: One professor, head of the department; three instructors, of whom the senior in rank is appointed by the Superintendent to be assistant professor; one draftsman, employed by the department.

The professor of civil and military engineering administers the affairs, executes the business, and, subject to the approval of the Superintendent of the Academy, controls the policy and regulates the methods of the department. He recommends the text-books to be used in the course, revising and correcting them when advisable, prescribes the lessons, apportions the time to the various subjects, and, in order to insure uniformity and efficiency in the work of the department, supervises the instruction of Cadets by frequent personal inspections of the progress and methods of his assistants.

There are also provided through his recommendation the necessary books of reference, apparatus, models, maps, materials, and supplies for the use of the department and the instruction of Cadets.

The assistant professor, in addition to his duties as instructor, is charged with the care of the property of the department, and attends to the issuing and collecting of the books, pamphlets, maps, models, samples, and other articles used in section rooms, drawing rooms, and in the quarters of Cadets, for their instruction. He acts as instructor for two sections of the first class in engineering and aids the professor in such manner as the latter may direct. Each of the other two instructors is in charge of two sections of the first class in engineering, and, in addition, holds himself at the service of the professor for such other duties as may be prescribed.

The first class in engineering, being arranged originally in the order of their standing in natural and experimental philosophy, is organized into six sections, numbered in order from one to six, inclusive, the first section being the highest. The higher sections usually number one or two more Cadets than the lower, in order that more time may be devoted to individual instruction and explanation in the lower part of the class, where presumably they are more needed. This organization of the class is maintained throughout the year, but the members of any or of all the sections may be changed by mutual transfers between the sections.

Each of the three instructors is charged with the instruction of two sections. The assistant professor begins each term with the first and second sections, the instructor second in rank begins with the third and fourth sections, and the junior instructor begins with the fifth and sixth sections. At the end of two weeks the instructors change sections, the senior taking the lower sections, the second in rank taking the higher sections, and the junior taking the middle sections. Thereafter the instructors change sections every two weeks in the order just indicated, except during engineering, drawing, and general review, when they retain the sections with which they began the term.

It is believed that this rotation of instructors eliminates to a great extent the effect of their "personal equations," and makes the merit marks of each section comparable by a just and uniform standard to those of all other sections.

This method has the further advantage of giving to all sections equal shares of the benefits arising from having the ablest instructor, and it enables the instructors to compare and weigh recitations in all parts of the class and to adjust their scales of marks to a truer and more uniform standard.

PART 4.—DESCRIPTION OF A RECITATION.

The section rooms used by the department of civil and military engineering are similar in all respects to the rooms on the same floor used by the department of mathematics. The formation of the class parade, the report of the sections to the instructor, and the method of conducting oral recitations by blackboard demonstration and by questions are also similar to the general method followed by the department of mathematics. As these subjects have been very fully and carefully described in the report of that department, it is thought advisable to refer to that description and to give in detail in this report only the points in which the two departments differ.

The apparatus belonging to the department and used in the instruction of Cadets consists of testing machines, models of engineering implements and machinery, including piledrivers, derricks, dredges, engines, etc.; models of engineering structures, such as arches, bridges, buildings, roof trusses, dams, locks, caissons, piers, crib work, etc.; samples of building material, models of fortifications, battle fields, defensive arrangements, block houses, etc. The smaller models and pieces of apparatus are displayed on the tables in the section rooms when they are subjects of discussion in the lesson. The larger models are in the model room (No. 106), and are described and explained to the Cadets when they visit this room with their instructors. The department possesses a number of tables, drawing boards, steel rulers and triangles, color-saucers and glasses for the use of Cadets in engineering drawing, and the usual instruments used in reconnoissance.

In engineering drawing the entire class attends daily, except Sunday, from 8 a. m. to 11 a. m., with an intermission of about eight minutes at 9.30. Several days before the drawing begins each Cadet receives a drawing board, which he takes to his quarters, and upon which he stretches a sheet of drawing paper, bringing it back to be inspected by his instructor. On the first day of drawing the whole class enters the engineering drawing academy (rooms 201 and 202, Academy building), and each Cadet, directed by his instructor, seeks the table that contains his drawing board. The tables and boards have been previously arranged so that the two sections of each instructor shall be kept together in a selected portion of the rooms, and the instructor's desk and chair are so placed that he may readily oversee the work of his sections. Cadets remain standing while working at their drawings, and are required to keep at work continuously and to refrain from communicating with their neighbors and from examining adjacent drawings. Their work is inspected daily by their instructor, who points out errors and gives such directions and assistance as may be necessary. The work is marked twice a week, on Tuesdays and Fridays, each mark representing an estimate of the progress, accuracy, neatness, and industry displayed in drawing, the scale of marks used being the same as for ordinary recitations, i. e., the maximum mark for three days of perfect work is 3. At 9.20 a. m. the class is dismissed by sections for a recess of about eight minutes, forming again and returning to work at 9.30.

The head of the department, as a rule, makes two visits to the section rooms each day, visiting on one day the two sections that attend successively in one section room, say No. 206; on the next day the two that attend in room 207, and on the next the two that attend in room 208, and continuing in this order, so that each section has received a visit from the head of the department every three days, except when these visits are interrupted or prevented by attention to other duties.

The visit usually extended over the last half hour of the recitations of each section.

PART 5.—EXAMINATIONS, WRITTEN, ORAL, WEIGHT OF—
DEFICIENCY OR PROFICIENCY OF CADETS—STANDARD
REQUIRED.

The general regulations giving the method to be followed in the examination of all classes are found in the Regulations U. S. Military Academy, 1894, sections 71 to 83, inclusive.

The examination of the first class in civil engineering in January and in military engineering and art of war in June are conducted orally by a committee of the Academic Board in the room and at the time prescribed by the Superintendent.

Prior to the examination each instructor prepares a list of subjects upon which he proposes to examine the members of his sections and submits it to the head of the department, who makes such alterations and corrections as may seem necessary, and the revised list is kept securely sealed pending the examination.

The examination begins with the lowest man in the lowest section and proceeds in regular order upward through the class.

The drawings executed by the cadets during the term are displayed on a table in the examination room for inspection by the Academic Board, which inspection is intended to constitute a part of the examination.

The proficiency of a Cadet in civil or military engineering before examination is considered doubtful if his total mark is less than two-thirds of the maximum total mark, and he is so reported to the examining committee. The question of his proficiency is then to be determined by the examination, and if he is markedly deficient in marks before examination he may be required to undergo a written examination in addition to the usual oral examination. If a Cadet fail on his first examination subject, he receives a second subject in order to determine his proficiency.

PART 6.—CRITICAL REVIEW OF THE PRESENT COURSE AND METHOD OF INSTRUCTION—COMPARISON WITH FORMER YEARS AND WITH OTHER INSTITUTIONS. 1896.

The gradual development of the present course and methods of instruction are given very fully in the preceding part of this report.

As an engineering school, its influence and methods as compared with schools making the instruction of engineering in its several branches a specialty are brought out in the report of Professor Riedler, of the Royal Polytechnicum at Berlin, in his report on American technological schools. (See Report of the U. S. Commissioner of Education, 1892-93, vol. 1, p. 657.)

The number of these colleges giving degrees in civil engineering is 45. The requirements for admission are all higher than at West Point, the course of pure mathematics consequently shorter, and the length of the course generally four years. The course of engineering is divided into recitations, lectures, laboratory work, drawing, and field work. The amount of time given to each division is quite different in the different schools.

As these schools differ very much in their methods, I have limited myself to the following extracts of the report, which refer specially to West Point and military schools in general:

Military schools.—Before 1840 real instruction in engineering was offered almost exclusively in the Military Academy at West Point. Up to 1840—even up to 1850—nearly all the civil engineers had received their preparation in this military school. From its establishment, in 1802, up to 1862 it prepared about 2,000 students. Of these, 200 became civil engineers and about 230 entered the military Engineer Corps.

Among the former number are the most renowned civil engineers of the country. * * *

Between the years 1880 and 1888 only 2 per cent of the students were admitted to the Engineer Corps of the United States. Service in this corps requires an additional study of two years and a half in the United States School for Engineers at Willets Point, Long Island, organized in 1885. The technical instruction in this school comprises twenty-two weeks in civil engineering, nineteen weeks in chemistry and photography, and forty weeks in science of explosives and torpedoes.

Since the beginning of the sixties the Military Academy at West Point has lost some of its importance with reference to education of practical civil engineers. The number and importance of engineering schools, pure and proper, have become very great, and the enormous development of this branch has necessitated a division of labor. * * *

The military schools do not serve the profession of civil and mechanical engineering any longer. The times in which mainly knowledge of mathematics, geometry, and geodesy were considered sufficient for the profession of engineers have passed, and to-day there is no engineering school which does not seek its main work in extensive professional instruction.

Nevertheless the military schools, with the peculiar education and rather limited theoretical and practical instruction for civil and mechanical engineers they offer, are of great importance. We find the proof of this in the great number of distinguished civil engineers who have graduated from such schools. This holds good not only for America, but for other countries. With us the course of education of a Werner-Siemens may induce us to deep reflection.

In face of the present enormous development in exact knowledge of scientific and technical details the actual result of the study is dependent now as formerly upon simple natural conception, clearness, and thoroughness, but not upon the extent of knowledge. Military schools in this respect offer many advantages. The most distinguished technological school in France also is a military institution. If a negative advantage of these schools is the prevention of knowing and learning too many things, then the strict formation of character, the reliability and independence gained, must be a positive advantage that can not be gauged too high. Alas, many a modern school esteems that advantage too little.

F.

HISTORICAL SKETCH OF DEPARTMENT OF DRAWING.

[The historical sketch of the department of drawing given below is taken without change, except as to order of arrangement and certain omissions, from the History of the Department prepared by Professor Larned for the Superintendent's report of 1896, to which reference can be made for other minor details.

Since 1896, with a view to the more perfect fitting of the graduate for his duties upon joining his regiment or corps, more time has been given to field reconnoissance and military sketching. There is a tendency to still further development in that direction provided it can be accomplished without detriment to other important instruction.

The department of drawing has done and is continually doing an enormous amount of work, most valuable for the Academy and the Government. This work consists of surveys and maps of the post, drawing of plans and elevations of buildings whenever improvements at the Academy have been made or are contemplated. The department has also

been several times called upon to prepare and arrange exhibits of the Academy for various expositions held throughout the country, which exhibits have involved great labor and done much good to the Academy. The extra work of this department, here alluded to, besides being not strictly legitimate as a function of a department of instruction, has been a most heavy burden for the past fifteen years.]

The subject of drawing is the second one to be mentioned during that period when the germ of the Military Academy was in process of creation by legislative acts of Congress. By the act of February 28, 1803, fixing the military peace establishment of the United States, section 2, the President of the United States is "authorized to appoint one teacher of the French language and one teacher of drawing, to be attached to the Corps of Engineers, whose compensation shall not exceed the pay and emoluments of a captain in the Army."

The course in drawing commences with the appointment of Francois Désiré Masson as teacher in that branch in connection with the French language, under the provisions of this act. In September, 1808, he was succeeded by Mr. Christian E. Zoeller, a Swiss of limited education, who seems to have been unequal to the requirements of his position. At the end of April, 1810, he gave up the office, but was reappointed July 1, 1812, there being no incumbent during the disorganization of the Academy in the interim.

The act of April 29, 1812, making further provision for the Corps of Engineers, section 2, gives explicit definition of the Military Academy and its personnel as consisting "of the Corps of Engineers and the following professors, in addition to the teachers of the French language and drawing already provided," etc.

Mr. Zoeller was succeeded January 5, 1819, by Thomas Gimbrede, a Frenchman of eccentric character, who was reputed to be a painter of miniatures previous to his appointment. Work now extant executed by him shows him to have had but little ability even in the stiff and dry academic methods of that time.

The first mention of drawing as an organic "department" of instruction is in the appropriation act of March 25, 1826, making appropriation "for articles required for the mathematical, drawing, chemical, and mineralogical departments."

From that date on, this, with other departments of instruction, is regularly appropriated for in the annual acts for the Military Academy. The professorship was created by the act of August 8, 1846, section 3, enacting: "That the teacher of drawing and the first teacher of French at the Military Academy shall hereafter be, respectively, professor of drawing and professor of the French language."

In 1833 the distinguished artist, Charles Albert Leslie, was induced to accept the position after the death of Mr. Gimbrede, December 25, 1832. Mr. Leslie, who was appointed March 2, 1833, was of American parentage, although born in England. From the age of 5 to 17 he lived in Philadelphia, but after that period his life belongs to the history of English art. The dry and rigid environment of a military school in a country destitute of art could not but be distasteful to a man of Leslie's temperament and education, and his stay was therefore exceedingly brief. In June of the same year he was succeeded by Robert W. Weir, an American artist who had already achieved distinction, and who was destined to take honorable place among the American painters of the first half of the nineteenth century. Mr. Weir was born in New Rochelle, N. Y., in 1803; studied in Italy from 1824 to 1827, and at the time of his appointment had a studio in New York City. As teacher of drawing Mr. Weir became a member of the Academic Board of the Military Academy August 8, 1834; his long and honorable career in this institution closed with his retirement July 25, 1876, after forty-two years of continuous service. He was succeeded at this time by Charles William Larned, the present incumbent, then first lieutenant, Seventh Cavalry, acting assistant professor in the department of drawing, a graduate of the Military Academy of the class of 1870.

During the early period of the Academy—from 1802 to 1810—the course in drawing, like that of other departments, appears to have been of a very elementary character, confined to the use of instruments, such as they were, with a little topography and fortification drawing. The regulations of May 22, 1816, define the course as consisting of the drawing of figures, fortifications, and topographical plans. At

the beginning of Thayer's administration instruction in the use of pen and ink, and color, and the use of surveying instruments in the field was nominally given by Mr. Zoeller, but under the existing conditions must have been both crude and ineffectual. Under the stimulating influence of the great Superintendent, however, work in this department soon took on a new character and embraced a much wider field, covering both figure and landscape work in pencil and ink, crayon, and color, and all forms of topographical drawing. It appears from the staff records that appointments to the corps of topographical engineers were at this time occasionally made according to proficiency in drawing. Cadet Bache was appointed a captain in that corps for this reason, and so held in spite of protest, completing a long, useful, and distinguished career in that branch of the service. Until 1817 drawing was confined to the first class. In that year the collateral course of the second class was established.

In 1820 the course was defined to be: Elements of heads and figures in crayons, elements of landscape in crayons, practice in taking actual sketches in landscape from nature, elements of topography and the raising of maps.

In 1821 the course was further defined to embrace a series of elementary studies in landscape, the art of shading geometrical figures with india ink, sketches from nature, and elements of topography with pen, pencil, india ink, and colors. Instruction was given daily to the second class from 2 to 4 p. m., and alternate days to the third class during the same hours.

In 1822 the course of drawing in the third class (second year) was established and dropped out of the first class (fourth year).

The method of instruction appears to have been wholly that of copying from other drawings, a method pursued for many years to come, and which, while devoid of practical value or permanent results except to a very limited degree, is fruitful in deception and false pretenses. An investigation made in 1826 by a committee of the Academic Board into the practices of Cadets in this work revealed an extensive demoralization, and the prevalence of fraudulent methods such as tracing, substitution, and the like.

In 1825 it was further modified as follows: (1) Elements of the human figure; (2) a series of elementary studies in landscape with the pencil; (3) the art of shading geometrical figures with india ink; (4) the shading and finishing of landscapes in india ink; and (5) sketches from nature, and elements of topography with the pen and pencil, and with india ink, and colors.

In the distribution of time the second class attended drawing daily from 2 to 4 p. m., taking landscape and topography; the third class, Mondays, Wednesdays, and Fridays, from 2 to 4 p. m., taking the human figure.

In 1839 "the art of shading geometrical figures with india ink," and "the shading and finishing of landscapes in india ink," together with "sketching from nature," are omitted from the prescribed course. The relative count of the third-class course in drawing was changed to one-half, although it appears that daily attendance was required. The course was somewhat elaborated under Mr. Weir's direction, and in this year is described in the Staff Records as consisting of the following subjects, with a text-book, probably as a book of reference, on topography, prepared by Lieutenant Eastman, and adopted in 1837:

1. Geographical signs.
2. Topographical delineation of rocks and hills; wild and uncultured grounds; rivers; lakes, marshes, etc.
3. Formation of letters.
4. A course of topography with the brush, laying flat, broken and blended tints (symbolical of various grounds, etc.); shading mountains, rocks, trees, and other objects appertaining to wild or uncultivated countries. This completes the course in topography.

The course in free-hand work began with outline drawings of the human figure (anatomical) in three positions, and outline drawings from Flaxman and Retzch, which conclude the third-class course. In the second class, landscape is taken up under the following heads: (1) Measurement; (2) form, simple and compound; (3) aerial perspective; (4) light, copying same size and different scales; (6) drawing on tinted paper; (7) use of brush (sepia); (8) coloring; (9) finished

drawings from standard works. The entire work seems to have been copied from models in the flat.

In 1867 the inspector of the Military Academy recommended that penmanship be made a part of the course of drawing and be assigned a separate value of 100 in credits. The Academic Board in accordance with this recommended that one hour each day be given to that subject in the beginning of the third-class course until each Cadet shall have acquired, in the opinion of the professor of drawing, a sufficient proficiency. It also recommended that no additional count be given in the course of drawing to that branch.

In 1872, upon the recommendation of the Academic Board, instruction in penmanship was discontinued for the reason that little benefit accrued to Cadets from its study, and that the time could be more profitably employed on the elements of drawing.

In 1879 the construction of various problems in descriptive geometry, shades, shadows, and perspective, then undertaken by the third class in the department of mathematics, was made a part of the course in drawing.

In 1880 the professor of drawing submitted to the Academic Board the following propositions regarding the course of instruction in that department:

1. That there should be a written examination in the course of drawing covering the subjects therein taught by lecture.
2. That a course of instruction by lecture, coupled with drawing from models, be given in the subject of mechanical engineering, embracing the elementary machines and movements.
3. That a portion of the time of the encampment be employed in practical surveying.
4. A detailed programme of the course in drawing.

A committee of the Academic Board was appointed to report upon these propositions, and recommended that there should be no written examinations in drawing; that such lectures as the professor of drawing shall deem necessary shall be prepared; that lectures and instruction upon the subject of mechanical engineering be wholly omitted; that the proposition regarding surveying during the encampment be so

modified as to apply to the hours now devoted to drawing; and that the course as submitted with those modifications be adopted.

The Academic Board adopted the recommendation of the committee rejecting written examinations; recommended that no study upon the matter given in lectures of the professor of drawing shall be required in any time other than that allotted to drawing; rejected the instruction in mechanical engineering and applied mechanics, and recommended the appointment of a new committee for the consideration of the matter of surveying.

The attendance in drawing, which up to 1839 appears to have been daily for both classes, was changed between that date and 1842, so that the third class attended only on alternate days, excluding Saturdays, giving five attendances in two weeks. The second class continued to attend daily. This disposition appears to have remained undisturbed until 1857, at which time the hours of attendance of the third class were changed so as to permit instruction in riding to be given after November 1. Up to that day the whole class attended daily; thereafter it was divided into two sections, alternating in attendance until March 15, after which daily attendance was resumed. It does not appear from the Staff Records at what time the daily attendance of the second class was changed so as to substitute an alternating attendance of sections of one-half the class. This is, however, the arrangement at the present writing, and has been so for over thirty years.

PRESENT COURSE, JUNE, 1896.

Based upon the detailed programme submitted by the professor of drawing in 1881 as modified and adopted by the Academic Board, the present course of instruction is arranged as given below, being the programme approved by the Secretary of War and incorporated in the academic regulations of October 1, 1894.

COURSE OF TECHNICAL AND FREE-HAND DRAWING.

First year.—Plane and descriptive geometry—topography—color reconnaissance.

[September to January.]

Instruction in the course of the first year is as follows:

1. Problems of construction in the applications of plane geometry, ranging from the laying out of angles and polygons to the construction of the various plane curves, including the ovals and conic sections. Drawn in pencil. (4 sheets.)
2. The conventional signs of topography. Drawn in pencil and in ink. (2 sheets.)
3. Determination of lines of screen and construction of sections and gradients on contoured map. Explanation of contours and study of terrain. (1 sheet.)
4. Exercise in hachure work. Explanation of scales of shade. Drawn in ink. (1 sheet.)
5. Exercise in contouring from dictation. (1 sheet.)
6. Construction of scales of distance. Diagonal scales. Verniers. Explanations of their uses. Drawn in ink. (1 sheet.)
7. Plotting of triangulation for completed map from field record. General explanation of triangulation methods and measuring of bases. (1 sheet.)
8. Plotting of details of completed map from traverse notes. Explanation of methods of field notes and contouring. Inking and finish of completed topographical map. (1 sheet.)

[January to June.]

1. Theory of color. Color standards and constants. Color tests. Laying of washes. Complementary colors. Hues, tints, and shades laid in water colors. (2 sheets.)
2. Construction of problems in Descriptive Geometry. Shades, shadows, and perspective. (9 sheets.)
3. Topography in colors. Conventional signs. Completed map in colors. (1 sheet.)
4. Field reconnaissance and sketching. Methods and materials. Instruments and their use. Descriptions and explanations. Practice sketch from dictation. (1 sheet.)
5. Work in the field. Reconnaissance map of position with hand level, prismatic compass, and clinometer. Drawn on regulation form prescribed by General Orders, Headquarters United States Army. (1 sheet.)

Second year.—Free-hand drawing—memory drawing—mechanical, architectural, and ordnance construction drawing.

Free-hand drawing.

[September to January.]

1. Lectures on form, light, and shade. Proportion, outline, technical and pictorial art, practical and aerial perspective. Drawing from wood blocks in outline in pencil. (7 sheets.)
 2. Shaded drawing from blocks and plaster. (2 sheets.)
 3. Drawing from memory. Originals—first, flat; second, blocks; third, buildings. (8 sheets.)
 4. Mechanical free-hand drawing. Dictated. Parallels, angles, proportional parts, polygons and stars, frets, gear teeth. Isometric working drawings to scale. Isometric building to scale. Cavalier projections. Cavalier machine casting to scale. No ruler or implements allowed. (6 sheets.)
 5. Free-hand drawing from flat. Figure outline. (2 sheets.)
 6. Free-hand drawing from flat. Figure and landscape. Pen and ink and pencil. (2 sheets.)
- Lectures on the above from time to time.

Technical drawing (architectural, mechanical, and ordnance construction).

[January to June.]

1. Project. Plan, section, and elevation of barrack for a company of infantry—drawn to scale, printed specifications and data furnished. Finished in ink. Measurements figured. (1 sheet.)
2. Working drawings to scale of steam engine and principal parts. (1 sheet.)
3. Working drawings to scale of parts of buildings. (1 sheet.)
4. Elevation and working drawings to scale of ordnance constructions. (1 sheet.)
5. Plan, section, and elevation drawings of civil and military engineering constructions. (1 sheet.)

All of the above in color or ink alone, according to character. Nos. 2, 3, 4, and 5 occupy the time remaining after completion of No. 1. No. 1 is taken by entire class. The others are assigned according to Corps to which Cadet will probably be assigned on graduation. Engineers, No. 5; Ordnance and Artillery, No. 4; line corps, Nos. 2 and 3.

6. Fifteen to twenty short lectures on the graphics of building construction and forms; methods and drawings in the planning and construction of buildings; the steam engine and its essential parts; machine drawings. These are accompanied by diagrams and models and the use of the stereopticon.

Sheets of data, working drawings, blue prints, and photographs used

for data in the foregoing are from the following sources: Corps of Engineers and Report of Chief of Engineers, U. S. Army; Ordnance Bureau and Reports of Chief of Ordnance, U. S. Army; Pneumatic Gun Carriage and Power Company, United States; Baldwin Locomotive Works, United States; Krupp's and Gruson's Werke, Prussia; Canet System, Forges et Chantiers de la Méditerranée, France; Maxim-Nordenfelt Gun and Arms Company, England; Construction Details, Austrian Military and Geographical Institute, Vienna, Austria; Notes on Building Construction, South Kensington, London, England; Details of Building Construction, Professor Chandler, Boston Institute of Technology; Senior Course in Mechanical Drawing, Professor Thorne, Franklin Institute, Philadelphia. Ordnance material and models in relief also used as models.

The third class attends daily, Saturdays and Sundays excepted, from 2 p. m. to 4 p. m. until November 1, after which day the class is divided into two sections—the first section, until January 1, consisting of the odd numbers in general class standing, the second section of the even, these sections alternating in attendance. After January 1 the division of the class is similarly obtained from the standing in drawing at that examination, and alternation continues until March 15, after which daily attendance, Saturdays and Sundays excepted, is resumed until the end of the term.

The second class alternates in sections throughout the term, being divided into two sections of odd and even numbers, obtained from the standing in drawing at the end of the third-class year. Its hours of attendance are from 2 p. m. to 4 p. m. For the better preservation of order the third class when attending daily is divided into four sections, which at the close of attendance are dismissed and retire separately under charge of separate section marchers, who are responsible for infractions of discipline.

CLASS REPORTS AND MERIT MARKS.

Class reports are submitted weekly, each Cadet being given a merit mark on his week's work. These marks are scaled on a maximum of 3, and are determined from a consideration of two factors—i. e., progress and quality. A time schedule compiled from the records of the department and the result of several years' experience is maintained for each separate

piece of work. If a Cadet begins a piece of work on Monday and has on Saturday completed the full amount of work according to the schedule, he is marked accordingly for progress. Going a second time over the class, the element of progress is entirely ignored and a mark for quality alone is given.

In work of certain character, where quality is considered most important—*e. g.*, conventional signs in color—the quality mark is given a multiplier of 2, and the resulting mark for the week would be determined as in the following example: Quality mark, $2.5 \times 2 = 5$; progress mark, 2.4; total, 7.4; reduced to a scale of 3 = $2.47 =$ mark for week.

In certain other portions of the work—as, for example, descriptive geometry—quality and progress are rated equal and given the same weight in the determination of the mark.

Exact record of progress is kept by recording against each Cadet at the end of every week the number of hours to his credit according to schedule in the particular piece of work upon which he is engaged. By this method a glance at the record tells exactly what each Cadet has done each week of the term, and as the work is filed away as fast as completed in the drawer allotted to him, the most complete information is always immediately available as to the status of every member of the class at any period of his instruction. The marks, with rating both for quality and progress, are posted in the class room weekly, so that Cadets know in what element of their work they are deficient.

As each problem, construction, or drawing to be inked is completed in penciling it is examined by an instructor, and if approved is so marked by him over his initials in pencil. The Cadet is thereby authorized to proceed to the inking, and upon the completion of this stage of the work it is again brought to the instructor for final approval, which, if accorded, is stamped in ink, with the instructor's name; otherwise the word "Disapproved" is stamped in a similar manner. Upon each drawing is also stamped the name of the Cadet and date of completion, a brief of the course of drawing to which it belongs, and, if a problem, an enunciation of its requirements.

At the examinations closing the year's course drawings of

special excellence are retained by the head of the department for preservation in the Academy gallery—a custom which has been adhered to for over seventy years—and, as a result, a collection of drawings dating back to the early twenties, and bearing the names of graduates whose reputations are national, is exhibited on the walls of the Academy.

EXAMINATIONS AND STANDARD OF PROFICIENCY.

Examinations are held and class standing determined by inspection of marks and drawings. The latter are displayed upon racks and tables so as to be easily examined and compared. As the course is mainly technical and constructive, the marking is according to schedule and very close, so that very little deviation from the standing resulting from marks is found necessary after a comparison of the work. In the course of free-hand work, from September until January of the second-class year, more change results from the final inspection of work than at other times.

The standard of proficiency exacted is such as long experience has demonstrated to be fully within the grasp of the diligent and fairly intelligent student, without reference to natural pictorial gifts. As three-fourths of the course is geometrical in its elements and technical or constructive in its character, mainly executed with drawing instruments, and as the free-hand work is confined to practicing and developing the perception of proportion and relation in the simpler elementary forms, beginning with blocks and elementary analysis of landscape, it is found that students with no natural pictorial powers whatever find no difficulty in passing and even in standing well in this study. A Cadet, therefore, who constructs with correctness and accuracy the problems in plane and descriptive geometry, plots and completes from traverse notes and triangulation sheet with correctness and fair neatness of finish the required topographical map, and shows ability to draw a fairly accurate reconnoissance field sketch, will be declared proficient in that portion of the course, although the pictorial finish may be 50 per cent inferior to that of the head man. In free-hand work the student must show a very rare incapacity for perception of

form to be declared deficient therein. In the course of architectural, building construction, engineering, and ordnance drawing the same conditions obtain as in the geometrical and topographical work.

The course of drawing at the Military Academy at the present time is based mainly upon the fact that the practical language of modern construction of every sort is technical drawing.

The appointees to the Military Academy were formerly for the greater part wholly deficient in any, even the most rudimentary, instruction in drawing. An average of 10 per cent had had no elementary training—in some classes not 5 per cent. It was therefore necessary that instruction here should begin at the illiteracy in this branch—a condition that was not paralleled in any other subject. Of late years this percentage has greatly increased and at present often reaches 50 per cent.

The result to be achieved is twofold: First, to train the faculties of vision and those of execution through the hand when at a period of comparative maturity they are entirely dormant; second, to teach the general principles of technical drawing so that the graduate shall have an intelligent acquaintance with the constructive language of engineering, architecture and building construction, topography and cartography, and machinery, and shall be able to make a fairly good free-hand drawing of natural and artificial form. In his capacity as commanding general, commanding officer of a post, engineer, ordnance, artillery officer, quartermaster, surveyor, subaltern on reconnoissance or supervising construction, he is liable to require any or all of this knowledge, and at least to translate it to his subordinates. The instruction is therefore twofold—in the practical graphical work and by lectures copiously illustrated, coupled with constant oral criticism.

The cardinal principle upon which instruction is based is that all work shall be *original*—that is to say, that every project or problem shall be the student's own work, constructed from the data or model according to the principles governing it. The only copies from drawings permitted are in the case of a

few outline studies of the human form and landscape at the close of the course of free-hand instruction. The next condition exacted is accuracy, after which comes pictorial excellence and neatness. The ultimate purpose is to give a sound general training in the elements of technical and free-hand drawing, so as to familiarize the student with the methods of graphical work in the various fields of topographical, geometrical, structural, and mechanical drawing to a sufficient extent to enable them to understand the graphics of these subjects when required to interpret them, and to possess a reasonable facility of design therein, rather than to attempt to carry any one of them to a degree of development appropriate only to special courses in schools of application. As a matter of fact, the more apt students do attain a facility and skill which enables their work to bear comparison with that of the best of the special schools either in this country or abroad. In the free-hand course the ultimate aim, after the cultivation of the perceptive faculties, is to give sufficient pictorial skill to enable the graduate to make outline sketches of general landscape and hill forms to accompany topographical and reconnoissance reports. Further than this with the average man it is not possible to go. Artistic power can not be taught; it must be innate in the same way as are poetic, rhetorical, or dramatic gifts. But the whole range of technical graphics, which is the language of the constructive and industrial world, and a certain ability to render ordinary form by free hand can be taught to all in precisely the same degree as any of the various branches of study; the eye-faculties of judgment, memory, and apprehension can be trained to a very high point, and the taste and appreciation can be developed in those in whom the artistic and creative power is lacking.

METHODS OF INSTRUCTION. 1896.

FIRST YEAR'S COURSE.

Geometrical and topographical drawing.

Plane geometry.—About 40 problems covering various applications, from laying out of angles to plane curves and conic sections. (See programme.) These are done in pencil

and constitute the first work of the student. The data are issued on printed sheets giving a brief general analysis of method. This refreshes the memory of plane geometry and gives the first practice in the use of instruments. Accuracy and neatness are here inculcated as primary requirements.

Conventional signs of topography.—Topography is assigned to this first year's course because surveying and trigonometry are taught in this year. The general signs are first executed in pencil and afterwards repeated in ink. The repetition impresses them upon the memory, besides making the transition to ink work gradual. In these signs there is a partial free-hand element which needs the practice in pencil before attempting ink. Clearness and neatness of finish emphasized. Examples in large maps of coast survey and foreign countries displayed for inspection upon tables.

Determination of lines of screens and sections, etc.—Lithographed sheets giving the contours of a particular region are issued. The lines of section required are indicated and the section is made by the student. Position of batteries indicated and lines of screen from fire determined on different slope by student. Gradient of required road given; position of road platted by student. A comprehensive series of questions covering the reading of the hypsometry, conventions and scales of the various maps of the United States and those of the leading nations of the world are given each cadet for solution on the maps.

Exercises in hachure work.—This work is now confined to a short exercise in the use of hachures, with an explanation of scales of shade of different methods of hachuring.

Exercise in contouring from dictation.—Bearings and gradients together with topographical features are given, from which terrain is plotted by the student.

Construction of scales of distance, etc.—These scales are thoroughly explained in theory and then accurately constructed to given representative fractions and units by the student.

Platting of triangulation for completed map, etc.—The class at this point begins the final work of the first term, which is a practical application of the foregoing preliminary instruction.

This consists in the actual work of platting and drawing a finished map from the triangulation sheet and field traverse notes, and demonstrates the extent to which the student has understood the principles of topography and acquired the necessary facility for the execution of a correct map. The data for establishing the triangulation points are given as if taken by observation, and a book containing all of the traverse notes as taken in the field book for the area to be mapped. The platting is carefully tested as it progresses and all errors noted. After final approval of the platting the finishing work in ink is proceeded with.

Theory of color, etc.; hues, tints, etc.—The subject of modern chromatics is taken up at the commencement of the second term. After an explanation of the modern theory of color of Young and Helmholtz, is taught the laying of flat tints of the primary and complementary hues and shading of cylinders and curved surfaces.

Construction of problems in descriptive geometry.—As this subject is the foundation of technical drawing, its practical application in graphical problems is given the most careful attention. In order that the difficulties of a practical grasp of the subject shall be overcome, the first work deals with the simplest problems. The class receives in the course of mathematics most thorough and careful theoretical instruction and comes to this work as fully equipped in the theory of the subject as can be desired. The problems given are selected with a view to practical bearing upon graphical work in architectural and mechanical construction. Each problem as given is carefully explained, and questions as to obscure points invited and answered. The principal problems as they are reached are then set up on the demonstration frame and the explanation repeated from the actual objects and projections in space. The students are then required to make the construction. The demonstration frame may be at any time consulted to resolve difficulties and forgotten points. Cadets are not allowed to help each other, and the signature of the Cadet is held to be a guaranty of the integrity of the work. The first problems are constructed in pencil alone, and consist

of the projections and revolutions in various planes of simple plane figures, cubes, and prisms, with sections and developments. These are quickly done, and give confidence and flexibility in the use of projective methods. After these the problems increase in complexity and are finished with greater care and accuracy in ink. They include determination of intersections of different solids with developments, shades and shadows of crosses, cylinders, rings, spheres, or ellipsoids; the column with abacus and base with taurus; chimney and dormer window on roof, vase, etc.; the perspective of rings, shafts, spheres, monuments, groined arches, buildings, or composed subjects. These are executed with the utmost accuracy and a high degree of finish which will compare with anything done by students elsewhere, at home or abroad.

Topography in colors.—Water-color washes as applied to topographical maps. First, a sheet of conventional signs followed by a completed map.

Field reconnoissance and sketching.—Careful lectures and explanation, with exhibition of implements and illustration by the lantern, precedes this most important branch of military graphics. Methods of work in this country and abroad are explained and illustrated, and preliminary practice given by dictating courses and data *viva voce*, requiring a topographical sketch to be platted from the description. The class is then taken into the field, formerly with prismatic compass and regulation protractor sheet, but now with the reconnoissance sketching board of Major Vernor, of the English service, as modified and greatly improved by Lieut. Charles B. Hagadorn, first lieutenant, Twenty-third Infantry, instructor of drawing. This is a simple application of plane table methods to field topography, and vastly superior both in accuracy and rapidity of result to the older methods. A sketch is made of a portion of the military reservation, and contours are determined and platted both with levels and clinometer. Practice is also given in sketching without compass or implement of any sort. This work closes the first year's instruction.

SECOND YEAR'S COURSE.

Free-hand drawing.

Outline drawings from blocks and plasters.—This work is addressed to the dormant faculties of vision, and is of the simplest and most elementary character. The objects are at first white cubes, which are carefully drawn "by eye," the knowledge of perspective laws acquired in the preceding year being here applied in the judgment of form. According as the student progresses other blocks are substituted, and then groups of two, three, four, and many blocks in irregular masses. Finally, rough buildings are constructed with blocks and sketched from different points of view, and, if sufficient skill is developed, plaster forms. Succeeding this, a series of memory drawings is required, beginning with simple rectilinear shapes, increasing in complexity, which the student is allowed to view for a very short period and must then reproduce. More complex forms succeed these, and finally the students are sent out to examine buildings for a short time, which they must then draw from memory.

Mechanical free-hand drawing.—This work is done without any implement or artificial aid whatever other than the lead pencil. This must not be used as a ruler. Beginning with simple subdivision of lines into equal parts, scales are drawn by eye showing subdivisions as high as sixtieths. The various constructions of frets, polyhedrons, stars, plotting and division of angles, etc., are gone through with, and finally scale drawings of objects giving sections and dimensions are done, concluding with isometric scale dimensioned drawings and cavalier projections of machine castings of the same kind. The class is then practiced in sketching hill forms from lantern projections on a large screen, beginning with very elementary forms and gradually leading up to views of the region of the Colorado Canyon. This work is followed by study from lithographed studies of landscape in the flat and landscape sketching in the field. The course concludes with a few figure outlines by Bargue and Gérôme, and studies of figure and landscape from the flat in pen and

ink, as an example of good method and to afford some slight facility in execution within the very limited time and range of this course. This concludes the first term.

Project—Barrack for a company of infantry.—This begins the final course of constructive drawing. This project is a practical one and is given out to the individual members of the class by a printed sheet of specifications and two sheets giving detail dimensions. The plan, section, and one elevation of the building are then constructed to the required scale. This important piece of work gives a very thorough practice in the preparation of general drawings for a building, and is undertaken in connection with a course of explanatory lectures fully illustrated by the stereopticon. In this work the student learns to relate drawings in plan, section, and elevation, and to understand the working out of detail and shop drawings. It is a double study for the student, teaching both construction and interpretation of working drawings. The drawings are carefully figured and colored in flat wash if the progress of the individual work justifies it.

Working drawings—Steam, building construction, ordnance, civil and military engineering.—After the completion of the project above described, the class is divided into groups according to the general class standing of the men. The final work is then assigned according to the corps of the Army to which the Cadets will probably be assigned. The first five men are given subjects selected from military or civil engineering data—batteries planned or in process of construction in the United States and abroad; portions of enceintes; magazines; bridge and canal work, the data for which are being constantly sought in the latest works. The next twenty men, whose probable service is to be in the Ordnance and Artillery Corps, are given subjects of ordnance and artillery construction. Working shop-drawings of the principal guns and carriages of the United States Ordnance Bureau are on file in the department, together with a large amount of data from foreign countries of the latest models. The remaining members of the class, whose duties will be in the line as quartermasters, commanders of working parties, and as commanding officers of posts and in control of Govern-



WINTER VIEW FROM FORT PUTNAM.

ment property, are given working drawings of details of building construction, and a figured drawing of a simple direct-acting high-pressure vertical steam engine to complete to given scale. A large perfect model of a frame house to a scale of one-sixth is used for this work. Students are required to make isometric sections and projections through different parts of the barrack project, showing entire construction of windows, doors, and interior floor and roof construction—figured. A facsimile model of steam engine to one-half scale is used for the figured drawing of steam engine. Detail drawings of all the parts are also available, and the student is required to set up the engine to scale from these and the model. This work completes the course of drawing.

LECTURES.

All theoretic and explanatory instruction is given by lectures abundantly illustrated by stereopticon, blackboard, and models. Running commentary and *viva voce* criticism and instruction go on at all times. At any time when special explanation is needed the classes are called into the lecture room or to the models.

The course of lectures beginning with the first year's work covers: Drawing instruments—their character, quality, use, and care; methods and connections in geometrical drawing; topographical signs and conventions; methods of large surveys; triangulation and field work; contouring and hill sketching; traversing; plotting; cartography—historical sketch, styles, and methods; reading of maps; study and character of terrain; scales; the Young-Helmholtz theory of color—the prismatic and normal spectrum, color constants; complementary color; nomenclature; subjective color; pigments; harmony, contrast—illustrated by the stereopticon, Maxwell's disks, and color samples; methods of field reconnoissance. Instruments—levels, odometers, pedometers, compasses, clinometers, etc.—are shown and explained.

Lectures on form, light and shade, proportion, outline, technical and pictorial art, practical and aerial perspective, and landscape drawing are given during free-hand work, and are all illustrated with stereopticon.

During the last term of constructive and mechanical drawing a carefully prepared series of lectures accompany the work, explanatory of the details of building construction from foundations to interior finish; a historical sketch of architecture and explanation of styles; a descriptive analysis of the steam engine and its details, showing character and functions of its working parts, and of the various shop drawings. In addition, lectures giving the character and number of architectural drawings, fees and procedure in architects' offices, specifications, reproductive processes, quality and preparation of paper, tracings, enlargements.

In former years the entire course in drawing consisted in copying pictures in pen, ink, and color from engravings and lithographs. The course was devoid of lectures or theoretical instruction. No original work was undertaken. The work was largely worked over and finished by the instructor to give pictorial effect.

The work of the present course can not well be compared with that of other institutions, for the reason that it is general and comprehensive, whereas in the technical and scientific schools of the country the work is special, and in the special lines is carried further, and in the art schools the object aimed at is fine art, while the students possess special talent and have had considerable training before entering. At the Military Academy the eye and hand must be trained from a condition of entire helplessness, while at the same time a knowledge of the graphics of a wide range of arts is acquired. Notwithstanding the great disparity in the preparation of the students and the character of the aim, as well as limitation of time, I am of the opinion that the result will compare without discredit with similar work, either at home or abroad. The best drawings do not fall below the grade of expert work. This high standard of achievement is due to the methods of work of the Military Academy, the thorough preparation given by my associates, and the conscientious and enthusiastic fidelity of my assistants, without which very little could be achieved. I may also add that the interest of the Cadets themselves in their work is an important factor.

HISTORICAL SKETCH OF THE DEPARTMENT OF MODERN
LANGUAGES.

[The following admirable sketch of the department of languages is that of Professor Wood (with a few omissions), prepared in 1896 for the Superintendent's report.

Since that date the following changes in the text-books of the department have been made: Traub's Spanish Verb and Spanish Pronunciation Book, and Ramsey's Elementary Spanish Reader have been introduced, and Mantilla's Reader discontinued in October, 1900.

In the general revision of the Academic course, which is to take effect September 1, 1902, the number of recitations in French was reduced to 200, terminating that course at the midwinter examination of the third-class year. The number of recitations in Spanish by the same revision was increased to 160—this subject to be taken up immediately after the conclusion of the French and continued to the following June. The revision referred to also increases the recitation period for English from 84 to 120. These changes will make necessary material modification in the time and work-schedule of the department of modern languages, and its labors, already great, have been thereby much increased. The assignment of the instruction in English to the department of modern languages differs from the method pursued in the majority of institutions of learning and adds materially to its work.]

The department of modern languages was established by the act of Congress of June 23, 1879, making appropriations for the support of the Army for the fiscal year ending June 30, 1880, which provided that when a vacancy occurs in the office of professor of the French language or in the office of professor of the Spanish language in the Military Academy both these offices shall cease, and the remaining one of the two professors shall be professor of modern languages, and thereafter there shall be in the Military Academy one, and only one, professor of modern languages.

By the retirement of Prof. Patrice de Janon, professor of the Spanish language, on June 30, 1882, and in accordance with the provisions of the foregoing act of Congress, Prof. George L. Andrews, professor of the French language, became professor of modern languages. The department of modern languages therefore dates from June 30, 1882.

As the present department was established by the absorption of the department of the Spanish language by the department of the French language, its history will require a history of the two latter departments.

(1) DEPARTMENT OF THE FRENCH LANGUAGE.

This department was established by virtue of the act of Congress approved February 28, 1803, which provided that the President of the United States be, and he is hereby, authorized to appoint one teacher of the French language and one teacher of drawing, to be attached to the Corps of Engineers, whose compensation shall not exceed the pay and emoluments of a captain in the Army. Section 27 of the act of Congress, approved March 16, 1802, had provided that the said Corps of Engineers, when so organized, shall be stationed at West Point, in the State of New York, and shall constitute a Military Academy.

The act of Congress approved April 29, 1812, which definitely established the Military Academy, provided that the Military Academy shall consist of the Corps of Engineers and certain professors, in addition to the teachers of the French language and drawing already provided.

Under the provisions of the act of Congress of February 28, 1803, François Désiré Masson, a native of France, was appointed teacher of the French language July 12, 1803, and was succeeded by his brother, Florimond Masson, April 15, 1810. On the resignation of the latter, January 3, 1815, Claudius Berard, a native of France, was appointed teacher, and as teacher and professor was the head of the department for thirty-three years. The above constituted the teaching force of the department from February 28, 1803, until March 1, 1818, on which date Joseph Du Commun was appointed second teacher of the French language. The office of second teacher was not created by act of Congress, as had been the case with that of teacher, but the appointment was made March 1, 1818, by virtue of an order of the Secretary of War in February, 1818. Pay, however, was appropriated for the second teacher of the French language in the successive appropriation bills for the support of the Military Academy, and it might therefore be said that the existence of the office was sanctioned by Congress. From March, 1818, the two teachers were designated in the regulations and registers of

the Military Academy as first teacher and second teacher, respectively, the first teacher being the head of the department. In 1846 the head of the department was made professor by virtue of an act of Congress approved August 8, 1846, which provided that the teacher of drawing and the first teacher of French at the Military Academy shall hereafter be, respectively, professor of drawing and professor of the French language.

The remaining teacher (Hyacinthe R. Agnel) was, however, still designated as second teacher until his appointment, May 16, 1848, as professor of the French language, to succeed Professor Berard, who died May 6, 1848. From May 16, 1848, no more teachers were appointed.

The teaching force of the department from March, 1818, until the appointment of Professor Berard as professor in 1846, consisted of the two teachers, permanent officers of the Military Academy, and such number of officers of the Army and Cadets as was deemed necessary detailed as assistants in the department.

In the early part of this period recommendations and efforts were made at several times for the appointment of an additional teacher of the French language, but Congress failed to create the office. These recommendations were evidently based on the belief, quite prevalent in that day, that instruction in French should be given by a native of France. In accordance with this belief, Théophile d'Orémieulx, a native of France, was appointed an officer of the Army, receiving the commission of second lieutenant, First Infantry, and detailed as an assistant in the department. He resigned December 8, 1856, having risen to the rank of captain, though serving continuously at the Academy and in the department. Since December 8, 1856, the assistants in the department have invariably been officers of the Army detailed for that purpose, except in some years when Cadets were detailed in addition to the officers already serving as assistants. In 1860 the head of the department, Professor Agnel, in his statement to the Congressional committee of that year, gave strong reasons in favor of having officers of the Army

as instructors in preference to having natives, his reasons having been based both on his experience and on theory.

During the period above mentioned (from 1818 to 1846) the officers and Cadets detailed as assistants in the department were designated as assistant teachers. From 1848, the date of the appointment of the second teacher as professor, the senior officer was designated as assistant professor and the others as acting assistant professors. Professor Agnel served as the head of the department from the date of his appointment as professor, May 16, 1848, to his death, February 10, 1871, thus having a service as professor of twenty-three years; or, including his service as second teacher, from February 4, 1840, the date of his appointment, a total of thirty-one years' service in the department. He was succeeded by George L. Andrews, brigadier-general and brevet major-general of volunteers, a distinguished graduate of the Military Academy, who was appointed professor February 28, 1871, and who served as head of the department until its incorporation with the department of the Spanish language June 30, 1882. He then became the first professor of modern languages and served as head of that department until he was retired, August 31, 1892, thus having a total service in the departments of the French language and of modern languages of twenty-one years.

He was succeeded by Captain Edward E. Wood,^a who was appointed professor of modern languages October 1, 1892.

^a Captain Wood, a graduate of the class of 1870, before his appointment was an officer of cavalry and had served under different details for thirteen years as an assistant in the departments of French and of modern languages, including two tours of service as assistant professor of French and two as assistant professor of Spanish.

The following table gives the different heads of the department from its organization in 1803:

| Appointment and name. | Army rank when appointed. | Term of service. | | Remarks. |
|--|-------------------------------------|------------------|---------------|--------------------------------|
| | | From— | To— | |
| DEPARTMENT OF FRENCH. | | | | |
| <i>First teachers. a</i> | | | | |
| 1. F. D. Masson | | July 12, 1803 | Apr. 15, 1810 | |
| 2. Florimond Masson..... | | Apr. 15, 1810 | Jan. 3, 1815 | Resigned. |
| 3. Claudius Berard..... | | Jan. 3, 1815 | Aug. 8, 1846 | Appointed professor. |
| <i>Professors. b</i> | | | | |
| 4. Claudius Berard, first teacher of French..... | | Aug. 8, 1846 | May 6, 1848 | Died. |
| 5. Hyacinthe R. Agnel, second teacher of French..... | | May 16, 1848 | Feb. 10, 1871 | Do. |
| 6. George L. Andrews | Brevet major-general of volunteers. | Feb. 28, 1871 | June 30, 1882 | Professor of modern languages. |
| DEPARTMENT OF MODERN LANGUAGES. c | | | | |
| <i>Professors.</i> | | | | |
| 7. George L. Andrews, professor of French..... | | June 30, 1882 | Aug. 31, 1892 | Retired. |
| 8. Edward E. Wood..... | Captain, Eighth Cavalry. | Oct. 1, 1892 | ..... |  |

^a The teachership of French, created by law of February 28, 1803.

^b The professorship of French, created by law of August 8, 1846.

^c The professorship of modern languages, created by law of June 23, 1879; went into effect June 30, 1882.

TIME ALLOTTED TO INSTRUCTION IN THE FRENCH LANGUAGE.

Owing to the lack of complete records relating to the early years of the Military Academy, I am unable to give with exactness and certainty the amount of time allotted to instruction in the French language previous to 1824. From 1803 until 1812 it seems that there were no annual classes. Cadets remained at the Academy for different periods, varying from six months to six years, before they were graduated, the length of time depending upon their previous preparation and upon their capacity. The teaching appears to have been mainly individual, and some Cadets supplemented it by private lessons. The French language seems to have been practically a voluntary study, as it was not a requisite for graduation, as appears from the fact that in some years the examinations therein were passed over for the reason that all the Cadets had not had the same advantages with respect to

their acquirements on entering the Academy. With reference to the hours of recitation, the only information thereon I have been able to obtain is that in 1805 recitations in French were from 11 a. m. to 1 p. m. (probably recitations of one hour), and alternated with drawing, the teacher of French having at that time charge of the instruction in the latter branch until the appointment of a teacher of drawing.

Although in the reorganization of the Military Academy in 1812 provision was made for annual classes, and for examinations for passing into the next class and for graduation, yet it does not appear that these provisions were rigidly and systematically carried out until 1817. From the above it should seem that the results of the instruction in French before 1817 could not have been uniformly satisfactory, and it has been stated that at the examination in 1817 but few Cadets could translate with tolerable facility the easiest French author.

From 1817 dates the definite establishment at the Military Academy of annual classes, of uniform and systematic instruction, of regular allotments of time, and of examination for passing from class to class and for graduation.

The earliest official record of a recommended allotment of time to instruction in the French language appears in the report of the Academic Board made July 1, 1816, which states what should be considered as a complete course of education at the Military Academy. In this report it is recommended that French be studied the first year (fourth class) in connection with English, and that it be completed the second year (third class).

The following table (p. 317) gives the various changes in the time allotted to instruction in the French language until June 30, 1882, the allotments previous to 1824 being either unknown or considered as probable; from 1824 they are taken from records.

| From— | To— | Recitations (one hour each). | Number and hours. | Preparation—time of study at quarters (two hours per lesson). |
|--------|--------|--|-------------------|---|
| 1803 | 1817 | Not known..... | | |
| 1817 | 1820 | Probable; first year (fourth class), recitations in afternoon, alternating with English..... | 90 | 620 |
| | | Second year (third class), recitations daily in forenoon..... | 220 | |
| 1820 | 1824 | Probable; first year (fourth class), recitations daily five days per week..... | 180 | 720 |
| | | Second year (third class), recitations daily five days per week..... | 180 | |
| 1824 | 1826 | First year (fourth class), recitations daily in afternoon..... | 180 | 800 |
| | | Second year (third class), recitations daily in forenoon..... | 220 | |
| 1826 | 1845 | First year (fourth class), recitations daily in afternoon..... | 180 | 580 |
| | | Second year (third class), recitations in forenoon, alternating with English or history..... | 110 | |
| a 1845 | a 1855 | First year (fourth class), recitations from January to June in afternoon, alternating with English studies..... | 52 | 544 |
| | | Second year (third class), recitations daily in forenoon..... | 220 | |
| a 1855 | a 1861 | Five years' course adopted in 1854; went into effect in French, September 1, 1855. Second year (fourth class), recitations daily in afternoon..... | 185 | 476 |
| | | Third year (third class), recitations from September to January in forenoon, alternating with Spanish..... | 53 | |
| a 1861 | b 1867 | Four years' course; first year (fourth class), recitations from January to June in afternoon, alternating with English..... | 52 | 544 |
| | | Second year (third class), recitations daily in forenoon..... | 220 | |
| b 1867 | a 1877 | First year (fourth class), recitations daily in afternoon..... | 180 | 580 |
| | | Second year (third class), recitations in forenoon, alternating with Spanish..... | 110 | |
| a 1877 | a 1878 | During this period 60 lessons were given to English studies from French..... | 230 | 460 |
| a 1878 | a 1882 | First year (fourth class), from January to June, three recitations per week in afternoon..... | 60 | 560 |
| | | Second year (third class), recitations daily in forenoon..... | 220 | |

a September 1.

b July 1.

c June 30.

INSTRUCTION, TEXT-BOOKS, ETC.

As before stated, but little is known concerning the amount and kind of instruction in the French language previous to 1817. The division of the Cadets into annual classes was not strictly observed even after 1812, nor were examinations for passing from one class to another or for graduation systematically required. As stated, the examinations in French were sometimes passed over on the ground that the Cadets were not on an equality as regards knowledge of the language when they entered the Academy. As a result, the study of the language with respect to application must have been practically voluntary. The amount of instruction appears to have varied according to the capacity and previous knowledge of the Cadet and to have been mainly individual in its character.

In some cases it was supplemented by private tuition. The only definite information I have been able to obtain concerning the kind of instruction is that about 1814 it consisted in reading aloud for the pronunciation and accent, and in writing from dictation for the orthography. There was but one teacher for all the Cadets undergoing instruction in French. His vernacular being that language, the embarrassment and difficulties experienced by the learner from differences of construction and analysis would neither be appreciated nor removed. As a result of the above circumstances, the examination in 1817 appears not to have been satisfactory.

The only information that I have been able to obtain concerning the text-books during this period is that Masson's French Grammar and Masson's French Reader were used in 1814.

Systematic instruction, regular allotment of time, requirement of examinations, and division of classes into sections for recitation date from 1817.

March 1, 1818, a second teacher of French was provided, and from that date until the establishment of a professorship of French, August 8, 1846, the instruction was given by the two teachers, supplemented by the detail of such number of officers and, at times, Cadets as was required. From 1846, or rather from the appointment of Second Teacher Agnel to the professorship of French, May 16, 1848, the assistants of the head of the department were officers of the Army, supplemented at times by Cadets detailed as instructors.

Previous to the January examination in 1821 the third and fourth classes in French were examined together, the sections being numbered consecutively throughout the two classes. Beginning with the above-named examination and down to the present day, the two classes have always been examined separately, the sections being numbered consecutively in each class.

The earliest record of what was considered to be the requirements of a course of French at the Military Academy is found in the report made by the Academic Board, July 1, 1816, which states as follows: A course of French shall consist in pronouncing the language tolerably, and translating from

French into English, and from English into French, with accuracy.

January 29, 1820, the Academic Board adopted the report of the committee appointed March 1, 1819, to revise the course of studies. This report stated the requirements of the French course to be as follows: The course of French shall consist in teaching to pronounce that language tolerably, to read and translate French into English, and to convert English into French. The elementary instruction in this department will be conveyed nearly in like manner to all the sections. An extent of French reading, however, will be admitted in the higher sections proportional to their progress and capacity.

The system of relative weights to be given the different subjects of instruction at the Military Academy was first adopted June 2, 1818. The weight given to the French language was 1, that of mathematical studies being 2.

The following programme of the course in French and requirements thereof was adopted by the Academic Board at its meeting March 13, 1840:

1. The elements of pronunciation, so as to impart a thorough knowledge of all the sounds of the language.

2. Reading with a correct pronunciation and the proper modulation of the voice.

3. French grammar in its general principles and particular rules.

4. Exercises in English translated into French on the blackboard, so as to reduce all the rules of the language to familiar practice.

5. Reading and translating into English the whole of the *Leçons Françaises* and as many volumes of *Gil Blas* as the capacity and progress of the pupils will allow.

6. Translating into French Murray's *English Reader*.

N. B.—This last exercise is now (1840) confined to the first section of the third class.

7. Speaking French. This can not be done except with the upper sections of the fourth and third classes.

In 1853 the requirements were as follows: French grammar; reading French with a correct pronunciation; translating English into French and French into English accurately.

In 1882, when incorporated with Spanish, the requirements were as follows:

French language.—Grammar; reading and writing French; translating (from text and orally) English into French and French into English.

From between 1817 and 1821 up to 1859 instruction was imparted by lessons assigned in the grammar and in the reader, the lessons varying in length and difficulty proportionate to the progress and capacity of the Cadet. This progress and capacity would be indicated by the number of his section. During the recitation of one hour certain members of the section would be given subjects in the grammar lesson, comprising rules and principles and their application by illustrative exercises, to be put upon the blackboard and explained and recited upon orally. The remaining members of the section would be called upon to read the reading lesson, reading aloud as much of the French text as the time permitted and then giving the English translation, either literal or free, as might be required. A due alternation was observed in assigning subjects in grammar and in reading. Pronunciation was acquired by the information imparted therein, and by the practice in reading and in oral recitation.

In 1842 an attempt was made to introduce a course of military reading by the adoption of Rocquancourt's *Cours Élémentaire d'Art et d'Histoire Militaire* as a text-book in the department, but the committee of the Academic Board reported against it March 1, 1842, on the ground that its style had not sufficient variety, being only an enumeration of military events, and that it presupposed on the part of the student too great a knowledge of military matters and extensive reading; that literary works best possess the qualifications for studying a language.

In 1849 a verb book (Bolmar's) was adopted and used until 1872, which, from its clear and systematic arrangement and explanation of French verbs, both regular and irregular, greatly facilitated the instruction in that difficult subject.

In addition to the text-book used as a grammar, Agnel's *Elementary and Practical French Tabular System* was adopted

in 1859 and used until December 14, 1883, when it was discontinued on account of being out of print. This most valuable and useful text-book, entirely original in method and scope, was devised and written by Professor H. R. Agnel, then head of the department. It had for its object the methodical classification of the defining words of the language, the important subject of the place and order of personal pronouns, a scheme of derivation for the ready use of regular and irregular verbs, the use of the past tenses of the indicative, the difference between French and English prepositions, the use of the subjunctive mood, and a course of idioms; the whole so framed as to harmonize with the portion of the grammar rules and exercises studied simultaneously with the tables during the whole course of instruction. Each table as successively studied was written out on the blackboard by the Cadet from memory, recited upon and explained by him thoroughly in all its bearings. The practical exercises for each table, arranged in the form of question and answer, were translated into French and written out in exercise books by the Cadet while studying in quarters. These exercise books were then given to the instructor of the section, who corrected the exercises and returned the book to the Cadet. From 1872 these exercises were written upon the blackboard during recitation and recited upon orally.

After the introduction of the tabular system the Cadets when writing a French verb were required to write in addition its primitive tenses.

After Professor Andrews became head of the department, February 28, 1871, many changes were made in the text-books previously used, their places being supplied by those of more modern date and of better adaptation to the requirements of the course. These changes are shown in the table given below. The methods of instruction were made more uniform throughout the classes undergoing instruction. Great thoroughness was required of the Cadets in their comprehension of the grammatical principles and rules, of the construction of the language, and accuracy in their explanation and application thereof. An accurate and natural English translation was required in translating from the reader, accuracy

was exacted in pronunciation and clearness in enunciation, and the average acquirement of the language by the Cadets was considerably increased, especially in the sections below the first.

As previously stated, the exercises in the tabular system from 1872 were no longer written in exercise books, but were written upon the blackboard during recitation and explained and recited upon orally, thus giving more practice in pronunciation and a better opportunity to verify the Cadet's comprehension of the subject. The method of examination was also changed. Previous to January, 1873, the examinations in French were oral, each Cadet at examination being given a subject in grammar to explain and illustrate upon the blackboard, and also being required to read in French and translate orally a portion of the course in reading studied during the preceding term. From the January examination, 1873, the examination in grammar and in the tabular system (as long as that text-book was used) was made written. The examination in reading remained oral.

The following table gives the text-books used in the department of the French language until June 30, 1882:

| Year. | Text-books. | | Remarks. |
|-----------|--|---|--|
| 1803-1820 | Masson's French Grammar; Masson's French Reader. | | Not known when these books were first used or when discontinued, but known that they were used in 1814. |
| | <i>Third class.</i> | <i>Fourth class.</i> | |
| 1821 | Exercises in Wonostrocht's French Grammar; The Poetry of the Lecteur Français; Voltaire's Charles XII; Gil Blas, Vols. II, III, IV. | Wonostrocht's French Grammar; Lecteur Français; Gil Blas, Vol. I. | Wonostrocht's Grammar and the Lecteur Français discontinued between 1820 and 1832, the exact year not known. |
| 1832 | Berard's French Grammar; Voltaire's Charles XII; Gil Blas, Vols. II, III, IV. | Berard's French Grammar; Berard's Leçons Françaises; Gil Blas, Vol. I. | The exact year when adopted not known. |
| 1841 | Levizac's French Grammar; Berard's Leçons Françaises; Gil Blas, Vols. II, III, IV; Murray's English Reader (used in first section only). | Levizac's French Grammar; Berard's Leçons Françaises; Gil Blas, Vol. I. | Gil Blas discontinued September 27, 1841; Murray's Reader adopted April 7, 1840. |
| 1842 | Levizac's French Grammar; Berard's Leçons Françaises; Voyage du Jeune Anacharsis; Murray's English Reader. | Levizac's French Grammar; Berard's Leçons Françaises; Voyage du Jeune Anacharsis. | Voyage du Jeune Anacharsis adopted September 27, 1841. |
| 1848 | Le Brethon's Guide to the French Language; Chapsal's Leçons et Modèles de Littérature Française. | Le Brethon's Guide to the French Language; Berard's Leçons Françaises. | Le Brethon adopted September 1, 1847; Chapsal adopted August 22, 1848. |

| Year. | Text-books. | | Remarks. |
|-------|--|--|---|
| | <i>Third class—Continued.</i> | <i>Fourth class—Continued.</i> | |
| 1849 | Bolmar's Levizac's French Grammar and Verb Book; Chapsal's Leçons et Modèles de Littérature Française; Rowan's Morceaux Choisis des Auteurs Modernes. | Bolmar's Levizac's French Grammar and Verb Book; Berard's Leçons Françaises. | Bolmar's Levizac and Rowan adopted January 16, 1849. |
| 1852 | Same, with addition of Berard's Leçons Françaises. | Same..... | |
| 1856 | Bolmar's Levizac's French Grammar and Verb Book; Chapsal's Leçons et Modèles de Littérature Française; Rowan's Morceaux Choisis des Auteurs Modernes. | Same, with addition of Chapsal's Leçons et Modèles de Littérature Française; Spiers and Surenne's French and English Dictionary. Used for reference in both classes. | Spiers and Surenne's Dictionary adopted June 2, 1856. For reference. |
| 1859 | Bolmar's Levizac, etc.; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Bolmar's Levizac, etc.; Chapsal's Leçons, etc.; Rowan's Morceaux, etc.; Berard's Leçons, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Agnel's Tabular System used in manuscript from 1859. Adopted in printed form July 1, 1865. |
| 1862 | Bolmar's Levizac, etc.; Berard's Leçons, etc.; Chapsal's Leçons, etc.; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Bolmar's Levizac, etc.; Berard's Leçons, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | |
| 1868 | Bolmar's Levizac, etc.; Chapsal's Leçons, etc.; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Bolmar's Levizac, etc.; Berard's Leçons, etc.; Chapsal's Leçons, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | A second course of idioms added to the tabular system in 1867. In third class Bolmar's Levizac, Chapsal and Berard's Leçons, etc., were discontinued June 24, 1872. |
| 1872 | Borel's Grammaire Française; Reynal's Verb Book; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Böcher's Otto's French Grammar; Reynal's Verb Book; Böcher's French Reader; Böcher's College Series of French Plays, Vols. I and II; Agnel's Tabular System; Spiers and Surenne's French Dictionary. | Böcher's Grammer, Reader, French Plays; Borel's Grammaire and Reynal's Verb Book were adopted June 24, 1872. Böcher's Grammar discontinued July 3, 1878. |
| 1879 | Keetels' Analytical and Practical French Grammar; Reynal's Verb Book; Borel's Grammaire Française; Böcher's College Series of French Plays, Vols. I and II; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Keetels' Analytical and Practical French Grammar; Reynal's Verb Book; Böcher's French Reader; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Reynal's Verb Book and Böcher's Reader discontinued November 1, 1881. |
| 1882 | Keetels' Analytical and Practical French Grammar; Borel's Grammaire Française; Böcher's College Series of French Plays, Vols. I and II; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Keetels' Analytical and Practical French Grammar; Keetels' Analytical French Reader; Agnel's Tabular System; Spiers and Surenne's Dictionary. | Agnel's Tabular System discontinued December 14, 1883. |

DEPARTMENT OF THE SPANISH LANGUAGE.

The Secretary of War directed, in a letter from the inspector of the Military Academy dated July 5, 1854, that the Academic Board arrange a programme of studies for a five years' course, and observe therein certain conditions, among which was the introduction of the Spanish language. The programme of studies drawn up by the Academic Board in accordance with the above instructions was subsequently approved by the Secretary of War and went into operation September 1, 1854. The Spanish language as one of the courses of instruction at the Military Academy therefore dates from September 1, 1854.

Previous to this date, however, it appears that there had been some thought of introducing the study of this language. A letter from the Superintendent of the Military Academy, dated January 28, 1824, to the inspector of the Academy acknowledges the receipt of a letter from the latter, in which it was stated that the authorities at Washington proposed to add to the Academic Board two professors (or teachers) of the Spanish language. In his reply the Superintendent states that the objection to the introduction of the language was the lack of time, unless some studies were dropped.

Although the Spanish language as a part of the course of studies dates from September 1, 1854, yet from the fact that in the arrangement of studies it was put in the third year (third class), instruction in it did not begin until September 1, 1856.

From September 1, 1856, to the establishment of a professorship of Spanish by Congress February 16, 1857, and until the appointment of a professor, the instruction in that language was placed under charge of the professor of the French language, who was styled the professor of French and Spanish, and the department was styled the department of French and Spanish.

The act of Congress approved February 16, 1857, provided that "there shall be appointed at the Military Academy, in addition to the professors authorized by the existing laws, a professor of Spanish."

Under the provisions of this act, Patrice De Janon was appointed professor of Spanish July 1, 1857. With the exception of the period from September 16, 1863, to March 4, 1865, during which he was out of service, Professor De Janon was the head of the department until his retirement June 30, 1882, when the department of Spanish was incorporated with the department of the French language into the department of modern languages.

Professor De Janon was the only professor of Spanish under the above act of Congress, and his total service as head of the department extended over twenty-three years.

From September 16, 1863, to July 27, 1864, the department was again placed under charge of the professor of the French language. From July 27, 1864, to March 4, 1865, when Professor De Janon returned, it was under charge of Capt. Edward R. Platt, Second United States Artillery, and major, United States Volunteers, as acting professor.

The following table gives the different heads of the department from September 1, 1856:

| Name. | Army rank when appointed. | Term of service. | | Remarks. |
|--------------------------|---|------------------|----------------|-----------------|
| | | From— | To— | |
| <i>Professors.</i> | | | | |
| Hyacinthe R. Agnel .. | Professor of French..... | Sept. 1, 1856 | July 1, 1857 | Relieved. |
| Patrice De Janon..... | Sword master | July 1, 1857 | Sept. 16, 1863 | Out of service. |
| Hyacinthe R. Agnel .. | Professor of French..... | Sept. 16, 1863 | July 27, 1864 | Relieved. |
| <i>Acting professor.</i> | | | | |
| Edward R. Platt | Captain, Second Artillery; major, United States Volunteers. | July 27, 1864 | Mar. 4, 1865 | Do. |
| <i>Professor.</i> | | | | |
| Patrice De Janon..... | ..... | Mar. 4, 1865 | June 30, 1882 | Retired. |

TIME ALLOTTED TO INSTRUCTION IN THE SPANISH LANGUAGE.

When the instruction in Spanish began, September 1, 1856, the time allotted to it in the programme of studies drawn up and approved in 1854 for the five-year course was as follows:

In the third year (third class), recitations of one hour each from 11 a. m. to 1 p. m., alternating with French, from September to January; daily recitations of one hour each from

11 a. m. to 1 p. m. from January to June; being a total of about 170 recitations.

When the change from the five-year course to one of four years finally took effect, September 1, 1861, the time allotted to Spanish in the new arrangement of studies was as follows:

In the fourth year (first class), recitations of one hour each from 11 a. m. to 1 p. m., alternating with riding, from September to June, being a total of about 110 recitations. As Spanish was changed from the third year to the fourth year, the first class was not reached until September 1, 1862; consequently from September 1, 1861, to September 1, 1862, no instruction was given in Spanish.

In the modification of the arrangement of the course of studies caused by discontinuing English studies, which went into effect September 1, 1867, instruction in Spanish was changed from the fourth year (first class) to the second year (third class), and the following allotment of time was made: In the second year (third class) recitations of one hour each from 11 a. m. to 1 p. m., alternating with French, from September to June, being a total of about 110 recitations.

In the rearrangement of the course of studies made necessary by the restoration of English studies in 1877, instruction in Spanish was, on the recommendation of the Academic Board approved June 18, 1878, again changed from the second year (third class) to the fourth year (first class), and the following allotment of time was made: In the fourth year (first class), recitations of one hour each, from 11 a. m. to 1 p. m., alternating with riding from September to June, being a total of about 110 recitations.

As Spanish was changed from the second year to the fourth year, the first class was not reached until September 1, 1880; consequently from September 1, 1878, to September 1, 1880, no instruction was given in Spanish.

This allotment of time was remaining in force June 30, 1882, when the department of Spanish was incorporated with the department of the French language into the department of modern languages.

The following table gives the various changes in the allotment of time to Spanish from September 1, 1856:

| From— | To— | Recitations (one hour each). | Number of recitations. | Preparation—time of study at quarters (two hours per lesson). |
|---------------|---------------|---|------------------------|---|
| Sept. 1, 1856 | Sept. 1, 1861 | Five years' course adopted in 1854; went into effect in Spanish September 1, 1856. Third year (third class), recitations from September to January, alternating with French in forenoon; from January to June, recitations daily in forenoon..... | 170 | 340 |
| Sept. 1, 1862 | Sept. 1, 1868 | Four years' course adopted in 1861; went into effect in Spanish September 1, 1862. Fourth year (first class), recitations in forenoon, alternating with riding..... | 110 | 220 |
| Sept. 1, 1868 | Sept. 1, 1880 | Change went into effect in Spanish September 1, 1868. Second year (third class), recitations in forenoon, alternating with French..... | 110 | 220 |
| Sept. 1, 1880 | June 30, 1882 | Change went into effect in Spanish September 1, 1880. Fourth year (first class), recitations in forenoon, alternating with riding..... | 110 | 220 |

INSTRUCTION, TEXT-BOOKS, ETC.

The instruction in Spanish followed as closely as possible the same system and methods previously described as having been followed in the department of the French language previous to the introduction of the tabular system in 1859. The examinations were oral and conducted in the same manner as the examinations in French previous to 1873. From September, 1857, to September, 1858, the professor had no assistants and was the only instructor in the department. The large sections necessitated thereby made it impracticable to give each Cadet the requisite amount of individual instruction and practice. From 1858 assistants were provided.

The requirements of the course in Spanish until the absorption of the department June 30, 1882, were as follows: Spanish grammar; reading and writing Spanish; translating (from text and orally) English into Spanish and Spanish into English.

The following table gives the text-books used in the department until June 30, 1882:

| Year. | Text-books. | Remarks. |
|-------|--|---|
| 1856 | Third class (third year), Josse's Grammar; Romer and Camacho's Spanish Reader; Ollendorff's Oral Method as applied to Spanish by Velazquez. | Adopted June 2, 1856. Romer and Camacho's Reader discontinued July 16, 1858. |
| 1858 | Josse's Grammar; Morales's Progressive Spanish Reader; Ollendorff's Oral Method, etc. | Morales's Reader adopted July 16, 1858. Josse's Grammar discontinued September 1, 1874. |
| 1862 | First class, same as above. | |
| 1865 | Same; Seoane's Neuman and Barette's Spanish Dictionary. | For reference. |
| 1868 | Third class, same as above. | |
| 1874 | Vingut's Guide to Spanish and English; Ollendorff's Oral Method, etc.; Morales's Reader; Seoane, etc. | |
| 1881 | First class, same as above. | |
| 1882 | Vingut's Guide to Spanish and English; Ollendorff's Oral Method, etc.; Morales's Progressive Spanish Reader; Seoane's Neuman and Barette's Spanish Dictionary. | |

ENGLISH STUDIES.

English studies were restored as a part of the course of instruction at the Military Academy June 26, 1877, and from that date until June 18, 1878, were under charge of the chaplain and professor of history, geography, and ethics, although the instructors therefor, with the exception of the assistant professor of geography, history, and ethics, were taken from the department of French. June 18, 1878, the instruction in English studies was placed under charge of the professor of French, who from that date, and until the organization of the department of modern languages, was styled the professor of French and English studies, and the department was styled the department of the French language and English studies.

When the instruction in English studies was transferred to the department of the French language, June 18, 1878, the following allotment of time was made therefor: English studies, first year (fourth class), September to January, daily recitations of one hour each, from 2 p. m. to 4 p. m., being about 84 recitations; first year (fourth class), January to June, recitations of one hour each, from 2 p. m. to 4 p. m., two days each week, being about 40 recitations; a total of 124 recitations, with a preparation of two hours' study in quarters for each lesson, or two hundred and forty-eight hours. This

allotment was in force at the organization of the department of modern languages.

English studies from June 18, 1878, comprised instruction in English grammar, rhetoric, and composition, and the use and meaning of words and constructions. Hart's Rhetoric and Abbott and Seeley's English Lessons for English People had been used as text-books during the academic year 1877-78. These two books were retained, and to them was added, July 3, 1878, Whitney's Essentials of English Grammar. Abbott's How to Write Clearly was added to the above, January 16, 1880, and was used in place of certain portions of English Lessons for English People.

The above text-books continued in use to the date of the organization of the department of modern languages.

The examinations were oral at January and written at June.

The requirements of the course in English studies June 30, 1882, were as follows: English grammar; rhetoric; rules and exercises on composition; study of words and sentences.

DEPARTMENT OF MODERN LANGUAGES.

The department of modern languages at its organization, June 30, 1882, was made to comprise the three following branches of instruction: (1) English studies; (2) the French language; and (3) the Spanish language.

The requirements in each branch were the same as those previously described under the respective heads of the above three branches.

The following table gives the respective heads of the department from its organization to the present date:

| Name. | Army rank when appointed. | Term of service. | | Remarks. |
|-------------------------|------------------------------|------------------|---------------|----------|
| | | From— | To— | |
| George L. Andrews | Professor of French..... | June 30, 1882 | Aug. 31, 1892 | Retired. |
| Edward E. Wood | Captain, Eighth Cavalry..... | Oct. 1, 1892 | ..... |  |

TIME ALLOTTED TO THE DIFFERENT BRANCHES OF STUDY.

The time allotted to instruction in English studies, the French language, and the Spanish language at the organization of the department has been given under those respective

heads. It remained in force for all the above branches until August 27, 1883, when the Secretary of War approved the recommendation of the Academic Board of March 14, 1883, that the study of history be introduced and that it be allotted the time hitherto allotted to Spanish, from September to January in the first class year.

From August 27, 1883, therefore, the allotment of time was as follows:

English studies.—Daily recitations of one hour each, from 2 p. m to 4 p. m., September to January, fourth class year; and two recitations per week from 2 p. m. to 4 p. m., one hour each, from January to June, same year, or 124 recitations.

French language.—Three recitations per week of one hour each, from 2 p. m. to 4 p. m., from January to June, fourth class year, or 60 recitations. Daily recitations of one hour each, from 11 a. m. to 1 p. m., from September to January, third class year, or 220 recitations, being a total of 280 recitations.

Spanish language.—Recitations of one hour each from 11 a. m. to 1 p. m., alternating with riding, from January to June, first class year, or 60 recitations.

The above allotment remained in force until 1893. June 19, 1893, the Academic Board adopted a programme rearranging the order and time of certain studies at the Military Academy, which received July 30, 1893, the approval of the Secretary of War for so much as related to the department of modern languages. The allotment of time then made to the department is the one now in force, and will be given in the description of the present course. This new programme took effect September 1, 1893, for English studies; January 1, 1894, for the French language; March 1, 1895, for the Spanish language.

The first class, however, still continued under the previous programme as regards time, lessons, and text-books until June, 1896, both the third and first classes, therefore, undergoing instruction simultaneously during the years 1895 and 1896.



CADET BARRACKS. BUILT 1851.

The following table gives the changes in the time allotted from June 30, 1882, exclusive of the present arrangement:

| From— | To— | Recitations (one hour each). | Number and hours. | | Preparation—time of study at quarters (two hours per lesson). |
|---------------|---------------|--|-------------------|-----|---|
| June 30, 1882 | Sept. 1, 1883 | English studies: First year (fourth class), recitations daily in afternoon, September to January; January to June, two recitations per week in afternoon | 124 | 124 | 248 |
| |do..... | French language: First year (fourth class), January to June, three recitations per week in afternoon | 60 | 280 | |
| | | Second year (third class), September to June, daily recitations in forenoon | 220 | | |
| | Jan. 1, 1884 | Spanish language: Fourth year (first class), September to June, alternating with riding, in forenoon | 110 | 110 | 220 |
| Sept. 1, 1883 | Sept. 1, 1893 | English studies: First year (fourth class), recitations daily in afternoon, September to January; January to June, two recitations per week in afternoon | 124 | 124 | 248 |
| | Jan. 1, 1894 | French language: First year (fourth class), January to June, three recitations per week in afternoon | 60 | 280 | |
| | | Second year (third class), September to January, daily recitations in forenoon | 220 | | |
| Jan. 1, 1884 | Mar. 1, 1895 | Spanish language: Fourth year (first class), January to June, recitations in forenoon, alternating with riding | 60 | 60 | 120 |

INSTRUCTION, TEXT-BOOKS, ETC.

From the organization of the department, June 30, 1882, to the reorganization of the course of studies therein, July 30, 1893, the instruction in English studies and the French language followed the same methods as previously used, and which are described above under those heads. The same text-books in English studies and the French language remained in use, with the exception that Agnel's Tabular System was discontinued December 14, 1883, on account of having gone out of print. Its place was supplied during this period by selecting for each lesson an exercise selected from the French Reader. This exercise was given to the Cadets in English and was required to be written in French upon the blackboard, recited upon, and explained. On the introduction of new text-books in 1893, this practice was discontinued. Rowan's Morceaux Choisis was also discontinued in 1885, and its place supplied by Roemer's Cours de Lecture et de Traduction.

In Spanish the former text-books (Vingut's Guide to Spanish, Ollendorff's Oral Method by Velazquez, and Morales's Spanish Reader) were discontinued December 8, 1883, and

their place supplied by the introduction of Knapp's Spanish Grammar and Knapp's Modern Spanish Readings. The latter were text-books of more modern date and were better adapted to the requirements of the course. Thoroughness and accuracy were required in recitations, both in grammar and in reading, and the system and method of instruction were made to harmonize with the system and method followed in English studies and in French.

The method of examination in English studies and in French remained during this period the same as before the organization of the department of modern languages, that is to say, as follows:

English studies.—January examination, oral; June examination, written.

French.—All examinations, both oral and written.

In Spanish all examinations were both oral and written, from and including that of January, 1883.

The following table gives the different text-books used in the department until July 30, 1893:

| From— | To— | Third class. | Fourth class. | Remarks. |
|-------|------|--|---|---|
| 1882 | 1893 | ..... | English: Whitney's Essentials of English Grammar; Hart's Composition and Rhetoric; Abbott & Seeley's English Lessons for English People; Abbott's How to Write Clearly. | Whitney's Grammar discontinued July 30, 1893. Abbott & Seeley's English Lessons discontinued July 30, 1893. Hart's Rhetoric discontinued July 30, 1893. |
| 1882 | 1885 | French: Keetels' Analytical and Practical French Grammar; Borel's Grammaire Française; Bôcher's College Series of French Plays, Vols. I and II; Rowan's Morceaux Choisis des Auteurs Modernes; Agnel's Tabular System; Spiers and Surenne's French Dictionary. | French: Keetels' Analytical and Practical French Grammar; Keetels' Analytical French Reader; Agnel's Tabular System; Spiers and Surenne's French Dictionary. | Agnel's Tabular System discontinued December 14, 1883. Rowan's Morceaux Choisis discontinued 1885. |
| 1885 | 1894 | Keetels' Grammar; Borel's Grammaire; Bôcher's Plays, Vols. I and II; Roemer's Cours de Traduction et de Lecture, Vols. I and II; Spiers, etc. | Keetels' Grammar; Keetels' Reader; Spiers, etc. | Keetels' Reader discontinued July 30, 1893. Bôcher's College Series of French Plays, Vol. I, discontinued July 30, 1893. |
| 1882 | 1883 | Spanish (first class): Ollendorff's Oral Method by Velazquez; Vingut's Guide to Spanish; Morales' Spanish Reader; Seoane's Neuman and Baretti's Spanish Dictionary. | | Discontinued December 8, 1883. |
| 1883 | 1896 | Knapp's Spanish Grammar; Knapp's Modern Spanish Readings; Seoane's Neuman and Baretti's Spanish Dictionary. N. B.—Spanish in first class continued until June, 1896. | | Do. |

THE PRESENT COURSE (1896).

The department of modern languages at the present time comprises the following branches of study, taught in the following order and with the following allotment of time:

First. English studies. Taught in first year (fourth class) from September to January, with daily recitations of one hour each, from 2 p. m. to 4 p. m., and with a total of 84 recitations.

Second. The French language. Taught in first year (fourth class) from January to June, with daily recitations of one hour each, from 2 p. m. to 4 p. m., with 100 recitations; in second year (third class) from September 1 to March 1, with daily recitations of one hour each, from 11 a. m. to 1 p. m., with 142 recitations, or a total number of recitations in the French language of 242.

Third. The Spanish language. Taught in second year (third class) from March 1 to June, with daily recitations of one hour each, from 11 a. m. to 1 p. m., with a total of 78 recitations.

ENGLISH STUDIES.

The requirements of the course in English studies, as given in the academic regulations of 1894, are as follows: Rhetoric; rules and exercises on composition; study of words and sentences; study of synonyms; history of the English language; history of English literature.

From the above requirements and the authorized text-books, the course in English studies is divided into the following subjects:

1. Rhetoric; study and use of words; rules and exercises in composition.
2. Study of synonyms.
3. History of the English language and literature.

TEXT-BOOKS.

The text-books adopted, with the date of their adoption, for the course in English studies are given below in the order in

which they are used. The order and numbers correspond to the order and numbers of the subjects given above:

1. Williams's Rhetoric and Composition, adopted July 30, 1893; Abbott's How to Write Clearly, adopted January 16, 1880.
2. Smith's Synonyms Discriminated, adopted July 30, 1893.
3. Meiklejohn's English Language, adopted July 30, 1893.

BOOKS OF REFERENCE.

Roget's Thesaurus of English Words, adopted July 30, 1893; Smith's Synonyms Discriminated, adopted July 30, 1893; Webster's Dictionary.

The above books of reference are used as such throughout the entire course of the three languages taught in the department. Webster's Dictionary is furnished to the Cadets not merely for use in their language studies, but for use during their entire four years at the Academy.

THE FRENCH LANGUAGE.

The requirements of the course in French, as given in the academic regulations of 1894, are as follows: Grammar; reading and writing French; study and use of idioms; military terms; translating (from text and orally) English into French and French into English; study of English synonyms.

The instruction in French is divided into the following courses:

1. First course: First year (fourth class), January to June, daily recitations of one hour each, from 2 p. m. to 4 p. m., with 100 recitations.
2. Second course: Second year (third class), September to January, daily recitations of one hour each, from 11 a. m. to 1 p. m., with 102 recitations.
3. Third course: Second year (third class), January to March 1, daily recitations of one hour each, from 2 p. m. to 4 p. m., with 40 recitations.

THE FIRST COURSE.

One hundred lessons; 66 advance, 34 review, the proportion between advance and review varying in different text-books.

Text-books.—De Peiffer's French Pronunciation, adopted July 30, 1893; Keetels' Analytical and Practical French Grammar, adopted July 3, 1878; Castarède's Treatise on the Conjugation of French Verbs, adopted July 30, 1893; Roemer's Cours de Lecture et de Traduction, Vol. I, adopted in 1885; Bôcher's College Series of French Plays, Vol. II, adopted June 24, 1872.

Books of reference.—Spiers and Surenne's French Pronouncing Dictionary, adopted June 2, 1856.

SECOND COURSE.

One hundred and two lessons; 68 advance, 34 review, the proportion between advance and review varying in different text-books.

Text-books.—Castarède's Treatise on the Conjugation of French Verbs; Borel's Grammaire Française, adopted June 24, 1872; Hennequin's Lessons in Idiomatic French, adopted July 30, 1893; Bôcher's College Series of French Plays, Vol. II; Roemer's Cours de Lecture et de Traduction, Vol. II, adopted in 1885; Revue Militaire de l'Étranger, six months' subscription each year, adopted July 30, 1893.

Books of reference.—De Peiffer's French Pronunciation; Spiers and Surenne's French Pronouncing Dictionary.

THIRD COURSE.

Forty lessons; all advance, no review.

Text-books.—Castarède's Treatise on the Conjugation of French Verbs; Edgren's Compendious French Grammar, adopted July 30, 1893; Hennequin's Lessons in Idiomatic French; Roemers Cours de Lecture et de Traduction, Volume II; Revue Militaire de l'Étranger; Monday Daily Figaro, three months' subscription each year, adopted July 30, 1893.

Books of reference.—De Peiffer's French Pronunciation; Spier and Surenne's French Dictionary.

THE SPANISH LANGUAGE.

The requirements of the course in Spanish, as given in the Academic Regulations of 1894, are as follows: Grammar; reading and writing Spanish; translating (from text and

orally) English into Spanish and Spanish into English; study of English synonyms.

There is one continuous course of 78 lessons; 52 advance, 26 review, the proportion varying in different text-books.

Text-books.—Knapp's Spanish Grammar, used as verb book and for pronunciation, adopted December 8, 1883; Monsanto and Languellier's Spanish Grammar, adopted July 30, 1893; Mantilla's Spanish Reader, No. 3, adopted July 30, 1893; Eco de Madrid, adopted July 30, 1893; Knapp's Spanish Readings, adopted December 8, 1883.

Books of reference.—Seoane's Neuman and Baretti's Spanish Dictionary, adopted in 1865.

ORGANIZATION OF THE DEPARTMENT.

The department, as now organized, comprises the professor of modern languages, head of the department, and seven assistants, who are officers of the Army that have been detailed for such duty. The two senior assistants are by rank assistant professor of the French language and assistant professor of the Spanish language, respectively. As two classes (third and fourth) are undergoing instruction daily in the department, each one of the assistants has assigned to him for instruction three sections, either one section of the third class and two sections of the fourth class or two sections of the third class and one section of the fourth class. The assistant professor of French is the principal assistant as far as relates to the instruction of the fourth class, and the first and last sections in that class are assigned to him for instruction in addition to the section assigned to him in the third class. The assistant professor of Spanish has similar duties assigned to him in the third class, having the first and last sections thereof, as a rule, in addition to the section in the fourth class. The senior of the two assistant professors is a member of the academic board and examining committee, for the purpose of examining Cadets, arranging them in order of merit, and determining the proficiency or deficiency in every branch of study in the department.

The various duties of the head of the department and his assistants are as given in Article V, Academic Regulations of 1894.

THE RECITATION.

The section rooms are the same in size and form as those used in the other departments of instruction at the Military Academy.

THE RECITATION IN ENGLISH STUDIES.

In English studies as many members of the sections are assigned subjects for recitation at the blackboard as the size of the section will permit, reserving one member, and sometimes two, for questions on the lesson of the day or on the lesson of the preceding day. Each Cadet, when his name is called, takes his place in the center of the room facing the instructor, and standing at attention receives his enunciation. He then goes to the particular blackboard assigned to him by the order in which his name was called to receive an enunciation or subject of recitation, the first Cadet called taking the first blackboard to the right of the instructor on the side of the room opposite the latter, the others following in consecutive order from right to left. Immediately upon arriving at his proper blackboard the Cadet writes his name in the upper right-hand corner and under his name the number indicating the order in which he received his enunciation. He then proceeds to put upon the blackboard the work called for by his subject. He is not permitted to write out the subject-matter of his recitation, but is required to write the different heads thereof in the form of a synopsis showing their relation to one another, and is required to make the explanation orally. At each recitation one member of the section is required to write a synopsis of the lesson of the day and another member to write a synopsis of the lesson of the preceding day. When the Cadet is ready for recitation he indicates it by taking the pointer in his hand and standing at the blackboard facing the instructor. Until the first Cadet is called upon to recite

at the blackboard the time has been occupied in questioning those members of the section who were not sent to the blackboard.

When a Cadet at the blackboard is called upon to recite, he first gives from memory the enunciation of his subject in the exact words in which he received it, and then proceeds to explain and illustrate the subject by the knowledge of it that he has obtained by his own study. If his recitation be entirely satisfactory in every respect, he is then told that it is sufficient, and takes his seat. If not so, the instructor then goes over the subject until, by explanation and question, the Cadet understands it.

The work upon the blackboard, including the Cadet's name and number, is required to be written neatly and spelled and punctuated correctly. In the case of illustrative examples and exercises for correction, the whole work, of course, is put upon the blackboard.

THE RECITATION IN FRENCH.

The preliminaries up to and including the questions on the lesson of the day are the same as in English studies. At each recitation, immediately after the preliminary questions, a portion of the time, not to exceed ten minutes from the entrance of the section, and limited, if possible, to five minutes therefrom, is employed for pronunciation exercises and practice.

Each Monday, in the third-class course, this time is employed in dictation exercises, the papers being subsequently corrected and marked by the instructor, and the mark given therefor combined with their mark on the recitation of the day.

Immediately after this daily practice in pronunciation the recitation proper begins. The members of the section are called up in order, and, with the exception of three or four who are reserved for recitations in reading, are given subjects for recitations at the blackboard. These subjects contain grammatical principles to be explained and illustrated and themes and exercises connected therewith, or idioms and

exercises thereon; each subject, however, always requires a tense of a verb to be written on the blackboard in addition to the subject-matter proper. Until the first recitation at the blackboard the time is employed in the recitations in reading by those Cadets who were not sent to the blackboard. After these Cadets have completed their recitation in reading, they are required to write a verb on the blackboard. The recitation at the blackboard is similar in form to that in English studies, except that the subject-matter is all put upon the blackboard, with the exception of explanations.

The recitation in reading is conducted as follows:

1. The Cadet, standing in the center of the room and facing the instructor, reads aloud a portion of the French text as an exercise in pronunciation.

2. He then translates literally or freely, as may be required.

3. The book is then closed, and as an exercise in ear training portions of the French text that he has read, or, when more advanced, portions of French text that he has not read, are read aloud to him by the instructor, the Cadet being required to give, as well as possible, the English translation of what he hears.

In order to counteract the pernicious habit of guessing at the sense without an accurate knowledge of the meaning of each word, and also in order to accustom the Cadet to the order of the words in French (differing so much from the order in English), translations strictly literal are required for the first twenty lessons in reading. After that free translations will be given, the instructor, however, whenever deemed necessary, ascertaining that the Cadet understands thoroughly the literal translation.

Reading at sight is practiced whenever time is available.

THE RECITATION IN SPANISH.

This recitation is conducted in the same manner and by the same methods as in French.

All recitations are marked on the following scale: 3, thorough; 2.5, good; 2, indifferent; 1.5, bad; 1, very indifferent; 0, complete failure.

The different sections in the two classes, varying in number from 17 to 20 and 21, are visited by the head of the department, when practicable, at least once each week.

REVIEW OF PRESENT COURSE (1896).

In the course of instruction as at present arranged in the department the three languages taught follow one another in succession; each language (English, French, Spanish) is taken up and completed before the succeeding one is begun, and no two languages are studied simultaneously by the same class. By being placed, according to the programme of studies, entirely in the first two years at the Academy (fourth and third classes), they are taught in combination with but one other branch of study, mathematics, thereby affording not only the natural and best correlation of studies for mental training during those years, but also the best opportunity for acquirement.

ENGLISH STUDIES.

As the Cadets of the Military Academy are destined to be officers of the Army, the primary aim of their instruction in rhetoric and composition is to give them such information, instruction, and training as will enable them to express themselves clearly and plainly, so that their meaning can not be mistaken, and that it be expressed in the most clear and forcible way. The course in rhetoric and composition is therefore prepared with this aim in view. It comprises the essential principles of punctuation, of the selection and right use of words, of the construction of sentences and the errors to be avoided therein, the principles of paragraphing, the outlining of subjects of composition, the effect and use of figures, and the forms to be observed in letters. All of these are supplemented by examples for practice in application.

As regards oral expression, it is known that errors therein are prevalent among Cadets, though it is doubtful whether they are more so than throughout the country or among students elsewhere. Certainly the Cadets are fair representatives of the average youth of the various schools throughout the United States. It is simply more noticeable to visitors

here on account of the greater opportunity the latter have, from the examinations and recitations, of hearing those errors.

Be this as it may, it is of course desirable to correct as far as possible these errors in oral expression. But it must be borne in mind that they are the result of acquired habit, and can be changed only by another acquired habit. This last can come only by persistent and constant correction of those errors of speech whenever and wherever they are heard in all branches of study. Mere knowledge given to the Cadet of these errors is not sufficient to eradicate them; correction of these errors during a recitation of an hour in one branch of study is not sufficient to eradicate them. Daily and constant correction everywhere is the only remedy.

A knowledge of the exact and precise meaning of the words to be used is of great value, and some instruction in the distinction of synonyms is desirable. It is thought, however, that consecutive lessons on this subject alone for a definite time as a separate division of English studies would not produce the best results. The knowledge would soon be forgotten by the introduction of new matter. Moreover, any such number of synonyms as would necessarily be given for a single lesson would require considerable time for their proper study. It is believed that the best practical results are obtained by assigning daily one word and its synonyms (learned from Smith's *Synonyms Discriminated*) from October 1 of the fourth-class year until the end of the entire language course—that is, June of the third-class year. The labor required daily to learn one word and its synonyms is a trifling addition to that required for the study of the lesson of that day, and by extending the study over the entire language course the habit of discrimination, resulting from studying 380 synonyms, would, it is hoped, be acquired.

The course in the history and historical elements of the English language and in its literature, though short, fulfills an object of considerable importance, namely: It not only gives information and knowledge such as those having the position of officers of the Army should possess, but it is also intended to be suggestive of different courses of reading that the Cadet could follow with interest and advantage.

THE FRENCH LANGUAGE.

Immediately after the completion of English studies the study of the French language is begun in January, fourth-class year, and extends over 242 daily recitations from that time until March 1, third-class year, being divided by examinations into the course from January to June, fourth class; September to January, third class; and January to March 1, third class, called the first, second, and third courses, respectively.

THE FIRST COURSE.

As regards pronunciation, the aim of the instruction throughout all the courses is to make the Cadet acquire, by knowledge and practice, the ability to pronounce accurately each word, to acquire a thorough knowledge of all the principles and sounds of sentence accentuation, and in practice to be fairly able to give the sentence accentuation correctly. Ease in word pronunciation and ease and correctness in sentence accentuation can be acquired only by fluency of speech. Fluency of speech in a foreign language can be acquired only by habitual use of it by one person by association with another using the language or by residence where it is spoken. In the entire course in French, consisting of 242 recitations or hours of practice, the sections number ten members, and frequently a greater number. This gives little more than twenty-four hours' practice in pronunciation for each Cadet during the entire course. The same conditions to a greater or less extent prevail in all institutions where a foreign language is necessarily taught in the class room, and it is for that reason that the power to speak with even moderate fluency a foreign language can not be and never has been acquired in a class room.

As the majority of the Cadets when they begin the study of French have no previous knowledge of the language, the first two lessons in the course are given solely to pronunciation. Lessons are assigned in the text-book on pronunciation, upon which the Cadets recite as well as receive information and example from the instructor. After the first two lessons instruction and practice in pronunciation are given by the

daily recitations and by the daily pronunciation drill described under the head of recitations.

Instruction in grammar is begun at the third lesson of the course. In the text-book used (Keetels' Analytical and Practical French Grammar), only the grammatical principle and rules, the illustrative examples thereon, and their application in the theme are required to be learned for recitation, the oral exercises and examples being used for reference only, except that in each lesson the first paragraph of the oral exercises, consisting of a few short sentences, is required to be committed to memory, not to be put upon the blackboard, but to be recited orally as an exercise in sentence accentuation.

It has been found by experience that for the study of the French verb better results are obtained by using a verb book separate and distinct from the grammar. To further aid the study of irregular verbs, a pamphlet has been prepared giving a brief explanation of the derivation of the different verb forms from the primitive tenses, accompanied by a model of the form in which the verb must always be written upon the blackboard.

In reading, no single text-book has been found that is suitable for the course here, and it has been found necessary to use several of them and to make suitable selections therefrom. As much as possible, text-books without vocabularies have been selected, as experience has proved that more French is acquired and more French retained when the learner has to search for the meaning of words and sentences in the dictionary than when he relies upon incomplete and faulty vocabularies and notes in the text-book.

THE SECOND COURSE.

As a thorough and familiar knowledge of the verbs is essential, repetition of their study is necessary. Beginning, therefore, at the first verb in the verb book, two verbs are assigned to each lesson as far as the fiftieth lesson, after which the verbs previously learned are reviewed.

Dictation exercises begin in this course, and are given every Monday. In the second course it is considered that

the Cadet has made sufficient progress in his knowledge of the language to admit of the introduction of a course in the study of French idioms. The text-book used on that subject is peculiarly suited, on account of the number of lessons into which it is divided and the arrangement of the subject-matter in each lesson, to the limitations and requirements of the course here. The book is divided into 50 lessons, each lesson containing two idioms with explanation, an exercise in French exemplifying the idioms, a short theme or composition, and a conversational exercise. Beginning with the second lesson of the programme of lessons, one lesson in the text-book on idioms is assigned to each lesson in the course, omitting the French exercise and the conversation and taking only the two idioms and the theme or composition; at the fiftieth lesson the book is completed, and the idioms are then gone over again in 50 lessons. In the review the theme or composition and the conversation are omitted, only the two idioms and the French exercise being required.

As the Cadet is to be an officer of the Army, the course in the French language should give him something of a military vocabulary. The course in reading, therefore, has a certain amount of military literature. As the Cadet at this stage of his progress has a fair acquaintance with literary and everyday French, it has been decided to introduce military literature in this course, keeping it subordinate to general literature. For this purpose one lesson per week is assigned in a French military periodical, the *Revue Militaire de l'Étranger*, thus giving in the second course 16 lessons in military reading. As it is deemed important to acquire as large a military vocabulary as possible, and as the style in military literature is generally quite simple and easy, the reading in the *Revue Militaire de l'Étranger* is continuous without any review. This periodical is taken by a six months' subscription each year, and consequently has the advantage of dealing with current military matters. Moreover, in addition to the instruction it gives in the use of the French language, the information it gives is eminently valuable to the military student and is likely to be remembered.

THE THIRD COURSE.

This course has only 40 lessons, and is the final or finishing course in French.

It is believed that the grammar course at this stage of the instruction in French should be of the nature of a general review or survey of the general and important principles of the language, combined with some instruction in the historical development of its various forms and constructions, the latter instruction being adapted to the knowledge and capacity of the Cadet. Some knowledge of this historical development is not only information proper for an educated man, but is extremely useful in enabling the student to understand, remember, and use the various forms and constructions of the language he is studying. As best answering the above requirements, Edgren's Grammar has been selected for this course.

The lessons are continuous, with no review, as the whole third course is of the character of a general review or survey of the general principles of the language.

In this course the military reading is made predominant. There is also introduced a course of reading from a French newspaper taken three months each year.

The following division is made of the different kinds of reading during the third course: Military reading from the *Revue Militaire de l'Étranger* during three days of the week; reading in general literature during two days of the week; reading at sight from a French newspaper for one day of the week. The lessons in reading are continuous in all kinds of reading, without any review.

The characteristics of the course in French are the variety of grammatical instruction arising from the use of many grammars—which enables the same subject to be presented in different ways and which gives more benefit than several reviews in the same book—the extent and variety of the course in reading, military reading, sight reading, the course of idioms, and the daily drill in pronunciation.

THE SPANISH LANGUAGE.

The system and methods used in the course in Spanish follow the same lines as in French, with the exception that there is no military reading and no course of idioms, time not being available therefor. On account of the small number of lessons, the same proficiency as in French can not be attained.

A good knowledge of the forms of the verb in Spanish is relatively of greater importance than in French, owing to the ordinary omission of its subject. The ease and quickness with which the verb in Spanish may be understood and learned depends almost entirely on the manner in which its forms are named, explained, and presented. For these reasons Knapp's Grammar has been selected as the text-book for verbs, and also for the reason given in the course in French that verbs are always better learned in a verb book separate and distinct from the grammar.

It has been found necessary to use three text-books to answer the requirements of the course in reading. In no other way was it possible to combine the necessary ease for beginners with the necessary variety in vocabulary and construction, and variety in examples of the literature of the language as well as its everyday speech. It is particularly the case in the Spanish course here, where it is necessary to have as much variety as possible in a short period of time. In selecting the three readers used, it has been the aim to secure thereby easy and simple selections for the beginning of the course in reading, good and representative examples of modern Spanish literature, and also reading selections that would give instruction in everyday speech and in the names of the ordinary and usual objects therein mentioned. The *Eco de Madrid* is used for the latter purpose.

In comparing the present course with former courses in the three languages, the comparison must be made between differences in arrangement of time and differences in matter and instruction. Formerly the three languages were in three different departments and under three different professors; now they are all under one head. Formerly and until 1893

two of the three languages were taught at the same time in the same class; now each language is taught separately, and the three languages follow one another in due succession—a great advantage over the former arrangement. In regard to the time devoted to their study, formerly French varied from 400 recitations to 272, having once 238 recitations; now it has 242 recitations. Formerly Spanish varied from 170 recitations to 60; now it has 78 recitations. English studies since their reintroduction in 1877 varied from 60 to 124 recitations; now it has 84 recitations.

In regard to matter and instruction, English at the present time differs from the former courses in the absence of instruction in grammar, in having a course in the history of the language and of its literature, in allowing only the heads of a subject to be put upon the blackboard, and in requiring synopses. French differs from former courses in having a greater variety of text-books in grammar and in reading, in having a course of military reading, in reading from a French newspaper, in the practice of sight reading and in requiring it at all examinations from every Cadet, in having dictation exercises, in the method of teaching pronunciation, in having daily pronunciation drill, and in the absence of a review in reading in the final course. Spanish differs in the greater variety of the reading, in having sight reading, requiring it of every Cadet at the examination, and in the method of teaching pronunciation.

As the object and aim of the instruction at the Military Academy give it a special character peculiarly its own, I have found it impossible to make any fair comparison between the course here and in other institutions.

The advantages of the present course are in the arrangement of studies, which permits the three languages to be studied separately without interfering with one another, and which permits them to follow one another in due order.

The defects are, first, the short time given to Spanish; second, the fact that the instructors are required to be versed in three languages and are required to teach two different languages at the same time, hearing recitations in both languages on the same day.

Language being so much a matter of acquired and afterwards involuntary habit, it is difficult to pass from the atmosphere of one immediately into the atmosphere of another for the purpose of instruction.

HISTORICAL SKETCH OF THE DEPARTMENT OF CHEMISTRY.

Instruction in chemistry was introduced at the Military Academy in October, 1820. The immediate cause and manner of this introduction are shown by the following letter and order:

MILITARY ACADEMY,
West Point, April 26, 1820.

DEAR SIR: I have just received your letter of the 20th instant and hasten to say in reply that I am highly pleased with your proposition to appoint Dr. Cutbush a post surgeon and to station him at West Point, with instructions to deliver each year a course of lectures on chemistry. The Cadets of the first and second classes (about 100) would be permitted to attend, and it is probable that few would decline the opportunity. I am of opinion that \$5 from each Cadet for a single course would be a reasonable compensation.

The sum of \$500, if necessary, may be spared from the appropriation of the present year to be applied to the purchase of chemical apparatus.

I am, sir, with great respect and esteem, your obedient and humble servant,

S. THAYER,
Brevet Major, Superintendent Military Academy.

Dr. JOSEPH LOVELL,
Surgeon-General United States Army.

It thus appears that the detail of Doctor Cutbush and consequent beginning of instruction in the department was immediately due to the suggestion of the Surgeon-General, Dr. Joseph Lovell. Doctor Cutbush was appointed post surgeon May 16, 1820, and his name appears on the Academic Register of June, 1820, as acting professor of chemistry. Instruction in the department was begun October 9, 1820, as shown by the following order:

U. S. MILITARY ACADEMY,
West Point, N. Y., October 8, 1820.

POST ORDERS.]

Dr. Cutbush, having completed his arrangements for a course of lectures in chemistry and mineralogy, will deliver the introductory lecture to-morrow at 12 o'clock.

The course will be attended by the Cadets of the first and second classes, which will be formed into one squad and marched to the lecture room at 12 o'clock every week day by the adjutant of the battalion or, in his absence, by the squad marcher of the first section of the first class. Seats will be assigned to the Cadets in such manner as to enable the whole to see the experiments to the best advantage, after which they are not to change seats. All officers of the post are permitted to attend the lectures. * * *

To enable Cadet Triste, acting assistant teacher of French, to attend the chemical lectures with his class, the fourth French section of the fourth class is to recite for the future in the evening, and will assemble for that purpose at the signal to return to quarters after supper.

By order:

GEO. BLANEY,

Lieutenant and Post Adjutant.

These lectures to both classes at the same hour did not long continue, for the regulations of the Academy, adopted in March, 1821, provided separate hours.

Both the first and second classes were examined in chemistry at the January and June examinations of 1821, and although there is no record of an examination in mineralogy, the first class was given a standing in this subject after the June examination, 1821, and it is inferred that it was also taught to the first class during the academic year 1820 and 1821. The regulations of 1821 provided that chemistry and mineralogy should be taught in a course of lectures and experiments to the first and second classes at the rate of three lectures per week to each class, accompanied with suitable interrogatories. These lectures from the beginning must have partaken largely of the nature of recitations, for the classes were divided into sections. One hour (12 to 1) every other day was devoted to lecture and interrogatory and the same hour on the other days to the study of the subject.

The instruction to the first class was at first given both in mineralogy and applied chemistry; to the second class in chemistry only. Geology is first mentioned as one of the subjects upon which the first class was examined in June, 1823. An important departure from the provisions of the regulations was made in December, 1822, when the hour from 11 to 12 was allowed for instruction of the first class in mineralogy, and in the spring of 1823 the same hour was allowed for the recitations of the second class in chemistry.

The regulations of 1825 (approved March 1 of that year) contained substantially the same provisions as those of 1821 in regard to the instruction to be given in the department.

(a) INSTRUCTION OF THE FIRST CLASS.

The history of the instruction to the first class in this department may be summarized as follows:

From 1820 to 1830, when instruction was given in both mineralogy and applied chemistry, an hour each day in the week was allowed for the section-room exercises during the entire year, but instruction was not always continuously given. From 1830 to 1853 the regulations of the Academy prescribe three section-room exercises per week in mineralogy and geology, but this number was actually held for only about one-half the academic year upon alternate week days, except Saturdays. The actual number of recitations or lectures permitted in mineralogy and geology since 1830 has been very nearly the same up to the present. There was a slight increase in the number at the time of the changes in 1872 and 1879, but the number has varied between 45 and 55. Prior to 1830 a greater number of days was given to the instruction of the first class in this department, but the class then devoted time to applied chemistry as well as to mineralogy and geology. The exact time devoted by this department to the instruction of the first class between 1820 and 1830 can not be determined; the regulation schedule was interfered with in many ways.

From June, 1834, to June, 1838, the study of mineralogy appears to have been suspended for lack of a suitable textbook, though that of geology was kept up. In the autumn of 1838 the study of mineralogy was resumed, and with geology has been annually taught since. Although but little time was devoted to these subjects during the second term of the academic year between 1841 and 1872 (about three weeks in May), the class was examined in the branches both in January and June. Since 1872 there has been only one examination (in June), all the study of the subjects pertaining to the second term. The previous study given the subject in May

(between 1841 and 1872) was merely a review for the June examination.

The text-books used in mineralogy and geology since 1820 are as follows:

Cleveland's *Treatise on Mineralogy and Geology*, 1820 to 1833 or 1834.

Bakewell's *Geology*, 1833 or 1834 to June, 1841.

Lyell's *Geology*, 1841 and 1842.

Dana's *Mineralogy* (manual), first to fifth editions, September, 1839, to January, 1894.

Elementary Geology, E. Hitchcock, 1842 to June, 1872.

Text-book of Geology, Dana, 1872 to 1882.

Elements of Geology, Le Conte, 1882 to 1896.

Elementary Lessons in Mineralogy, Tillman, 1894 to 1900.

A Description of the Common Rocks (brochure), Tillman, used with Le Conte's *Geology* until 1900. In 1901 *Important Minerals and Rocks*, by Tillman, replaced the last two books of the above list.

(b) INSTRUCTION OF THE SECOND CLASS.

The study of chemistry in the second class was introduced October 9, 1820. The schedule for this branch of study in this class assumed definite shape very soon after introduction, and with only a few temporary interruptions has continued almost unchanged to the present time. Instruction in general chemistry has from the above date been given to the second class. For a year or two after the introduction of the subject one hour (12 to 1) a day was devoted to this subject, but in 1823 the hour from 11 to 12 was also given. From 1823 to June, 1880, with the exception of short intervals between 1823 and 1830, recitations in chemistry, or lectures on that subject, have been held on alternate week days throughout the year—half the class reciting one day and the other half the next—each section attending one hour, the first hour being from 11 to 12 and the second from 12 to 1 o'clock. In the reorganization of the course for a five years' term (1854 to 1861) this arrangement was not disturbed. After June, 1879, when instruction in mineralogy and geology was transferred to the

second class year, recitations in chemistry were made daily between November 1 and January 1, and from the close of the January examination to the end of the course in chemistry. The recitations were on alternate days during September and October. When the course in chemistry was completed, after the January examination, the other subjects, transferred to this year from the first class year, were continued until June, recitations being daily, except during the month of April. In May, 1882, the schedule which appears in the regulations of 1883 was established and is still in operation, except that the additional subject of physiology and hygiene was introduced for the first time in 1887, a law to that effect having been passed in 1886. From 1823 to 1880, approximately, the same allowance of time was given to the chemical recitations and instruction of the second class. Since 1880 there has been a slight increase, due to the changes resulting from the transfer of mineralogy and geology to the second class year. In this connection it should be remembered that the term chemistry included electricity from 1858 to 1880.

The text-books used in the chemical studies of the department were the following: Henry's Chemistry, from 1820 to June, 1829; Turner's Chemistry, from 1829 to June, 1840; Webster's Chemistry, from 1840 to June, 1843; Kane's Chemistry, from 1843 to June, 1858. During the years 1859 and 1860 both Fowne's and Regnault's chemistries were used. Fowne's Chemistry from February, 1858, to June, 1884 (seventh to thirteenth editions); Bloxam's Chemistry from June, 1884, to 1896 (fifth to eighth editions).

Principles of Chemical Philosophy or Essential Principles of Chemistry (Tillman) was used in conjunction with Bloxam. In 1897 Tillman's Descriptive General Chemistry replaced Bloxam. The subject of electricity and magnetism was first taught in this department during the year ending June, 1858. Miller's Physics of Chemistry was the text-book on this subject from that time until January, 1883. In January, 1883, Miller was replaced by S. P. Thompson's Elementary Lessons in Electricity and Magnetism. This book is still used,

having passed through several editions, the latest being that of 1895.

Dr. James Cutbush, assistant surgeon, U. S. Army, was the first head of the department and acting professor of chemistry at the Academy. He served from the creation of the department until his death, December 10, 1823. Assistant Surgeon James G. Percival succeeded Doctor Cutbush, and was acting professor of chemistry, etc., from March 4 to July 6, 1824. Assistant Surgeon John Torrey was the acting professor from August 25, 1824, to June 15, 1827. Doctor Torrey afterwards filled many distinguished positions, among which may be mentioned that of professor of chemistry and botany in the Collège of Physicians and Surgeons in New York City; professor of chemistry at Princeton College, New Jersey; professor of chemistry, mineralogy, and botany at the University of the City of New York.

Lieut. W. F. Hopkins, Fourth Artillery, was acting professor of chemistry, etc., from June 15, 1827, to August 31, 1835. Among the positions subsequently filled by Professor Hopkins may be mentioned that of professor of chemistry and natural philosophy, William and Mary College, 1849-50; professor of natural and experimental philosophy, United States Naval Academy, 1850 to 1859. Lieut. J. W. Bailey, First Artillery, was the acting professor of chemistry, etc., from August 31, 1835, to July 8, 1838. At this latter date he was appointed professor of chemistry, mineralogy, and geology, and occupied the position until his death, February 26, 1857. Capt. H. L. Kendrick, Second Artillery, was appointed professor of chemistry, etc., March 3, 1857, and served until December 13, 1880. Professor Kendrick, prior to his appointment as professor, had served from September, 1835, to January, 1847, as assistant in the department to Professor Bailey. Lieut. S. E. Tillman, Corps of Engineers, was appointed to the professorship to succeed Professor Kendrick January 1, 1881. At the date of his appointment Lieutenant Tillman had served for four and a half years as assistant in the department to Professor Kendrick and one year as assistant in the department of philosophy.

The foregoing account shows the general development of the department. There has been but little variation in the time devoted to the subjects of the department. The list of text-books given shows that constant effort was made to keep abreast with the advances in the branches taught.

The most important single and distinct change in the department since 1830 was made when all the instruction in the department was transferred to the second-class year and the whole placed in the morning hour, from 11 to 1, for recitations. This change first took effect with the second class 1879 and 1880. It allowed 25 more lesson days to the department, gave the morning hour for all recitations, and relieved the department from the necessity of conducting simultaneously instruction in two branches, occupying both morning and afternoon, with the same set of instructors, an arrangement which prevented sufficient attention to either branch.

THE PRESENT COURSE.

Since the changes as to time, made in 1879 and 1882, already referred to, the department has had 186 recitation days; of this number 81 come before January and 105 after.

The course before January embraces the subjects of heat and chemistry; after January, physiology and hygiene, electricity, mineralogy and geology. The text-books used before January are, *Elementary Lessons in Heat*, Tillman; *Descriptive General Chemistry*, Tillman.

The text-books used after January are *Anatomy, Physiology, and Hygiene*, Tracey; *Elementary Lessons in Electricity and Magnetism*, S. P. Thompson; *Elements of Geology*, Joseph Le Conte; *Important Minerals and Rocks*, Tillman.

The number of recitations before the midwinter examination is 68; after this examination, 92. Lectures with experimental illustrations accompany the recitations throughout the course and are so selected and timed as to elucidate many of the difficult points of the course and to benefit the students as much as possible in acquiring a knowledge of the principles of the sciences taught. There are from 25 to 28 lectures during the year's course.

The lectures are delivered to the entire class assembled in the lecture room of the department. The arrangement of lectures is such that they, in general, are delivered on the advance course and pertain to the discussion and illustration of principles and subjects already studied by the Cadets. Having the lecture precede the study of the subject was tried and found less satisfactory than the method indicated. It frequently happens that the knowledge of the class is such that subjects in advance of the lesson may with advantage be dealt with; it is then done, but as a rule the lectures relate to subjects already studied. All but a few of the lectures are delivered during the advance lessons of the class and follow each other in such order that the illustrations and demonstrations in each may embrace, as nearly as possible, all the matter studied by the class since the preceding lecture. There were 27 lectures during the last academic year, thus giving one lecture for each three advance lessons of the course, there being 81 such lessons. The intervals between lectures are not, however, uniform, so that precisely three recitations do not always intervene between them, even when no review is made.

These frequent assemblies of the class give ready opportunity to enforce thought in the directions that the section-room consideration show to be most desirable. They are made the occasion of calling the attention of any members of the class to subjects, principles, etc., that need more study. While the main object of the lectures is to illustrate and elucidate the principles and facts of the text, they are taken advantage of to convey much useful information—scientific, historical, and otherwise—in the effort to show the breadth of the sciences taught, their relations to other branches of knowledge, and to give to the study a real meaning and create a living interest in the Cadets.

Before the midwinter examination the members of the class who have made sufficient progress are given a course of “chemical manipulation” in the laboratory during the month of November. This laboratory experience was first undertaken in November, 1900. Up to the present time about three-fourths of each class have been given the laboratory

course. After the midwinter examination the entire class is given practical work in the electrical laboratory during the month of April.

The full course comprises—

CHEMISTRY, MINERALOGY, AND GEOLOGY.

Chemistry: Chemical philosophy; inorganic chemistry—chemistry of the nonmetallic elements and their compounds, chemistry of the metallic elements and their compounds, useful applications of the principles of inorganic chemistry; organic chemistry—chemistry of the carbon compounds, animal chemistry, chemistry of vegetation, useful applications of the principles of organic chemistry; physiology, hygiene, action of alcohol and narcotics on the human system.

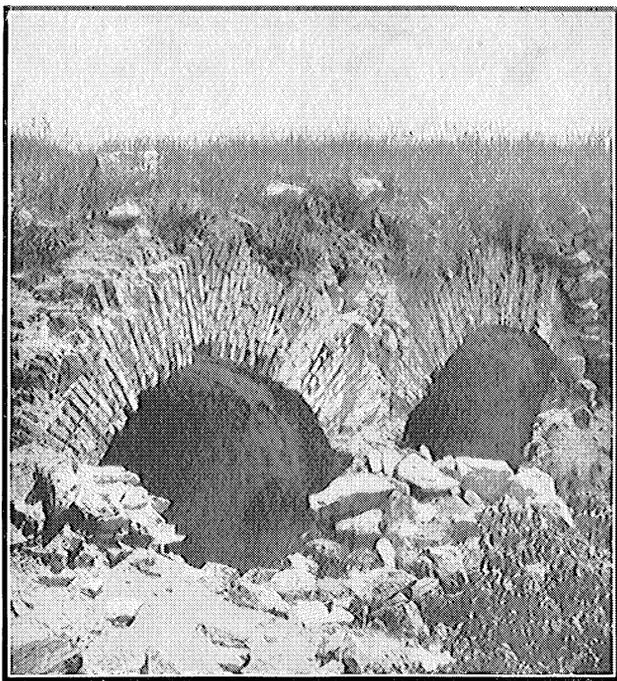
Chemical physics: Heat—thermometry, dilation of bodies, calorimetry, production and condensation of vapors, latent heat, hygrometry, conduction, radiation, relation between heat and light, thermo-dynamics, terrestrial temperatures, aerial meteors, aqueous meteors; electricity—frictional electricity, sources of electricity, magnetism, current electricity, electrostatics, electro-magnetics, electrical measurements, heat, light, and work from electric currents, thermo-electricity, electro-optics, magneto-electricity, electro-chemistry, construction and use of apparatus illustrating and involving the principles of the foregoing subjects, useful applications of electricity.

Mineralogy: Crystallography, physical and chemical properties of minerals, practical determination and use of minerals, descriptive mineralogy and petrography.

Geology: Dynamical, structural, and historical, with special reference to the United States.

TIME FOR STUDY.

The Academic Regulations up to 1853 prescribed that “the daily allowance of time for the class studies shall not be less than nine hours, nor more than ten.” The present regulations of the Academy make about the same amount of time available for class studies, as will be seen from the following considerations: The working day of the Cadets begins at reveille



CASEMATES OF FORT PUTNAM, 1902.

(5.45 a. m.) and ends at taps (10 p. m.), embracing $16\frac{1}{4}$ hours. One hour of this time may be considered as unavailable for purely personal reasons, leaving $15\frac{1}{4}$ hours. Of this time each day, except Saturdays and Sundays, the class is in the section room $3\frac{1}{2}$ hours, which must be classed as study time; 2 hours of the day are devoted to meals, which leaves $9\frac{3}{4}$ hours of the day. Assuming 2 hours for military exercises and $1\frac{1}{2}$ hours for other recreation, exercise, or rest, there is left $6\frac{1}{4}$ hours for application to the studies of the second class outside the section room.

ORGANIZATION OF THE DEPARTMENT AND DUTIES OF THE PERSONNEL.

The personnel of the department consists of the professor and the requisite number of instructors, a civilian employee, and an enlisted attendant.

The professor is, by the academic regulations, made responsible for the mode of conveying instruction in his department. He prepares and delivers the lectures that pertain to the course, and with the aid of the instructors and employee he arranges for the illustrations and experiments that accompany them. He arranges and prescribes all the lessons during each term, this tedious duty being often necessary owing to a change of text-books or the date of lectures. He constantly supervises and assists in the instruction by frequent visits to the section rooms, and is always ready to replace any instructor who may be sick or detailed to other duty. He makes constant effort to have the aims and objects of the department thoroughly understood by the instructors, has frequent interviews with them as the course progresses to this end; invites suggestions and discussion from them, individually and collectively, toward the accomplishment of better results. He sees that the same general methods are followed by all the instructors. To this end it is found very beneficial to have a new instructor present at two or more recitations before he is required to conduct them. The professor, aided by instructors, endeavors to keep note of the most important publications pertaining to the department, and

secures them by purchase as the funds warrant. With the same assistance he watches some of the best technical and scientific journals and attempts to provide the department with the best, new, and approved apparatus that the funds of the department will purchase, and which can be made useful with available facilities.

In nearly all the duties enumerated as pertaining to the head of the department much assistance is derived from the instructors, and it is the settled purpose of the head of the department to give the instructors every opportunity and encouragement to aid in its development.

Until 1902 each instructor had charge of two sections, one reciting from 11 to 12, the other from 12 to 1. In 1902 each instructor was given three sections, one of which recited from 10 to 11. This arrangement became necessary because of the large size of the class.

The instructors are required to be present in the department by 9.30 a. m., and as a rule are there much before that time. The senior instructor, or assistant professor, is required to make out a programme for each day's recitation, selecting the matter to be given out at the board, that for questions, and the problems to be solved. All the other instructors use this programme, so that entire uniformity is observed as to the matter recited upon each day, and the experience of the senior instructor is made use of to select it. This programme is the same for all the sections in the same half of the class, but a difference is often made between the two halves. Each instructor is required to have everything in perfect readiness in his room when the section enters. The problems given out the previous day must be corrected and ready for return to the section. He must see that any chemicals, specimens, or apparatus required in the room for the day are upon the exhibit table.

Any drawings upon the board or other work that he may need for the explanation of the lesson of the day, or of the previous day, must be in readiness. The assistant professor is charged with the accounts of purchases, expenditures, etc., and the inventorying of the new property. Included under the

above duties are many details, too numerous to mention in full.

The civilian employee has much occupation in the preparation for lectures, getting in readiness the necessary apparatus, preparing the agents, and in removing the material afterwards. He is at the service of any of the instructors in assisting to supply the exhibit of specimens, apparatus, etc., required in each section room, and in removing such exhibit after use, and in replacing it in the proper storage case.

During the instruction in mineralogy and geology he keeps all the working stands and the reagent stands of the different section rooms properly supplied with chemicals, apparatus, and material, removing that used and replacing it by fresh—a very onerous task. With the enlisted attendant he keeps the various rooms of the department well policed. They both also have important duties in the power and battery rooms in connection with the electrical part of the course.

ORAL RECITATIONS.

When the section enters and the marcher has made his report the instructor inquires if there are any questions the section wish to ask about the lesson. If there be any, as is very frequently the case, they are answered as clearly as possible. When the section has nine men the order of recitation is as follows: After all questions are answered, five of the members are assigned subjects for discussion or description at the board.

The enunciations of the subjects at the board are printed and bound in pamphlet form. The instructor directs Mr. A, B, C, D, and E to discuss at the board subjects 20, 21, 23, 24, and 25, taking them in the order named, the numbers of the subjects being already written upon the boards. Each Cadet called writes his name upon the board containing the number of his subject. He uses one of the enunciation pamphlets in preparing for his recitation.

The enunciation calls the Cadets' attention to the important points of the subject, but does not give information upon

them. He is permitted to write out under each term of the enunciation such knowledge as he has acquired in regard thereto and is then ready for recitation. While being permitted to write upon the board the substance of his recitation, each Cadet is encouraged to outline the matter diagrammatically and only so fully as is necessary to bring readily to mind what he wishes to say, and then to bring out the details orally instead of by writing out the whole upon the board. The Cadets are supplied with the enunciation pamphlets and have the use of them in their study at their rooms. This greatly assists most Cadets, serving to call attention to the principal and essential points of the subjects studied. When the instructor has sent the proper number of Cadets to the board he assigns to two others sets of problems involving principles already studied. These two proceed at once to the solution of their problems.

The simplicity of the problems, of course, depends upon the progress of the course, becoming more complex as principles are acquired in greater number.

The remaining two members of the section not yet mentioned are called up and take their position in the center of the room and are questioned by the instructor upon parts of the lesson not given out at the board, on the more important parts of the lesson of the previous day, or upon principles pertaining to the subject which should be known. Experience has developed an advantage in this department in having the Cadets who are to be questioned take the floor together instead of in succession, as was formerly the custom.

After these two Cadets are questioned from fifteen to twenty minutes they are given a set of problems to solve—this set of problems involving less work than that given to the two members who were not questioned. Sometimes more than two are questioned, and then all receive problems afterwards. The exact programme for each day is arranged by the senior instructor and is followed in all the sections.

When the instructor has finished with the Cadets on questions, some member at the board is generally ready, or nearly ready, to recite. This member is then called

upon, and proceeds to make his recitation. He makes such use of his board work as is necessary to enable him to set forth all the information he possesses upon the points enumerated in his enunciation. During the discussion of each heading the instructor makes only such interruptions as are essential to correct understanding and statement. Before leaving any particular heading the instructor brings out by questions all the important points that may have been omitted. At the close of the recitations the instructor endeavors to call attention to all points in any part of the subject which seem not to have been properly appreciated. It is also a prime effort of the department to show the relation between new principles and facts brought out and others already studied, and to point to some application which these principles find in the arts and industries. This is done by a simple statement of the instructor or by a query to the Cadet as to whether he had ever observed such or such applications.

The above-described method for section-room exercises is applicable during the study of heat, chemistry, and electricity. During the study of mineralogy and geology the method is materially different. A smaller number of subjects is given out at the board; no problems are given out, but instead several members of the section are given a number of mineralogical or geological specimens to determine by practical tests, suitable stands and all the necessary apparatus being in the room for the purpose. In mineralogy and geology the Cadets placed upon questions are very frequently asked about the objects themselves. Thus, Cadets called up for questions are placed in front of a lot of mineralogical or geological specimens, and each in turn is directed to pick up one of them, and is then asked all of its visible and easily determined characteristics, as color, structure, texture, luster, hardness, tenacity, heaviness, etc.

After being questioned these gentlemen are given selected specimens to determine by the blowpipe or chemical tests. The Cadets who have minerals or other specimens to determine, after due time, bring them up in front of the instructor's desk and give the results of their determinations, being

required at the same time to state what tests were applied in the determination. The recitations are so short that in these subjects it is often impossible to hear all recite upon their determined specimens. In such cases those not reciting leave their names in their trays with their labeled specimens, and any serious mistakes of determination are referred to the next day.

The time devoted to the determination of minerals, rocks, and fossils is largely increased by allowing the Cadets to use in the section room certain "tables for the determination of minerals." By this aid they can have practice upon minerals not in the lesson of the day. In the same way, by the use of their text-books in the section room, we are enabled to give out rocks and fossils, though they have not been mentioned in the lessons of several previous days. In other words, the practical work on rocks and minerals, etc. is not limited to the time that the lithology and mineralogy are studied, but continued through all the course of geology as well.

Thus we have developed a thoroughly practical course of very reasonable length. In each room a full set of ordinary exhibition specimens of minerals, rocks, and fossils is placed, so that the Cadets have the benefit of a small cabinet collection in their study of the subject. This exhibit collection is allowed to be used only under such restrictions as tend to cultivate the powers of observation and partially supply the defects of insufficient time. It is of great assistance in acquiring a knowledge of the subjects.

In addition to the cabinet tables already referred to in the mineralogical section rooms, another table is kept in each room at all times. Upon it are exhibited the special chemical specimens, apparatus, or drawings referred to almost daily in the text. Any members of the section not otherwise engaged are permitted to examine and familiarize themselves with the objects thus exposed. The members around this table are permitted to converse in regard to the objects under consideration, but it is contrary to order to discuss other matters or to seek information upon subjects not yet recited upon.

WRITTEN RECITATIONS.

A good many written recitations are held, usually as the subjects are being reviewed. In these cases the entire class or half the class attends at the same hour in one of the larger rooms of the Academy. All write answers to a series of questions pertaining to the subjects of the lesson for that day or upon principles which are always required. This written recitation is generally adopted when it is desired to include a number of important facts or principles. The attention of each Cadet is then called to the desired points and more time is given for them to express their knowledge of them. The written recitation serves to pick out the Cadets who are weakest in certain directions. It is also occasionally resorted to as a means of introducing a set of problems involving the application of principles that it is desired to impress promptly upon all. Only a small number of such recitations is found desirable in this department.

SEMIANNUAL EXAMINATIONS.

The annual and semiannual examinations in this department have, with few exceptions, been oral. The relations between the different subjects pertaining to each term and the present distribution of time to each subject renders intermediate examinations impracticable and undesirable. When a Cadet's work during the term indicates deficiency, in the opinion of the department, he is subjected to a written test at the end of the term. A Cadet whose mark during the term indicates doubtful proficiency is given a sufficiently extended oral examination to dispose of such doubt. If in the oral test he still fails to prove his proficiency to the satisfaction of every member of the Academic Board, he is then given a more extended written test. All those Cadets whose marks during the term clearly indicate proficiency are, at examination, given some subject in the course, usually chosen by lot. These subjects are taken from all parts of the course, and there is little or no repetition among them. A proficient knowledge of such subject indicates a proficient knowledge of the course, and it is so taken. A failure upon one subject

is followed by a test upon another selected in the same way. A second failure makes it necessary for the Cadet to prove his proficiency upon a more extended test.

The decision as to the probable proficiency of Cadets at the end of the term and before examination is based upon the entire work during the term. The considerations involved are numerous and varied and differ in different cases. The record made upon general review is given the greatest weight. Generally, when a Cadet has made an average of a little over two-thirds of the maximum in all parts of the course, his work is taken by the department to indicate proficiency. An average of a little less than two-thirds of the maximum over all parts of the course indicates doubtful proficiency, and the doubt is decided by the results of the examination. An average considerably less than two-thirds—say 1.8 out of 3—in all parts of the course is considered to indicate deficiency, and an extended written examination is considered essential to determine whether such Cadet has been able to make up the deficiency between the time recitations ceased and the examinations are held.

GENERAL CONCLUSIONS.

The method of instruction is, in general, the same that has long prevailed at the institution. The transfer of all the instruction of the department to the second-class year, and of all recitations to the morning hour (made in 1880), allows each instructor to devote his entire time at any period to one subject, to the manifest and greatest benefit of the instruction. It permitted a perfection of arrangement in all the details of the section-room work not before possible, adding greatly to the efficiency of the instruction.

In present instruction greater importance than formerly is attached to the practical bearing of all that is taught. To this end, in the subjects of heat, chemistry, and electricity, the solutions of problems involving the principles taught has become a marked feature of the recitation work. During the day's recitation of three hours in the above subjects

each instructor gives out from twelve to thirty problems. The Cadets make an effort to solve them, and the instructor examines, corrects, and returns them to the section at the next recitation. In mineralogy and geology trays of minerals, rocks, etc., for determination replace the problems, and each instructor must daily provide from eight to ten sets of specimens, each containing from six to ten varieties of minerals, rocks, or fossils. The method now pursued has greatly increased and concentrated the labors of the instructors, with the greatest advantage to the instruction. While it is certain that the course embraces more now than formerly, and while it is thought that as good results are obtained over the broader course, it is believed that no greater effort is required from Cadets. This belief is based upon observation and the conversation of Cadets, as well as upon the reasons for such results apparent in the facts above set forth.

The marked advantages of this department in accomplishing results may be stated as follows:

1. The division of the class into small sections, by which each instructor is enabled to give greater individual attention to each Cadet and closer personal supervision of all the work of his section.

2. The assistance of competent, willing, and interested instructors, by which the department is enabled to create and develop the interest of the Cadets in the subjects taught. This factor, too, keeps the department in healthy activity and multiplies the chance of improvement in the course of study and methods of instruction.

3. The lever of effectual compulsion, which pertains to all the departments of the institution.

H.

HISTORICAL SKETCH OF THE DEPARTMENT OF LAW AND HISTORY.

The following sketch of the department of law and history was prepared in 1896 by the then head of the department, Prof. G. B. Davis. Professor Davis was appointed Judge Advocate-General of the Army, and was succeeded as professor of law, etc., on July 31, 1901, by Col. Edgar D. Dudley, of the Judge-Advocate's Department of the Army. No important changes are to be recorded between 1896 and June 30th, 1902.

THE DEPARTMENT OF LAW.

The Regulations of the Military Academy, issued under the authority of the Secretary of War on July 10, 1816, prescribed that "a course of ethics shall include natural and political law." It is difficult at this distance of time to understand what was meant by the terms thus used by the Secretary of War. Natural law, a term but little used in England and the United States, relates to a subject which has always been extensively studied on the continent of Europe, especially in those states whose jurisprudence is derived from or based upon the civil law. Natural law, the *jus naturale* of the Roman law, may be defined^a as "the rule and dictate of right reason, showing the moral deformity or moral necessity there is in any act according to its suitability or unsuitableness to a reasonable nature," and embraces those fundamental rules of conduct in human affairs which have received general assent and recognition in all civilized states. It also includes matter which in England and the United States would be taught under the name of ethics or moral science. As I can find no record of the adoption or introduction of a text-book on this subject I am constrained to believe that no formal instruction was given at any time in natural law.

The term political law, as used in 1816, is also somewhat vague. The great text-book on that subject, prepared by Sir

^a Taylor's Civil Law.

William Blackstone, and published in 1758, would have been too voluminous for use in a course of study so elementary in all respects as was that which appeared in the regulations of 1816. I am disposed to believe that the regulation above cited is to be regarded rather as an expression of the executive will, as to the general importance or necessity of the study of law in some form at the Academy, than as a direction that the two subjects named should form a part of the official course of study.^a

Section 2 of the act of April 14, 1818 (3 Stat. L., 426), provided that there should be "one chaplain stationed at the Military Academy at West Point, who shall be professor of geography, history, and ethics, with the pay and emoluments allowed the professor of mathematics." Under the authority conferred by this statute the Rev. Dr. Thomas Picton was appointed chaplain and professor of ethics on July 23, 1818, and continued in office until January 21, 1825, when he left the service by the resignation of his commission. The first text-book of law studied at the Military Academy seems to have been Vattel's *Law of Nations*, then as now the most widely accepted standard of authority on the subject of which it treats.

The records show that Wheaton's *National Law* was introduced at some time prior to 1839, when it was replaced by Kent's *Commentaries*. I can hardly believe that the title cited is that of the text-book actually adopted and studied. The first edition of Wheaton's *International Law* was issued in 1836 and was, in all probability, adopted as a text-book immediately upon its publication. I have been unable, after considerable inquiry, to learn that Mr. Wheaton ever wrote on the subject of national, as distinguished from international, law. He was for many years the reporter of the decisions of the United States Supreme Court, but never wrote upon the subject of national or constitutional law. His work gave place in 1839 to Kent's *Commentaries*, a single volume covering the subjects of both constitutional and international law,

[^aThe text-book used was Burlamaqui's "The principles of natural and politic law in two volumes," translated into English by Mr. Nugent. The fifth edition was printed at Cambridge, Mass., in 1807.—EDITOR.]

which continued to be used as a text-book in those subjects for more than thirty years.

Professor Picton was succeeded in the chair of geography, history, and ethics by the Rev. Charles P. McIlvaine, who resigned on December 31, 1827, and was in turn succeeded by Prof. Thomas Warner, who was appointed on January 1, 1828, and continued in office until September 1, 1838, when he vacated the office by resignation, and was succeeded by Prof. Jasper Adams, during whose incumbency of the office Chancellor Kent's work was adopted as the principal text-book in the course of study in law.

The register of the Academy for 1841 contains the name of the Rev. M. P. Parks as professor of geography, history, and ethics, and the register for 1842 contains the first outline of the course of study in law, together with a list of the text-books then in use at the Military Academy. In this list appears Kent's Commentaries, including the constitutional and international law, Vattel and Wheaton having both been superseded. The Rev. William T. Sprole became chaplain and professor of geography, history, and ethics on March 2, 1847, and was "superseded" in that office on August 16, 1856, by the Rev. John W. French.

During the incumbency of Professor French, which extended over a period of about fifteen years, an extensive course of study was built up, including all of the subjects mentioned in the act of April 14, 1818. In the academic year 1858-59 instruction in the subject of military law was first given, the text-book adopted for that purpose being De Hart's Courts-Martial. During the ensuing year the study of the rules and Articles of War was for the first time made a part of the course of study in law. The register for the year 1862 shows Professor French's pamphlet on Law and Military Law to have been made a part of the course of study. In the academic year 1866-67 Halleck's International Law was introduced, replacing Kent, and Benét's Military Law replacing De Hart. In the academic year beginning September 1, 1867, all instruction in the subjects of geography, history, and ethics was discontinued, and the course of study pursued

under the direction of the chaplain included only the subjects of international, constitutional, and military law.

The vacancy in the chair of geography, history, and ethics, caused by the death of Professor French, on July 8, 1871, was filled on the 28th of July following by the appointment of the Rev. Dr. John Forsyth, who continued to give instruction in law until August 28, 1874, when under the authority conferred by the act of June 6, 1874, which provided that "the Secretary of War may assign one of the judge-advocates of the Army to be professor of law," Maj. Asa Bird Gardiner was detailed for duty in the department of law, and the several heads of department have since been assigned by the Secretary of War under the authority conferred by this statute, although under the acts of June 1, 1880, June 27, 1881, and June 30, 1882, any officer of the Army may be assigned to that duty.

Major Gardiner initiated numerous changes in the course of study. In the year 1875-76, Woolsey's International Law replaced the text-book of General Halleck on that subject, and the new work of Professor Pomeroy on Constitutional Law replaced Kent's Commentaries. Professor French's pamphlet on Law and Military Law, was retained and Benét's Military Law discontinued as a text-book, the latter being replaced by Gardiner's Practical Forms for use in Courts-Martial and Head Notes on the Law of Evidence in Courts-Martial, and the systematic study of General Orders, No. 100, of 1863, containing Dr. Francis Lieber's admirable presentation of the rules of modern war, was introduced as a supplement to the course of international law. Major Gardiner was relieved on August 28, 1878, and Maj. G. Norman Lieber, of the Judge-Advocate-General's department, now the Judge-Advocate-General of the Army, was assigned to duty as professor of law.

During Major Lieber's incumbency of the office, Ives's Treatise on Military Law was introduced and Pomeroy's Constitutional Law was replaced by Judge Cooley's text-book on the same subject, which is still in use. Major Lieber was succeeded by Lieut. Col. Herbert P. Curtis, of the Judge-Advocate-General's department, who was in turn succeeded

by Lieut. Col. William Winthrop, during whose incumbency Winthrop's Military Law was introduced during the academic year 1886-87. Colonel Winthrop was succeeded on August 28, 1890, by Maj. (now Lieut. Col.) John W. Clous, of the Judge-Advocate-General's department. Beginning with the academic year 1891-92, Davis's Outlines of International Law was introduced, replacing Woolsey's Elements of International Law. Colonel Clous was relieved on August 20, 1895, by Lieut. Col. George B. Davis, Deputy Judge-Advocate-General, the present incumbent.

The present course of study in law covers the subjects of elementary law, constitutional law, international law, and military law; the text-books being Davis's Introduction to the Study of the Constitutional and Military Law of the United States, Cooley's Constitutional Law, Davis's International Law, and Winthrop's Military Law. The courses of study in elementary and constitutional law are completed during the first half, and those in international and military law during the last half of the academic year. In view of the character of the subjects studied, each text-book is passed through but once in advance and once in review, the general review being omitted. The course in elementary law embraces 12 lessons in advance and 6 in review, and that in constitutional law embraces 20 in advance and 10 in review. During the half year it is proposed to give at intervals a course of 6 lectures upon the following subjects: The common law, the civil law, the constitutional law of the United States, crimes and criminal procedure, and the government of the United States.

During the second half year the courses of study in international and military law will be passed over, the former in 20 advance and 10 review lessons; the latter in 18 lessons in advance and 9 in review. During this period two lectures will be given, one upon the history of the Articles of War, the other on the subject of military discipline and administration. Under the arrangement of studies which is to go into effect at the beginning of the next academic year (1896-97), the first class will attend recitations in law three times per week throughout the entire year, alternating daily with history, in which subject two hours of recitation per

week are required. Instruction in both of these subjects is carried on upon the basis of one and one-half hours of study in quarters to each hour of recitation in the section room.

The mechanism of the recitation has already been fully and accurately described by the professor of mathematics in the article treating of the course of study in that department. It only remains, therefore, to describe those matters in which the course of study in law differs from that pursued in the department of mathematics. Cadets are encouraged to ask questions and to bring to the attention of the instructor any points in the lesson of the day which may have seemed to them either difficult or obscure. These are explained to them before the recitation begins, which is carried on in the same manner as a recitation in mathematics. The practical work in the section room consists in the study of cases bearing upon the lesson of the day, the enactment, modification, and repeal of statutes, the examples being taken from the Revised Statutes and Statutes at Large of the United States, and in the application of the rules of interpretation to the statutes relating to the military establishment of the Federal Government. Cases from the reports of the United States courts are also given out for special study when important points are involved in respect to the military or constitutional law of the United States. The course of study is precisely the same for all the sections.

As at present organized, the department consists of a professor, an assistant professor, and three acting assistant professors, all detailed from the Army. For purposes of recitation the first class is divided into eight sections of nine Cadets each, who attend recitations daily from 2 p. m. to 4 p. m. on Monday, Wednesday, and Friday of each week during the entire academic year. The same instructors hear recitations in history on Tuesday and Thursday of each week during the same period. The recitations are carried on, as has already been stated in the same manner as recitations in mathematics. The same or similar section rooms and furniture are used, and the recitations are marked on the same scale and in accordance with the same system. In each section two or more of the daily

recitations are required to be in writing, the subjects being chosen from the lesson for the day or taken in the form of general questions from the lesson of the day before. The recitations in writing are marked on the same scale and have the same value in all respects as the oral recitations. As there are four sections reciting at the same hour, it is impossible for the head of the department to visit each section more frequently than twice per week, the lower sections being visited more frequently than those at the head of the class where any variation is made.

The weekly class reports are made in the same form and convey the same information as those submitted by the department of mathematics. Transfers are made, as a rule, whenever a Cadet has an aggregate mark greater by two units than the lowest mark in the section immediately above or less by the same amount than the highest mark in the section immediately below. While this rule is general, exception is made when from sickness, absence, or other unavoidable cause injustice would be done by its strict enforcement. The marks are posted on Saturday of each week in the frames provided for that purpose in the north hall of the Academy Building.

As two courses of study are carried on independently, the examinations are arranged in such a way as to allow one of the classes to be examined orally and the other in writing at each semiannual examination. In this way each class as it passes through the courses of study in law and history will be examined orally and in writing in each subject of study. The weights to be attached to the term marks in advance and review and the special weight to be given to each form of examination are determined by the Rules for the Guidance of the Academic Board and its Committees.

The present arrangement of the course of study in law is based upon the experience of many years, and seems to be fairly well adapted to the peculiar needs of the institution and at the same time to carry into effect the will of Congress in its several enactments directing that the study of law shall be pursued at the Military Academy.

(2) THE DEPARTMENT OF HISTORY.

The offices of chaplain and professor of geography, history, and ethics, created by the act of April 14, 1818, after a joint continuance of something more than seventy-eight years, were dissociated by the act of February 18, 1896, which directed the discontinuance of the latter and vested the duties of the former in an officer to be appointed by the President for a term of four years. The study of history was transferred by Executive order to the department of law, thus bringing together after a separation of nearly twenty-two years the closely related studies of history and law.

The present course of study in history went into effect on September 1, 1883, and was comprised in a course of 50 lessons, begun and completed during the first half of the academic year. The reintroduction of history into the official course of study was due to patient and persistent endeavors of the late Rev. Dr. William M. Postlethwaite, who succeeded Rev. Dr. John Forsyth in the chaplaincy and professorship on December 21, 1881. For a little more than twelve years the course of instruction in history was carried on under the able guidance of Professor Postlethwaite, whose labors were interrupted by his untimely death in January, 1896.

For purposes of instruction in history the first class was divided into sections in September of each year, the arrangement of the class being based upon the general merit roll of the preceding year. Each half class attended recitations three times per week from September to December, and the course in history closed with the semiannual examination in January.

With the resumption of academic duties in September, 1896, the new arrangement of the courses of study in law and history became operative. The entire first class attending recitation daily between the hours of 2 p. m. and 4 p. m. On Monday, Wednesday, and Friday instruction was given in law, and on Tuesday and Thursday in history, the same instructors and section rooms being used for both branches of study.

Myers's General History, the text-book adopted by the Academic Board, replaced Swinton's Outlines of the World's

History, which have been in use since the reintroduction of the course of study in history in 1883. The new text-book was so arranged as to enable the course in ancient history to be completed during the first term, leaving the study of mediæval and modern history for the longer term from January to June.

The methods of instruction in history are the same in all respects as those prevailing in the department of law, which have already been described. The best attainable maps are constantly and freely used in the course of instruction, and a part of the written recitations in this subject will be devoted to the graphic representation of the growth and development of the principal states of antiquity and to the origin, colonization, and territorial development of the great states now constituting the civilized world.

I.

HISTORICAL SKETCH OF THE TACTICAL DEPARTMENT, ETC.

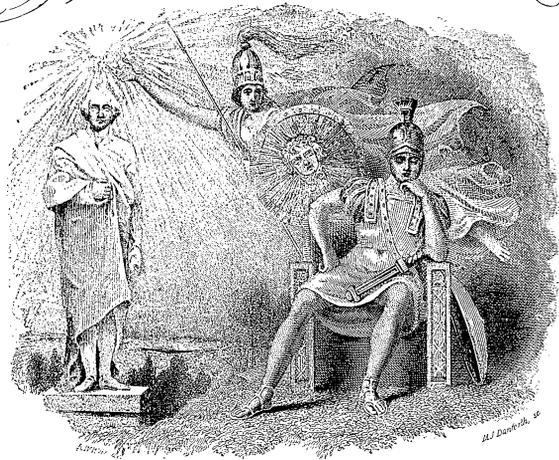
[The following historical sketch of the department of tactics was prepared by Col. S. M. Mills in 1896 for the report of the Superintendent for that year. Since that date the department has been very materially expanded, modified, and improved. The development and improvement is exemplified by the full extracts from the reports of the commandants who have succeeded Colonel Mills.]

From the earliest days of the Military Academy, 1802, Cadets have received practical instruction in tactics; it was not, however, until many years later that Congress, by act dated June 12, 1858, recognized the department by law, and designated the commanding officer of the corps or battalion of Cadets as commandant of Cadets and instructor of artillery, cavalry and infantry tactics.

The following extracts, taken from General Cullum's history of the Military Academy and from other sources, is of interest, and has a connection in showing the development of this department:

Instruction.—From 1802 to 1812 the term time varied; usually began in April and ended in November; the remainder of the year the Cadets were absent. Study hours after 1805 were from 8 a. m. to 1 p. m., 2 to

REGULATIONS
OF THE
United States Military Academy
AT



WEST POINT.

FRONTISPIECE TO THE REGULATIONS, U. S. M. A., 1853.

From a drawing by Professor Weir.

4 p. m., and in the evening, and drills and practical exercises from 4 p. m. to sunset and occasionally before breakfast.

* * * * *

The instructors for all purposes at any one time never exceeded four and sometimes were reduced to one. The instruction in infantry included the manual exercise with the musket and the infantry drill extending to the school of the company, the drill with field pieces and mortars, and a little target practice.

* * * * *

Regulations.—The first regulations were made immediately after the opening of the Academy in 1802; were very brief, and adapted to the small requirements of the institution. After an experience of eight years a more extended code was approved April 30, 1810, and this is the basis upon which the school rests to this day. These regulations established 15 to 20 years as the age of entrance; obliged Cadets to serve the United States for four years unless sooner discharged; abolished furloughs except during vacations or under peculiar circumstances; prescribed the same uniform for all Cadets of the different arms of the service, and ordained minor rules for interior police and discipline. Previous to the adoption of these regulations and between 1802 and 1810 Cadets were admitted to the Academy without mental or physical examinations on any day or in any month of the year. Of the small number that were present at any time some had good preliminary education before coming to West Point; a few were college graduates; one had been an officer in the British army; another had practiced law in the supreme court of New York, and generally they had more knowledge and maturity of mind than those of the present day, but were of all ages from 12 to 34 years, one or two being married men with several children.

* * * * *

Quarters.—Cadets were lodged with soldiers in the old "Long Barracks" of the Revolution (near the site of the present hotel) and were instructed in a two-story wooden building which served both as an academy and for headquarters.

* * * * *

Discipline.—Little can be said for the discipline during this period, except when personally supervised by Colonel Williams, the Superintendent, but when he was out of the service, 1803–1805, and when absent on other duty, 1806–1809, great irregularities took place from want of proper control on the part of the commanding officer, but more because the instructors were all civilians and foreigners.

* * * * *

The law of April 29, 1812, authorized the appointment of 260 Cadets and an academic staff. On the last day of September, 1812, there was present only one officer, a captain of engineers, and one new Cadet.

April 15, 1813, the Military Academy, with less than a dozen Cadets, resumed its existence.

* * * * *
 In 1814 a civilian was appointed to take charge of the Cadet commons.
 * * * * *

The prescribed uniform at this time was a coat and pantaloons of blue cloth, round hat with black silk cockade and gilt eagle, and Jefferson shoes. The coat was single-breasted, with one row of bullet buttons and a standing collar. The belts were black, and the muskets the same as those used by soldiers, except a lighter one for the small boys. Each Cadet was expected to wear a sword, but few possessed the weapon.

* * * * *
 During the summer of 1814 the Cadets, under command of the commanding officer of the post and Acting Superintendent, made an excursion to Governors Island, New York Harbor, and another excursion of three days to New York was made in the summer of 1816.
 * * * * *

The regulations approved July 2, 1816, under the head of military instruction, prescribed infantry and artillery tactics, practical gunnery and camp duties, and broad and small sword exercises.

* * * * *
 Pierre Thomas was the first sword master, appointed in May, 1814. Sword exercise was only given to such Cadets as were specially selected.
 * * * * *

The present uniform for Cadets, with slight differences, was adopted September 4, 1816.
 * * * * *

During the period from 1812 to July 28, 1817, when Capt. and Bvt. Maj. Sylvanus Thayer was appointed Superintendent, the course of instruction prescribed by Regulations was practically ignored, except infantry and artillery drills, which were the Acting Superintendent's delight, and were well taught by him in person, but were necessarily limited, owing to the small number of Cadets to exercise and the few pieces of ordnance for drill and target practice.

* * * * *
 There was no officer designated specially as instructor of tactics prior to 1818. The Acting Superintendent from 1814 to 1817 was commander, professor (teaching all branches then taught), and, when need be, chaplain.^a

The recorded history of this department may be considered, properly speaking, to date from the time that Bvt. Major and Captain Sylvanus Thayer assumed command and the superintendency of the Military Academy.

He at once organized the Cadets into a battalion of two companies, officered by members of their own body, with a

^a For other data of this kind, see Volume II, pp. 46-164.

colonel at its head and an adjutant and a sergeant-major for his staff, and appointed an officer of the Army to command the battalion, as instructor of infantry tactics and in soldierly discipline, who was responsible for the interior police and administration.

Second Lieut. G. W. Gardiner, of the Corps of Artillery, was detailed for this duty temporarily September 15, 1817, and was succeeded by Capt. John Bliss, of the Sixth Infantry, April 2, 1818, who was the first commanding officer of the Battalion of Cadets and instructor of infantry tactics. The position was not known as Commandant of Cadets until the Regulations of 1825. The Regulations of 1821 provided that a captain or field officer should be detailed as instructor of infantry tactics.

These regulations also provided for the following instruction in this department: The system of infantry tactics established for the Army of the United States and to include instruction in the school of the soldier, school of the company, school of the battalion, and the evolutions of the line, the exercises and maneuvers of light infantry and riflemen; the duties in camp and garrison of privates, noncommissioned officers, and officers, including those of guard and police.

In 1818 the commanding officer of the Battalion of Cadets was first designated as the inspector of the Cadet commons, and the Regulations of 1825 makes him the permanent president of the board to audit the accounts of the Cadets' mess and board of inspectors of supplies.

In 1821 was first introduced the study of infantry tactics as a regular course, recitations upon which were held between 2 and 4 p. m., the text-books being the rules and regulations prescribed for the infantry branch of the service.

From 1820 to 1827 there were two assistant instructors of infantry tactics. After that period for a number of years three, and later, 1852, four, assistants were authorized.

July 20, 1821, the Corps of Cadets made a notable summer excursion to Boston, Mass., under Major William J. Worth, the then Commandant and afterwards distinguished general. The Corps went by steamer to Albany, and thence marched to Boston, where they spent two weeks; thence they marched to

Providence, R. I., where they spent several days; then resumed the march to New London, Conn., having marched more than 310 miles; thence by steamer to New Haven; after a few days' stay there they embarked again for New York and by steamer the same day for West Point, N. Y., where they arrived September 25.

The Regulations of 1825 provides for a battalion of four companies, and designates the instructor of infantry tactics and commanding officer of the battalion of Cadets as "Commandant of Cadets," and first mentions the "officer in charge," and defines his duties, which were practically the same as at present. The Regulations also for the first time provide that the Corps of Cadets shall be divided into as many squads as there are tables in the mess hall, and when the signal for breakfast, dinner, and supper is sounded, these squads will assemble under the direction of the first or second carver, and shall march to the mess hall by the superintendent of the mess hall.

The Regulations of 1829 make the first mention requiring explanations to be submitted for offenses; from this time until 1857 all explanations were required to be submitted in writing. From 1857 until 1866 they were required to be submitted verbally, and if unsatisfactory to the commandant might be submitted in writing. From 1866 until 1892 they were all to be submitted in writing. From 1892 until the present time they may be submitted verbally and in writing; if unsatisfactory to the commandant may be submitted in writing. From the date when written explanations were first required various forms of submitting the excuses have been prescribed. First, the form prescribed that it should be characterized as "offense;" then follows the "excuse;" later it was known as "delinquency;" then follows the "explanation;" then as "report," and followed by "explanation;" finally, and at present, the form is that prescribed for official correspondence in the service.

In 1837 the first instructor of cavalry tactics was appointed.

In 1838 the term of service of Cadets was increased to eight years, unless sooner discharged.

In 1839 the regulations prescribe that during the encampment Cadets of the first class should study the evolutions of the line in the system of infantry tactics prescribed for the Army, and recite upon and explain the same to the instructor. Also, that selected portions of the General Regulations of the Army should in like manner be studied and recited upon. This was continued until the summer of 1862.

In 1839 a sergeant and five dragoons were ordered to West Point, N. Y., from Carlisle Barracks to aid in exercises and instruction of Cadets in riding. Twelve horses were supplied by the Quartermaster's Department. The sergeant was discharged the service and, as a civilian, appointed riding master. At this time were also purchased the necessary horses and harness for the light battery. Previous to this time Cadets hauled the pieces and carriages about by means of rope harness.

In 1840 it was provided by law that the commander of the Corps of Cadets should be either the instructor of infantry tactics, of cavalry and artillery, or of practical military engineering.

In 1842 Regulations first designated an officer as instructor of artillery and cavalry tactics.

In 1849 the Regulations designated the instructor of cavalry as instructor in riding. The riding master disappeared in 1852.

In 1852 the register shows the "commandant" and instructor of infantry tactics with four assistant instructors of infantry. In 1857 the Regulations provide that at the hour appointed for breakfast, dinner, and supper the companies would be formed and united and marched to mess hall by senior cadet officer present.

On June 12, 1858, Congress first recognized the title of "Commandant of Cadets," and provided by law that "the Commandant of Cadets shall have the local rank and the pay and allowances of a lieutenant-colonel of engineers, and besides his other duties shall be charged with the duties of instructor in the tactics of the three arms of the service."

February 28, 1853: First mention of an officer as instructor

in small arms and military gymnastics. The sword master was his assistant. This instruction was discontinued on April 24, 1861.

September 12, 1859: During the five-year course, by direction of the Secretary of War, the subjects of strategy, grand tactics, outpost duty, army organization and administration, equitation and veterinary science were transferred to the second class, department of tactics, and the Commandant of Cadets was directed to prepare a programme for instruction. For want of proper number of assistants in the tactical department the commandant recommended that the subjects of strategy, grand tactics, and outpost duty be continued in the first class, department of engineering. This was approved October 20, 1859.

These subjects, together with infantry and cavalry tactics, were taught in the first-class course, to include the June examination of 1860; after that time these subjects were discontinued in that class. After the January examination of 1860 the above-mentioned subjects were also taught in the second class, department of tactics, up to and including the June examination of that year. From September, 1860, until May 4, 1861, these subjects were taught in the second class, department of tactics. At the end of this time the course was again changed to four years, and the subjects of strategy, grand tactics, and outpost duty were transferred back to the first class, department of engineering. The subjects—viz. army organization and administration and veterinary science—were dropped. The other subjects were continued in the second-class course.

The text-books at this period were *Tactics of Three Arms*; *Tactics for Garrison, Siege, and Field Artillery*; *Youatt on the Horse*; *Mahan's Treatise on Advanced Guards and Outposts*; *Jomini's Art of War*; *Thackeray's Army Organization and Administration, and Army Regulations*.

While this additional theoretical course was in this department, it was, under the Commandant of Cadets, taught as follows:

The cavalry assistant taught cavalry tactics, equitation, and outpost duty; the senior infantry assistant taught infantry tactics, strategy, grand tactics, and logistics; the senior

artillery assistant taught artillery tactics and army organization and administration.

After May, 1861, and the return to the four-year course, the theoretical branches taught in the department were those described above, and from which there has been but little change to the present day.

In 1863, during the New York riots, there occurred an incident in the history of West Point and of this department which has never been made of record. Rumors reached the authorities of the intention of the disorderly element of New York City to visit and destroy the Cold Spring Foundry, which at that time was the largest establishment for making guns in the country, and at the same time to visit and burn West Point. Ball cartridges were issued to Cadets, and the other military resources of the post were at once made use of, including the issuing of arms and performing of guard duty by civilians and employees attached to the Academy. Pickets of Cadets, with a field gun at each point, were established at the south and north docks and Gees Point; the river and back roads at challenging intervals were lined with armed sentinels. This state of armed resistance was kept up for several days and nights. No attack was made. Since this time armed sentinels have patrolled the post continuously night and day.^a

In 1873 the Corps of Cadets took another excursion from West Point to Washington, D. C., and were absent several days participating in the ceremonies of the second inauguration of General Grant as President, Lieutenant-Colonel and Brevet Major-General Emory Upton in command. In 1876 the corps visited Philadelphia, where it spent a week on the occasion of the centennial celebration of the Declaration of Independence, Lieutenant-Colonel and Brevet Major-General Thomas H. Neill in command. The corps has in more recent years made other short excursions from West Point for a day or two, and on one rather notable occasion the corps visited the World's Columbian Exposition at Chicago in the summer of 1893, leaving West Point August 17 and

[^aSentinels were posted both night and day as early as 1795, but the practice has not been continuous.—EDITOR.]

returning to West Point August 30, 1893, Lieutenant-Colonel Samuel M. Mills in command.

List of Commandants of Cadets.

| Name. | Rank and regiment. | Time. | |
|------------------------|---|----------------|----------------|
| | | From— | To— |
| George W. Gardiner .. | Second lieutenant, Corps of Artillery | Sept. 15, 1817 | Apr. 2, 1818 |
| John Bliss..... | Captain, Sixth Infantry..... | Apr. 2, 1818 | Jan. 11, 1819 |
| John R. Bell..... | Captain, Light Artillery | Feb. 8, 1819 | Mar. 17, 1820 |
| William J. Worth..... | Captain, Second Infantry, brevet major..... | Mar. 17, 1820 | Dec. 2, 1828 |
| Ethan A. Hitchcock... | Captain, First Infantry | Mar. 13, 1829 | June 24, 1833 |
| John Fowle..... | Major Third Infantry | July 10, 1833 | Mar. 31, 1838 |
| Charles F. Smith..... | First lieutenant, Second Artillery | Apr. 1, 1838 | Sept. 1, 1842 |
| J. Addison Thomas..... | First lieutenant, Third Artillery..... | Sept. 1, 1842 | Dec. 14, 1845 |
| Bradford R. Alden.... | Captain, Fourth Infantry..... | Dec. 14, 1845 | Nov. 1, 1852 |
| Robert S. Garnett..... | Captain, Seventh Infantry, brevet major, U. S. Army. | Nov. 1, 1852 | July 31, 1854 |
| William H. T. Walker | Captain, Sixth Infantry, brevet lieutenant-colonel, U. S. Army. | July 31, 1854 | May 27, 1856 |
| William J. Hardee.... | Major Second Cavalry, brevet lieutenant-colonel | July 22, 1856 | Sept. 8, 1860 |
| John F. Reynolds.... | Captain, Third Artillery, brevet major..... | Sept. 8, 1860 | June 25, 1861 |
| Christopher C. Augur. | Major Thirteenth Infantry..... | Aug. 26, 1861 | Dec. 5, 1861 |
| Kenner Garrard..... | Captain, Fifth Cavalry | Dec. 5, 1861 | Sept. 25, 1862 |
| Henry B. Clitz..... | Major Twelfth Infantry..... | Oct. 23, 1862 | July 4, 1864 |
| John C. Tidball..... | Captain, Second Artillery, colonel volunteers, U. S. Army. | July 10, 1864 | Sept. 22, 1864 |
| Henry M. Black..... | Major Seventh Infantry, colonel volunteers, U. S. Army. | Sept. 22, 1864 | July 1, 1870 |
| Emory Upton..... | Lieutenant-colonel First Artillery, brevet major-general. | July 1, 1870 | June 3, 1875 |
| Thomas H. Neill..... | Lieutenant-colonel Eighth Cavalry, brevet major-general. | July 1, 1875 | June 30, 1879 |
| Henry M. Lazelle.... | Lieutenant-colonel Twenty-third Infantry..... | July 1, 1879 | Aug. 4, 1882 |
| Henry C. Hasbrouck.. | Captain, Fourth Artillery..... | Aug. 22, 1882 | Feb. 1, 1888 |
| Hamilton S. Hawkins. | Lieutenant-colonel Twenty-third Infantry..... | Feb. 1, 1888 | Sept. 1, 1892 |
| Samuel M. Mills..... | Captain, Fifth Artillery..... | Sept. 1, 1892 | June 15, 1897 |
| O. L. Hein..... | Captain, First Cavalry | June —, 1897 | June 15, 1901 |
| Charles G. Treat..... | Captain, Artillery Corps..... | June —, 1901 | ..... |

The scope of this department in the beginning included infantry tactics, interior police and discipline, and the supervision of the Cadet commons. The functions of the department were not appreciably enlarged until the law of 1858, which made the Commandant of Cadets instructor of tactics in the three arms of the service and increased for the two years following the theoretical course by transferring to this department the subjects heretofore mentioned and taught in the first class, department of engineering.

The Commandant of Cadets has always had supervision of the instruction in saber and broadsword exercise, the sword master being a civilian. From February 28, 1858, until

April 24, 1861, instruction in small arms and military gymnastics was added to this instruction, and a commissioned officer not attached to the tactical department had charge of it. After 1861 this instruction was returned to the Commandant of Cadets with a civilian as sword master, but without gymnastics. In 1881 an officer of this department reorganized gymnastics at the Academy, which instruction was continued by an officer, the civilian as sword master, until February 1, 1885, when the present incumbent was appointed and has since, under the direction of the Commandant of Cadets, had charge of all this instruction. This step has been an important and most successful one in the development of this part of the instruction. The department has developed otherwise along the lines of general improvement in military instruction adopted and employed in the service during the past forty years, a description of which would involve the history of these modern methods.

The following are some of the changes made in the methods of administration and changes of regulations, with the approval of the Superintendent, that have been introduced in the past four years—1892 to 1896: The assembling of the officers of the department daily in the Commandant's office, to hear reports of the previous day, to receive the Commandant's instructions for the day, interpret regulations so that in all dealings and intercourse with Cadets the practice and rulings should be uniform; adjutant excused from making consolidated morning report, but required, before signing, to make note of required data for details, etc.; revised, reduced, and simplified reports and returns required from Cadet companies and from headquarters Corps of Cadets to correspond with army methods and returns; made the salute of Cadets to correspond with the drill regulations; revised, rearranged, and indexed interior regulations, known as blue book; extended the hours of Commandant of Cadets for transacting business with Cadets; introduced verbal explanations; introduced new form in submitting written explanations to correspond with the official correspondence found in the Service; revised and printed the lectures for second class on subjects modified to read, staff, post, and company administration; promulgated

rules and regulations in the use of the gymnasium and natorium; attached linen collar to dress and fatigue coat with fastenings; modified riding trousers and introduced leggings; discontinued wearing waist belt to church and equipments in quarters at Sunday morning inspection; discontinued the police inspection after reveille and of signing a certificate pertaining thereto; introduced the system of anthropometric records and extended the same to include other classes besides the fourth; reintroduced the battalion color; introduced the regimental drill and parade; cordage and application of tackles for raising heavy weights; during the encampment all drills and instruction, except dancing, to take place in the morning; during the absence of the second class on furlough all appointments of sergeants made from the first class. Experience has thus far shown good results from these changes.

STATEMENT OF THE COURSE, ETC., 1896.

THEORETICAL.

Text-books used.—Drill Regulations, United States Infantry, Cavalry, and Artillery; Tidball's Manual of Heavy Artillery; Blunt's Firing Regulations for Small Arms; Fitzwagram upon Horses and Stables; Wagner's Service of Security and Information; Guard Manual; Articles of War and U. S. Army Regulations. Recitations only in first three named, twelve recitations in infantry and ten in artillery; drill regulations between November 8 and December 31, second class year, and twelve recitations in cavalry drill regulations. February, first class year, sections attending in all cases on alternate days. Length of lessons, about 16 pages, and no lessons in review.

The hours of study and recitation are from 11 a. m. to 1 p. m. The length of the recitation is one hour and the total number of hours allowed to each subject, both inside and outside the section room, is 24 for infantry, 24 for cavalry, and 20 for artillery. The course is the same for all sections. Short lectures upon company, post, and staff administration are given to the second class from November 1 to March 15 weekly, half the class attending at a time for one hour.

The lectures, nine in all, are printed and delivered to the class in advance. The lecture is read to the section by the instructor and the hour spent in explaining points referred to. The lecture is required to be read over carefully by Cadets before coming to the lecture room; notes are not taken upon it. The lectures are compilations from Army Regulations and Orders of the War Department, and deal with the following subjects:

1. Instructions of recruiting officers; reports and returns.
2. Company organization; how men are gained and disposed of.
3. Army ration.
4. Company records; reports and returns.
5. Duties pertaining to the quartermaster's department.
6. Subsistence and ordnance departments.
7. Property accountability.
8. Money accountability.
9. Duties of post treasurer and post adjutant; returns and reports; the post exchange.

These lectures, in pamphlet form, are subsequently and before graduation given to the class to carry into the service.

Three lectures are given to the first class by the senior assistant instructor of cavalry in latter part of June and in connection with field exercises during that period.

The following subjects are treated: Preparations for field service; marching and camping; bits and biting (illustrated); stable management; the horse's foot, shoeing; common diseases of the horse; the conformation and points of the horse; the age of the horse as indicated by the teeth, and packing the Moore pack saddle.

Instructions are also given to members of the first class as to the proper method of making out the daily reports of a company.

In addition to the above one hour is spent daily in camp during latter half of June, when there is but little practical work, in readings and explanations of the guard manual, Articles of War, and regulations upon the police and government of Cadets in camp, based upon Army Regulations.

PRACTICAL WORK DURING THE FOUR YEARS.

First year.—First three weeks, school of the soldier, settings up, manual, and exercises of the squad; three drills daily. Thereafter, and until the new class is sufficiently advanced to become part of the battalion (a period of about two weeks), two drills daily. In camp, from June 30 to August 28, practical instruction in military police and camp discipline. Practical instruction in guard duty from about July 4. From July 5 to August 28, artillery drill each week day, one hour; school of the cannoneer; siege and mortars on alternate days; swimming for one hour, until all the class have qualified—qualification consists in the Cadet being able to swim at least ten minutes with chest stroke; infantry drill three-fourths of an hour daily, except Saturday and Sunday, in August, school of the company. September: Infantry drill, school of the company, battalion, and regiment. October: Infantry exercises of the squad in extended order half the month; the remaining half, school of the cannoneer, siege and mortar drill, and pointing and aiming drills, small arms. March 15 to 31: Infantry, school of the company. April: Infantry, extended order, use of cover and battle exercises of the squad, and school of the cannoneer, siege and mortar drill. May: Infantry, school of the company and battalion, close and extended order. From October 1 to June 1, three-fourths of an hour daily in the gymnasium, Sundays excepted, use of the sword and bayonet, and military gymnastics.

Second year.—In camp June 15 to August 28; practical instruction in guard duty, etc., same as in first year; after July 4, instruction in small arms, gallery practice; artillery drill, school of the cannoneer; instruction in cordage; infantry, school of the company same as first year; drillmasters for the fourth class squads and gunners and chiefs of detachment for fourth class batteries. September: Infantry, school of the company, battalion, and regiment. October: Heavy artillery, seacoast battery; squad leaders for fourth class squads, extended order and instruction in small arms; range practice. November 1 to March 15: Riding, school of the

trooper on alternate days, March 15 to 31: Same as first year. April: Same as October. May: Same as first year.

Third year.—September: Same as first and second years. October: School of the cannoneer, light artillery. November 1 to May 1: Cavalry, school of the trooper, troop, and squadron. March 15 to 31: Infantry, same as in first and second years. April: Artillery, same as October. May, same as first and second years.

Fourth year.—In camp June 15 to August 28. Cavalry exercises, advance and rear guards and outposts, latter half of June. Instructions as to the method of giving commands. Practical instruction in heavy artillery, mechanical maneuvers, use of blocks and tackles, and in light artillery, school of the battery. Infantry drill, August, as in first and second years and as officers, noncommissioned officers, and guides of companies. September: Infantry, as in other years. October: Light artillery, school of the battery. September to June: Cavalry, school of the trooper, troop, and squadron. March 15 to 31: Infantry, as in other years. April: As in October, and infantry, extended order, battle exercises. May: As in other years. Practical instruction throughout the year in the exercise and responsibilities of command as officers and noncommissioned officers in camp, in charge of subdivisions in barracks, and in command of companies at infantry drill, and of various detachments at artillery and cavalry exercises.

The members of the class before graduation are sent to visit the squad rooms and stables of the cavalry detachment to see the manner in which enlisted men are quartered and cared for.

ORGANIZATION OF THE DEPARTMENT, 1896.

The department as now organized has charge of all strictly military drills and exercises and military gymnastics, including the sword and bayonet. The personnel is as follows:

A Commandant of Cadets with the rank of lieutenant-colonel. He is in immediate command of the Corps of Cadets,

the instructor of tactics, inspector of the Cadets' mess, president of the board of inspectors of supplies for Cadets, and in charge of the police, discipline, and administration of the corps.

One senior assistant instructor of cavalry tactics, usually a captain, member of the board of inspectors of supplies for Cadets.

One senior assistant instructor of artillery tactics, usually a first lieutenant. He is under the Commandant, the inspector of clothing for Cadets.

One senior assistant instructor of infantry tactics, usually a first lieutenant.

Four assistant instructors of tactics, commanding the Cadet companies, lieutenants.

One assistant instructor in cavalry, lieutenant.

An instructor of military gymnastics and use of the sword and bayonet, civilian; appointed permanently.

The senior assistant instructor in cavalry and assistant take all the drills in riding.

The infantry and artillery drills are divided as nearly as possible equally among the other officers of the department.

The instructor in military gymnastics, etc., has charge of the exercises in swimming also.

The four assistant instructors, commanding Cadet companies, conduct the infantry drills of their companies and are responsible for the ordnance equipments issued to them. They are also, under the regulations of the Academy and instructions from the Commandant, directly in charge of the police and discipline of the companies. They are required to make inspections of their companies at least twice daily before taps, both in camp and in barracks, with frequent inspections after taps. The official papers of the companies pertaining to delinquencies, privileges, etc., pass through their hands.

All the officers of the department, except the head and the senior in cavalry, form a roster for "officer in charge." This officer is the executive head of the department for the day and represents the Commandant in his absence.

DESCRIPTION OF A RECITATION; CLASS REPORTS; TRANSFERS, ETC.

For recitation the classes are divided into sections, and the system of instruction, marking, etc., conforms to the practice of the other academic departments. Weekly class reports and exhibition of marks the same. Transfers are rarely made on account of the small number of recitations.

REVIEW OF THE PRESENT COURSE, METHOD OF INSTRUCTION, ADVANTAGES, ETC., 1896.

The present course designs to give to the Cadet the elements of a military education, as comprehended in the drill regulations of the three arms of the Service and in the other manuals and lectures referred to in the theoretical course; and in the practical work to impress upon him a thorough knowledge and appreciation of discipline and of military police, both in barracks and in camp; to educate him in the important qualities of attention to detail and of promptness in all his work; to give him the physical training necessary for the work and hardships he may be called upon to endure; and in conjunction with the other departments, to instill into his mind during his four years at the Academy a proper spirit of subordination and obedience to authority and to develop his confidence and capacity for command.

The physical training, so far as it relates to work in the gymnasium, aims at the following results:

1. To counteract by judicious and well-regulated exercise the mental strain which the successful mastery of the academic course makes necessary;
2. To improve the physical and general carriage, develop strength, health, and endurance; and
3. To develop agility, activity, and grace; also self-reliance, self-control, precision, and accuracy.

These results are accomplished by a thorough system of progressively arranged exercises, from which are excluded all movements of questionable value, and every one in the execution of which the element of danger is involved.

At the beginning of each year every Cadet is measured in accordance with the rules prescribed by the American Association for the Advancement of Physical Education. These measurements, nearly 60 in number, are compared with those of the average student of the same age; the weak points are noted and directions given as to how they may be strengthened. Only members of the fourth class attend the regular drills, but the above measurements are made for Cadets of every class and the members of the upper classes are encouraged to avail themselves of the opportunity the gymnasium affords.

Each class spends three of the four summers in camp, a total of about two hundred and ten days. The remainder of the four years, with the exception of two and one-half months on furlough at the end of the second year, is spent in barracks.

The Cadets are organized, under regulations prescribed by the Superintendent, into a battalion of four companies, each company composed of fractions of all four classes. The Cadet officers for the companies, with an adjutant and quartermaster for the battalion, are selected from the first class; the noncommissioned officers from the second and third classes. The selections are made by the Superintendent, upon the recommendation of the Commandant, from "those Cadets who have been most studious, soldier-like in the performance of their duties, and most exemplary in their general deportment."

The companies have separate quarters in barracks, separate tents and company streets in camp, and separate tables at meals.

The tents used in camp are the regulation wall tents with flies. Two Cadets live in each tent, except members of the fourth class, most of whom live three in a tent.

Two Cadets live in a room in barracks.

Cadets are allowed in camp only the minimum of bedding, clothing, etc., needed for the climate and season and consistent with a neat and soldierly appearance at all times.

The Commandant of Cadets and the four assistant instructors of tactics, with an assistant surgeon, live in camp.

All regular drills in camp are finished before 1 p. m. During the academic term the practical work in the department is done between the hours of 4 and 6 p. m., with the exception of a portion of the cavalry exercises and the military gymnastics.

Two dress parades are held daily in camp, at troop and retreat, except on Saturday, when the troop parade is replaced by an inspection.

One dress parade is held daily while in barracks, at retreat, except on Saturday, when it is replaced by an inspection at 2 p. m.

A complete guard is maintained at all times in camp and the instruction in this duty is most thorough. During the term in barracks a guard is posted in the divisions of barracks only during study hours in the evening to preserve quiet and to prevent Cadets from visiting or from leaving the barracks without authority.

The companies are practiced with the fire engine and apparatus one week each autumn, and are turned out for service whenever the emergency justifies it.

Cadets are formed by companies, classes, details, or sections, and the rolls called for all drills and exercises and for marching to meals and to recitations. Reports of all roll calls are rendered to the cadet officer of the day, whose duty it is to promptly investigate every case of absence reported to him.

Regulations are prescribed by the Commandant of Cadets, approved by the Superintendent, upon the arrangement of rooms in barracks, tents, in camp methods of conducting official correspondence, uniform for drills, privileges and minor duties of Cadets, to more fully carry out the regulations of the Military Academy. These regulations are bound in small book form and one copy is issued to each Cadet.

The method of instruction, broadly stated, may be said to be based upon the principle of requiring each Cadet to learn by actually performing them all the duties of a private soldier in the different arms of the service, beginning with the drill of the recruit, and thereafter the duties of the different

grades of noncommissioned officer and of an officer, in so far as the conditions surrounding the course will permit.

Each Cadet has at some time during the course the opportunity of exercising command in all the grades of noncommissioned and commissioned officer up to and including that of captain of a company. The method is progressive and follows the logical principle of assigning to a Cadet supervision and command in any drill or exercise as soon as practicable after he has himself become proficient in it. To illustrate: the third class furnishes the drillmasters for the fourth-class squads, school of the soldier. These in their work are supervised by Cadet officers of the first class, and these latter receive their instructions from a commissioned officer, who has general charge of the drill. Thus does the Cadet have combined, almost from the beginning of his course, the practice of command and the exercise of authority in drills in which he has become proficient, along with the work and instruction in drills not yet mastered; the proportion in the former division increasing naturally up to his graduation.

The officers of the department are assembled daily by the Commandant to receive any instructions he may desire to give them upon the drills and duties of the day; to hear reports and observations of the previous day; to point out and correct errors, if any have been made; to interpret tactical and other doubtful points, and to adopt absolutely uniform teaching and practice, so that all Cadets, though the battalion be divided for purposes of administration into four companies, shall receive the same and uniform instruction throughout, so far as it is practicable. This supervision of the daily work is a feature introduced by the present head of the department, and has been of incalculable benefit, enabling the Commandant through these means to keep closely in touch with every phase of discipline and instruction. This system, together with the more recently adopted provisions of permitting Cadets to submit verbal explanations, gives the Commandant an opportunity of personally coming in contact with every Cadet in the Corps and of learning his character and special aptitude for his work, to correct and point out to him the true and proper direction

of his line of duty and its connection with the duties that may devolve upon him as an officer.

It is thus by constantly and unceasingly, patiently and earnestly placing before the Cadet his obligations to duty, and impressing upon him the qualities of mind and character that constitute the high-minded, truthful, and conscientious officer, that the Commandant of Cadets, in my judgment, fulfills the most important part of his many responsible duties.

[Extracts from report of Commandant of Cadets, September 18, 1898—
Colonel Hein.]

INSTRUCTION IN DRILL AND TACTICS.

(a) *Practical.*—The course of practical military instruction embraced the drill of infantry, cavalry, light and horse artillery, and siege and seacoast artillery; tactical and minor tactical exercises of infantry and cavalry; practice marches of infantry, cavalry, and light artillery; target practice with rifle and revolver, and with field, siege, and seacoast guns; fencing with the foil, broadsword, and bayonet; gymnastics and swimming; instruction in castrametation; cavalry and artillery stable duties, and practice in some of the duties especially devolving upon these arms.

The effort was made to widen the scope of the course of practical military instruction—especially that held during the summer encampment—and to place it upon a more practical basis; also to carry out the principal and most important aim of this department, the promotion of the self-reliance and confidence, sense of responsibility, and development of character of Cadets, in order to prepare them more fully for the performance of the duties devolving upon the young officer when he first joins his regiment or corps, and which he is expected to be able to enter upon at once.

To effect this it was found necessary to rearrange the summer programme of military instruction so as to give more time for the work to be accomplished and to give more opportunities for Cadets, especially the privates of the first class, to exercise the command and responsibilities devolving

upon officers and noncommissioned officers. This was done by suspending troop parade, except on Sundays, and by postponing guard mounting until immediately after evening parade; by dividing the forenoon into two drill periods—first, from 7.10 to 8.30 a. m., and, second, from 9 to 10.45 or 11 a. m., or even later if desirable or necessary to obtain the best results—and by making the instruction in these drill periods interchangeable; by reserving an entire day of each week for a practice march, and by placing the privates of the third class on the roster for corporal of the guard and those of the first class on the permanent roster for officer of the day and guard, and requiring the latter to frequently act as captains and lieutenants at the various drills and exercises of each arm.

More time and attention were given to exercises in applied tactics and minor tactics, on varied ground in and beyond the reservation, and the practice marches were generally combined with field exercises. These exercises and practice marches were as follows:

June 21.—Cavalry practice march of 11 miles and exercises in minor tactics, stable duties performed on return (first class); duration, about nine hours.

June 24.—Cavalry reconnaissance (first class); duration, about nine hours. Exercise in infantry outpost duty (third class); duration, about two hours and twenty-four minutes.

June 27.—Outpost duty and patrolling (third class); duration, three hours and thirty-five minutes.

June 28.—Advance guard and rear guard duties (third class); duration, three hours and thirty-five minutes.

June 29.—Infantry practice march (third class); about $7\frac{1}{2}$ miles.

June 30.—Advance guard exercise and infantry attack (third class); duration, two and one-third hours.

July 1.—Light-battery practice march of about 12 miles and target practice with projectiles (first class). All duties pertaining to harnessing, hitching, and care of horses (grooming, watering, feeding, and bedding down) were also performed by the first class. On this march the cadets acted as

drivers, noncommissioned officers, and officers. Infantry practice march of three hours (third class).

July 8.—Infantry practice march, with exercise in advanced and rear guard (first and third classes); duration, four and three-fourths hours.

July 15.—Infantry practice march, with exercises in minor tactics and castrametation (first, third, and fourth classes); duration, seven and three-fourths hours.

July 22.—Infantry practice march and field exercises (first, third, and fourth classes); duration, four and one-half hours.

August 8.—Infantry practice march and field exercises (first, third, and fourth classes); duration, four and one-half hours.

August 21.—Infantry practice march to Camp Townsend, Peekskill, where a bivouac was established and field exercises carried out, consisting of an attack of three companies against one in an intrenched position and attack of a defile held by one company by three companies (first, third, and fourth classes); duration, twenty-seven hours.

As a preparation for practical field work, cadets had been given preliminary instruction in the duties of advanced guard, rear guard, outposts, etc., having been supplied with a manual of exterior guard duty, which they were required to read and study in camp.

Proper instruction in extended-order drill of infantry and in minor tactics has been attempted, with but little success, during the autumn and spring drill terms, on account of the insufficiency of time available and the lack of a suitable maneuver terrain in the vicinity of the post for this purpose; but the first-mentioned difficulty can be overcome by giving this instruction during the summer encampment, and the latter inconvenience be met in the future by the utilization of the ground formerly used as a cadet garden, which is now being put in order for this important instruction.

The course in rifle firing for all classes was extended and more systematically and progressively carried out than heretofore.

This instruction was facilitated by the preparation and issue

to Cadets of a small manual, *Outline of Instruction in Small-arms Firing*, based on *Small-arms Firing Regulations*.

Instruction in aiming, pointing, and gallery practice began and ended with the fourth class during the summer encampment; the third class had short and mid-range practice, and the first class mid-range practice only, the target range not having been yet prepared for long-range and group firing. Work on the range is now being done, however, and it will be ready for this practice during the autumn and spring terms.

The idea followed in this course was to give Cadets a complete outline course of the target practice carried out in the service, and also some preparation for the duty of musketry instructors.

Revolver practice (dismounted) was given to Cadets of the first class, it being impracticable to have mounted practice, on account of the limited time available for this purpose.

SPECIAL CAVALRY INSTRUCTION OF THE FIRST CLASS DURING THE SUMMER ENCAMPMENT, 1898.

Theoretical.—Saddles and saddling; bits and biting; the saddle packed; age of horses to 20 years; nomenclature of horse; points of the horse; blemishes and defects, etc.; the foot and its shoe (seven lessons—lectures and explanations).

Practical.—Manual of the carbine mounted; folding saddle blanket; rolling overcoat; making packs; packing saddle; troop inspection armed with carbine; saber and pistol practice; march from 9 a. m. till 4 p. m., 11 miles, and practical care of horses (grooming, watering, feeding, and bedding down) on return; outpost duty; fighting on foot; age of horses.

At each drill Cadets were required to saddle and bridle their own horses and to unsaddle and unbridle on their return. All theoretical instruction was followed by such practical application as would impress the subject on their minds.

(b) *Theoretical.*—The theoretical instruction imparted in the department of tactics comprised recitations in the drill regulations of infantry, cavalry, and artillery, according to

the following programme as laid down in the regulations of the United States Military Academy:

First class, fourth year, cavalry drill regulations. Every other week day, Saturdays excepted, from November 1 to March 31, alternating with drawing. Ten lessons each of one hour.

Second class, third year, infantry and artillery drill regulations. Every other week day, from November 8 to January 1, alternating with chemistry.

Ten lessons in infantry drill regulations and 10 lessons in artillery drill regulations, each of one hour.

Some theoretical instruction in minor tactics to supplement that taught in the drill regulations was imparted during the summer encampment (on days not available for outdoor work) by means of lectures, by reading the Manual of Outposts, Advanced and Rear Guards, etc., prepared for this purpose for the use of cadets, and by the solution of simple, tactical problems.

Some little knowledge of the theory of musketry instruction is also a necessary preliminary to target practice, and this has been acquired by cadets by means of a little pamphlet ("Outline of instruction in target practice") prepared for their use.

MILITARY ADMINISTRATION.

The course in military administration consisted of—

Two lectures on instruction of recruiting officers and reports and returns pertaining to recruitment.

Two lectures on duties of post adjutant, post treasurer, and post exchange.

Two lectures on company records.

Two lectures on the ration.

Two lectures on duties pertaining to the Quartermaster's Department.

Two lectures on Subsistence and Ordnance Departments.

Two lectures on company organization.

One lecture on money accountability, etc.

One lecture on personal reports; to each half of the second class, divided into two sections for this purpose.

[Extract from report of commandant, Colonel OTTO L. HEIN, August, 1900.]

INSTRUCTION IN DRILL AND TACTICS.

(1) *Practical.*—The course of practical military instruction comprised the following branches: (*a*) Infantry, cavalry, and artillery drill and exercise; (*b*) tactical and minor tactical exercises; (*c*) target practice; (*d*) castrametation; (*e*) field intrenching; (*f*) pack train; (*g*) fencing, gymnastics, and swimming; (*h*) fire drills; (*i*) practice marches and field exercises.

The course began on September 1, and with the exception of branches (*g*) and (*h*) embraced the months of September, October, last two weeks of March, the months of April and May, last ten days in June, and the months of July and August—a total of about seven months. During the August and spring terms the time allotted for practical instruction averaged about one hour daily, four days each week, and during the summer term up to August 12 about two and one-half hours on Mondays, Tuesdays, Wednesdays, Thursdays, and Fridays, and three hours on Saturdays. From August 12 to 26, inclusive, the instruction hours began at 7 a. m., and there was no recall.

All the drills and exercises during the summer term (except from August 12 to 26, inclusive) were held between 7 and 10 a. m., and on Saturdays from 9 a. m. to 12 m.

(*a*) INFANTRY, CAVALRY, AND ARTILLERY INSTRUCTION.

Infantry.—This consisted of drills and exercises in the school of the soldier, company and battalion, which were held during September (17 drill days), March 15 to April 15 (17 drill days), May 14 to 31 (12 drill days), July 5 to August 11 (27 drill days). Infantry instruction preparatory to field exercises, and practice marches, was held on the six Saturdays during the last-mentioned period.

The members of the first class were detailed in turn as captains and lieutenants at the company and battalion drills and preparatory exercises, and as adjutant and quartermaster at the battalion exercises.

Cavalry.—Cavalry instruction during the year consisted of equitation in the riding school, drills in the school of the trooper, squad, troop, and squadron (close and extended order), and dismounted cavalry; also the ceremonies.

Much attention was given to proper biting and saddling, and to packing the saddle, also to practice in the use of the ordinary civilian saddle as a necessary accomplishment, and for polo, which sport was given much encouragement.

Cavalry instruction was imparted progressively to the third, second, and first classes. The members of the first class were detailed in turn to command the platoons and troop at the troop and squadron drills.

Light and horse artillery.—This instruction comprised the school of the battery, light and horse artillery, with the first class detailed in turn as officers during the autumn, spring, and summer, and the third class as cannoneers during the autumn, spring, and part of the summer.

It also embraced the school of the driver, fitting of harness, use of the coupling rein, whip, bridling reins of off horse, instruction by pairs and teams unhitched, to post teams with their carriages, to hitch and unhitch, and instruction by teams hitched.

Light artillery target practice and ranging under the service conditions approximately was held during the latter part of the summer.

Artillery—3.2" gun foot drill.—This instruction was imparted to the fourth class during the months of October, from April 15 to May 15, and the months of July and August. It consisted of the service of the piece, instruction in aiming, setting the sights for indicated ranges and for indicated deflection; practice in aiming, bringing into line of sight a disk moved over the face of a target set up a short distance from the gun; fuze setting, explanation of the nature and working of the fuze by model fuze exhibited; practice in fuze setting by use of dummy shrapnel with holes (to indicate time train) and pins; fire discipline, instruction in the duties of the personnel and in the service of the guns in action; finding the range, establishing the long and short brackets, finding the length of the fuze.

This instruction is preparatory to the field practice of the light battery where projectiles are used and the conditions made more realistic.

The chiefs of platoon of this instruction battery were detailed in turn from the first class and gunners from the third class.

Siege-gun and mortar drill.—This instruction was given to the fourth class, with gun commanders from the first class, during the autumn, spring, and summer terms, alternating with the 3.2" gun foot drills. It comprised the service of the piece, also instruction in nomenclature and general features of the pieces (rifling, breech mechanism); aiming (practical laying by open sight, correction of aim by observed results, use of sight and quadrant in conjunction, indirect laying); ammunition (weights, velocities); penetration, etc., effects of fire.

The course in cavalry, light and horse artillery, will, during the coming year, be put upon a plane of excellence heretofore unattainable.

In the past it has always been necessary to use the same horses for cavalry and artillery instruction, and to employ the enlisted men of the cavalry detachment as drivers. This condition no longer obtains since an artillery detachment and the necessary artillery horses have been authorized for instruction at the Military Academy.

Mountain gun artillery.—This consisted of instruction in the material (1.65 Hotchkiss mountain rifle), the gun, its ammunition, sights, etc., and the pack saddle and its accessories, in fitting pack saddle to mules, in the transportation of the battery by pack mules and by draft, and in the service of the piece.

This instruction was given to the first class during the spring and summer periods of instruction.

Recommendation has been made that the inferior Hotchkiss mountain gun of small caliber be replaced with the Maxim-Nordenfeldt 75 mm. mountain gun, which is officially reported to have given perfect satisfaction in the field, and it

is hoped that the modern gun may be furnished for use in the instruction of cadets as soon as practicable.

Machine gun.—Instruction in machine guns (10-barrel Gatling), consisted of the nomenclature and service of the piece, maneuver of the horsed gun detachment, and firing practice with blank ammunition, and ball ammunition on the target range. It was imparted during the autumn and spring periods to the second class as cannoneers, with officers detailed in turn from the first class.

Coast artillery.—Instruction in this branch was given to the first class in the autumn, to the second class in the spring, and the third class in the summer. The gun used was the 8-inch B. L. rifle on United States barbette carriage and 12-inch B. L. mortar on spring return carriage. It comprised the care, cleaning, etc., of the rifle and mortar, and manual of the same; use of horizontal position finder, setting up base end instruments, and measuring horizontal angles, taking and transmitting azimuths of moving vessels; use of plotting board to determine position, speed, and direction of moving vessels; relocating for use at gun.

This instruction is now placed in the third-class course, and will be given to that class hereafter, the class having previously had a theoretical course in coast artillery drill regulations in the section room, besides theoretical and practical instruction in the same line in the siege-battery instruction given to the class when fourth classmen.

(b) TACTICAL AND MINOR TACTICAL EXERCISES.

These exercises were held during the autumn, spring, and summer terms on the maneuver terrain, on the reservation, and contiguous country. They consisted of the attack and defense of a position (sometimes intrenched), of a defile, woods, etc., and battle exercise in the open; also exercises of advance guards, rear guards, outposts, and reconnaissance of the enemy and country. Some of the exercises were carried out by infantry and cavalry singly, and by these arms in combination with light and mountain artillery.

(c) TARGET PRACTICE.

Rifle.—The course of rifle target practice during the instruction year consisted of—

A. Sighting, position, and aiming drills, and gallery practice.

B. Short range, 100, 200, 300 yards; midrange, 500, 600 yards; and long range, 800, 1,000 yards, firing.

C. Skirmish firing, 600 to 200 yards.

As the course is now arranged the instruction in subdivision A is given to the fourth class during the period of recruit instruction, that in subdivision B to the fourth class in the spring and third class in the summer, and in subdivision C to the third class in the summer.

Revolver.—The course of revolver practice during the past year consisted of—

A. Position and aiming drill, and snap shooting with blank ammunition.

B. Dismounted practice at 10, 20, and 50 yards.

C. Mounted practice at a walk and gallop at the prescribed ranges.

The course of revolver practice is given to the first class.

The interest manifested by Cadets in their target practice was very gratifying and the work accomplished most satisfactory.

(d) CASTRAMETATION.

This course consisted of instruction in pitching shelter tents, wall and conical wall tents, and in laying out camps, and was given to the companies of the battalion of Cadets in turn during the spring and summer terms.

(e) FIELD INTRENCHING.

Instruction in the construction of shelter trenches was given to the companies of the battalion of Cadets, in turn, during the spring and summer terms, and practice in this branch was also carried out at a number of tactical and field exercises.

The intrenching equipment of Cadets, consisting of a portable spade and pick, worn suspended in leather cases from the field cartridge belt (adopted in the summer of 1898), has been thoroughly tested, and has proven to be a very satisfactory equipment.

(f) PACK-TRAIN SERVICE.

This instruction comprised the setting up of the aparejo (with willow strips and steel ribs), fitting the same to mules, and detailed instruction of each Cadet in putting on the aparejo, in loading cargo on the mule, and securing the same with diamond and other hitches, and methods of adjusting loads of different kinds; it was imparted to the first class during the summer period of instruction.

To qualify, each Cadet was required to start with aparejo and load on the ground, to put on the aparejo, and sling and lash the load within three minutes. The entire class qualified during the summer.

The pack train as organized for the use of Cadets consists of the quartermaster-sergeant, eight packers, and twelve pack mules.

An ammunition pack train for the supply and distribution of ammunition to troops in the firing line, consisting of eight pack mules with packs of eight boxes of ammunition under charge of the Cadet Quartermaster with eight ammunition carriers (provided with ammunition pouches), has been organized, and Cadets have received instruction and practice in this important branch at the tactical exercises.

(g) GYMNASTICS, SWIMMING, AND FENCING.

The course of physical training of Cadets was carried out in accordance with the prescribed programme, and the instruction imparted to the new Cadets was similar to that of last year and the year before.

(h) FIRE DRILLS.

Fire drills of the battalion, comprising the service of the steam fire engine, hook, ladder, and hose trucks, were held

during the month of December and continued until a sufficient degree of efficiency with the fire apparatus in case of fire was insured.

(2) FIELD EXERCISES AND PRACTICE MARCHES.

Field exercises and practice marches.—The culmination of the practical instruction of the summer occupied the last two weeks of the encampment; that is, from August 12 to 27. The field exercises embraced an extended application of the principles of attack and defense, of advance and rear guards, of outposts and reconnoissance, with an enemy imaginary, outlined or represented, or with opposing sides. The practice marches were generally combined with such exercises, and when made by mounted organizations stable duties (watering, grooming, feeding, and bedding down horses) were performed as required by the cavalry or light artillery drill regulations and customs of the service, upon the completion of the march.

The field exercises alternated with the practice marches, the former beginning at 7.10 a. m. and ending at or before 11 a. m., and the latter lasting from 7.10 a. m. till 2.30 or 3.30 p. m.

The uniform worn consisted of gray shirts, trousers, campaign hats, and leggings. Blanket rolls, canteens, and haversacks were carried on some of the practice marches, and in case of mounted organizations saddles were packed.

The rank and file of the cavalry, light and mountain artillery organizations, and pack train consisted entirely of members of the first class, and of the infantry organizations, of members of the third and fourth classes, with officers detailed from the first class according to roster.

The field exercises and practice marches were all carried out in accordance with general schemes, in which the conditions were made to resemble those in actual service, and were superintended by officers of the tactical department.

All of the exercises and marches, with the exception of the march to Peekskill, were carried out within 8 or 10 miles of the post, and were as follows:

August 4.—First class, organized as platoon of mountain artillery, and train loaded with reserve ammunition and camp equipage, marched to clearing on Eagle Valley road and went into camp; pack mules unloaded and cargo stored; picket line stretched; camp pitched, using shelter tents; drivers and packers sent to care for animals, cannoners to care for their guns, etc.; details made for pitching wall tent, digging sinks, and kitchen fatigue; duration about four and one-half hours.

August 11.—First class, organized as platoon of mountain artillery and pack train, field exercise and camp duties; duration three hours and twenty minutes. Third and fourth classes, organized as two companies of infantry, carried out exercise in attack and defense of an advance guard and outpost, enemy represented; duration three hours and twenty minutes.

August 14.—First class, organized as troop of cavalry, acted as reconnoitering detachment and outpost; enemy outlined; duration three hours. Third and fourth classes, organized as two companies of infantry, exercise of advance guard and outpost, enemy outlined; duration three and one-half hours.

August 15.—First class, organized as light battery, went on practice march; enemy imaginary.

In this march the officers, noncommissioned officers, and drivers comprised members of the first class. The teams were harnessed and hitched by the latter.

The battery went into park on the return march, when the teams were unhitched and unharnessed, the picket line stretched, and camp made; picket and park guards and sentinels were posted, and fatigue details sent to procure wood, and in digging and screening sinks. After dinner the camp was struck and policed and sinks filled. Teams were harnessed and hitched, the carriages repacked, and the battery returned to the post, after which they performed evening stables; duration nine hours and thirty minutes.

The third and fourth classes, organized as two companies of infantry, went on practice march, and carried out exercise

as advance guard, reconnoissance and outpost, with opposing sides; duration seven hours.

August 17.—First class, organized as platoon of mountain artillery, went on practice march, established camp, etc.; duration seven hours. Third and fourth classes, organized as battalion of infantry, executed a field maneuver.

August 18.—First, third, and fourth classes, organized as a battalion of infantry, executed a field maneuver, enemy outlined; duration three hours and fifteen minutes.

August 20.—First class, as a troop of cavalry, executed a field maneuver; duration three hours and thirty minutes.

Third and fourth classes, organized as battalion of infantry, executed a field maneuver; duration two hours and fifteen minutes.

August 21 and 22.—The Corps of Cadets, organized as a battalion of infantry, troop of cavalry, platoon of mountain artillery, and pack train, in heavy marching order, marched from West Point at 8 a. m. on August 21 to the State camp of the New York National Guard, with troop of cavalry acting as advance guard. The command reached Peekskill at 11.30 a. m. and went into bivouac, establishing an outpost. A field exercise was carried out at 4 p. m., one company intrenching and defending a position which was attacked by the remaining three companies. The mounted organizations performed evening stable duty and furnished a stable guard. The command broke camp at 7 a. m. on August 22 and carried out a field maneuver on the return march. One company of infantry was sent in advance of the remainder of the command to take up and defend a position in the defile about 4 miles north of Peekskill. This was reconnoitered by the cavalry and then attacked by three companies of infantry in front, the cavalry and mountain artillery cooperating on the flanks. At the conclusion of the exercise the march was resumed, and the command reached West Point at 12.45 p. m.

August 23.—First class, as troop of cavalry, carried out a field exercise with enemy outlined; duration two hours. The third and fourth classes, organized as a battalion of

infantry, carried out a field exercise with enemy outlined; duration two hours.

August 25.—The first class, organized as a light battery, had target practice, the targets being placed at a distance of 2,150 yards and 2,250 yards from the battery. Eighty-six common shell with brass percussion fuses and 30 shrapnel with combination fuses were fired. All of the targets were repeatedly hit and a large percentage of the shots fell within the area that would have been occupied by a battery in action; duration eight hours. The third and fourth classes, organized as a battalion of infantry, executed a field maneuver; enemy outlined; duration three hours and forty-five minutes.

August 27.—The first class, organized as a troop of cavalry with packed saddles, went on practice march and performed reconnoitering and outpost duty; enemy outlined. Evening cavalry stable duty was performed on the return to the post; duration seven hours and forty minutes. The third and fourth classes, organized as a battalion of infantry, carried out an exercise of advance guard and outpost; enemy outlined.

Field sketches and reports were made by detailed members of the first class on all of the practice marches and several of the field exercises.

(2) *Theoretical.*—The course of theoretical instruction during the past year consisted of recitations in the United States infantry, cavalry, and light artillery drill regulations, regulations for mountain, coast, and siege artillery, and service of security and information during the academic year, and of lectures and practical demonstrations during the summer encampment, according to the following scheme:

(a) United States infantry drill regulations:

Fourth class.—As far as and including the school of the company (8 lessons).

Second class.—Remainder of drill regulations (11 lessons).

(b) United States light artillery drill regulations:

Fourth class.—School of the cannoneer (4 lessons).

Second class.—School of the battery and employment of artillery (11 lessons).

(c) Siege and coast artillery:

Fourth class.—School of the cannoneer (4 lessons).

(d) United States cavalry drill regulations:

First class.—School of the troop, squadron, regiment, employment of cavalry (12 lessons).

(e) Service of security and information:

Fourth class.—Advance and rear guards, outposts, reconnoissance, etc. (11 lessons).

The course of lectures was delivered to the first, third, and fourth classes on days unfit for practical work out-of-doors, as follows:

| Day of lecture. | Class. | Branch. | Subject. |
|-----------------|--------|-----------------------|---|
| First | 1 | Cavalry | Conformation, physiology, and anatomy of the horse. |
| | 3 | Coast artillery | Defense of coast of United States, general plan and subdivision; classification of harbors and general method of their defense. |
| | 4 | Artillery | Cannon, classes; guns, howitzers, mortars, machine and rapid-fire guns, nomenclature. General principles of gun construction. |
| Second | 1 | Light artillery | Open sights; kinds and use of fuses and projectiles. |
| | 3 | Infantry | Preparation of orders and reports. |
| | 4 | Infantry | Field intrenching. |
| Third | 1 | Mountain artillery. | Organization of a mountain battery. The latest models of mountain guns. Organization of a pack train. Capacity of pack mules. |
| | 3 | Coast artillery | Seacoast fortifications; carriages for heavy and rapid-fire guns. |
| | 4 | Artillery | Projectiles; shell, shrapnel, canister, cored shot, and construction and use of each. Material of which they are made and why. |
| Fourth | 1 | Cavalry | Simple diseases and injuries of horses and remedies. |
| | 3 | Infantry | Scales and map reading. |
| | 4 | Artillery | Modern guns; their development; materials and methods of manufacture. Different kinds of projectiles and their uses. |
| Fifth | 1 | Cavalry | Stable management. |
| | 3 | Artillery | Coast artillery range and position finding. |
| | 4 | Castrametation | Methods of laying out regular camp and bivouac; points in selecting camp. |
| Sixth | 1 | Light artillery | Artillery in field, ranging, marching, use of telescope sight. |
| | 3 | Coast artillery | Seacoast guns, construction, etc. |
| | 4 | Infantry | Firing regulations. |
| Seventh | 1 | Cavalry | Forage; care of horses in "the field;" the foot and shoeing. |
| | 3 | Infantry | Outposts. |
| | 4 | Artillery | Sighting and aiming; indirect pointing, etc. |
| Eighth | 1 | Cavalry | Seats and saddles. |
| | 3 | Light artillery | Use of sights; method of ranging. |
| | 4 | Infantry | Attack and defense. |
| Ninth | 1 | Cavalry | Age of horse; bits and biting. |
| | 3 | Light artillery | Cannoneers on march and in camp; projectiles, fuses. |
| | 4 | Artillery | Carriages; definitions, descriptions, kinds, etc. |

A course of lectures and practical demonstrations, followed by outdoor work on the following subjects, was held for the members of the first and third classes whose presence was not required at artillery drills daily except Saturdays from 7 to 8.30 a. m. during the second period of instruction, from July 5 to August 11:

Map reading and practical uses of maps; scales; sketches, reports, reconnoissance; practical work in reconnoissance and sketching; solution of minor tactical problems.

Manuals of instruction prepared in the department of tactics.—Drill regulations for mountain artillery, First Lieut. W. Lassiter, First Artillery.

Drill regulations for siege and coast artillery, First Lieut. W. Lassiter, First Artillery.

Service of security and information, First Lieut. E. Anderson, Seventh Cavalry.

Manual for making blanket rolls and for pitching shelter tents, First Lieut. W. Lassiter, First Artillery.

Manual for constructing shelter trenches, First Lieut. G. Blakely, Second Artillery.

Notes on horses and rules for polo, First Lieut. R. L. Howze, Sixth Cavalry.

The transfer of the elementary part of the infantry and artillery drill regulations from the second class course to that of the fourth class and the introduction of the study of security and information in the fourth class course went into effect during the past year, and now comprises a very satisfactory course for that class.

MILITARY ADMINISTRATION.

The course of lectures on company, post, and staff administration, as required by Regulations, United States Army, was delivered by assistant instructors of tactics to the half of the second class which did not attend drawing on Fridays from 2 to 3 p. m. between October 13 and March 2.

Nine lectures were delivered to each half of the class, which alternated in attendance, as follows:

First lecture.—Instruction of recruiting officers, and reports and returns pertaining to recruitment.

Second lecture.—Company organization; how to obtain and dispose of enlisted men.

Third lecture.—The ration.

Fourth lecture.—Company records, reports, and returns.

Fifth lecture.—Duties pertaining to the Quartermaster Department.

Sixth lecture.—Subsistence and Ordnance Departments.

Seventh lecture.—Property accountability.

Eighth lecture.—Money accountability.

Ninth lecture.—Duties of the post adjutant and post treasurer, and reports and returns pertaining thereto. The post exchange.

To facilitate this instruction, printed lectures in pamphlet form were issued to the class before the beginning of the course, and the particular lecture of the day was announced in advance for discussion, and Cadets were required to prepare themselves to be questioned.

This course was supplemented during the months of January and February by practical instruction given to the first class in the manner of making out the morning report and other papers and records pertaining to the company.

LECTURES ON CUSTOMS OF SERVICE AND MILITARY ETIQUETTE.

Four lectures—on the customs of the service, uniforms and equipments, horse equipments and field outfit, and military etiquette—were delivered to the first class during the month of February.

The members of the class were allowed to submit to the lecturers written questions on any point included in the subject-matter of these lectures one or two days before their delivery.

INSTRUCTION OF NEW CADETS.

The recruit instruction of new Cadets (80 in number) arriving in June began on June 23 and ended on July 3 (13 drill days), and consisted of the following subjects:

Physical exercises and setting-up drill; school of the

soldier and squad, extended-order drill, and ceremonies; preliminary target practice (sighting, position, and aiming drills, gallery practice); shelter-tent exercise; shelter-trench exercise.

Lectures were given to the new Cadets on the Academic Regulations, blue book, care of arms and equipment, firing regulations, and service of security and information.

The instruction of the new Cadets (83 in number), arriving on the 25th of July, began on July 31 and ended on August 14 (13 drill days), and comprised the same programme as that mentioned above.

The hours for daily instruction (except Sundays) were as follows:

Physical exercises, 7.15 to 8.15 a. m.; infantry drill, 8.45 to 9.45 a. m. and 4.30 to 5.30 p. m.; gallery practice, 10.30 to 11.15 a. m.: shelter-trench and shelter-tent exercise during some of the morning and afternoon drill hours; lectures, 12 to 12.45 p. m.

The instructors employed over new Cadets were specially selected members of the first and third classes and comprised careful, painstaking, patient, exemplary, and intelligent instructors, all of whom worked conscientiously and efficiently under the immediate supervision of the assistant instructor of tactics in charge and the master of the sword.

The progress made in this branch of instruction was most satisfactory and gratifying and can be principally attributed to the systematic and rational arrangement of the course, the excellent instructors employed, and the strict compliance of the latter with the correct methods laid down in the drill regulations for the conduct of instructors. The work was also greatly facilitated in the marchings by indicating the proper and uniform cadence for instructors and squads by the tap of the drum, regulated accurately by the metronome; by object lessons in the manual of arms and position of the soldier rather than by long and tiresome oral explanations; by carefully sifting out and advancing the men from one squad to another according to proficiency, and by placing the most backward men under the very best instructors.

MILITARY EFFICIENCY.

During the past year the members of the first class have been detailed in turn, according to roster, as officer of the day and guard, commandants of table, and inspectors of subdivision (weekly tours), and were marked for their performance of these duties.

At all drills, tactical and minor tactical exercises, and practice marches and field exercises they have in turn performed the duties of officers, and a record of marks was kept upon the efficiency shown, i. e., as based upon their knowledge and application of the drill regulations, manner of giving commands, proficiency in making corrections and explanations, and control of men exhibited.

During the year the first class men of each company have in turn exercised command of the company, making its inspections before and commanding it on parade, marching it to and from the mess hall, and being held responsible for its good order during his tour, the latter beginning at guard mounting and ending at guard mounting on the following day. They have also acted in turn as adjutant at guard mounting and as adjutant and quartermaster at parades. They were marked on the performance of these duties, and also on equitation and for their work on the target range.

Marks on soldierly deportment and discipline, based upon the character and degree of soldierly qualities of each Cadet of the first class, as determined by the estimate of the Commandant of Cadets and each of his assistants and upon delinquencies affecting soldierly conduct, have been recorded.

The marks on military efficiency and soldierly deportment and discipline were submitted periodically to the Superintendent.

From this it will be seen that each member of the first class has been given every possible opportunity during his last year at the Academy to exercise the command and many of the responsibilities and duties which devolve upon a commissioned officer of the junior grade in the Army, preparatory to graduation, and has been given credit for the

efficiency shown in the performance of duty and for his exhibition of those qualities which are essential in the make-up of an officer.

[Extracts from report of Commandant, Col. Charles G. Treat, August, 1901.]

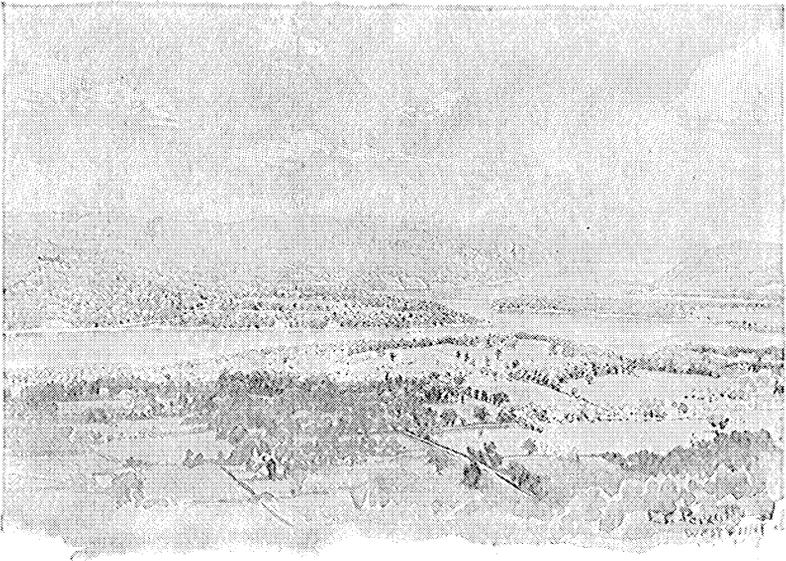
The undersigned assumed command as Commandant of Cadets June 15, 1901. Up to that time the regular drill schedule, as set forth in the annual report of the Commandant of Cadets for 1900, had been carried out. The regular drill season began June 15. A practice march to Lake Mohegan was made June 17, 1901. It was a march of concentration on the Peekskill waterworks, where contact was made with the Seventh Regiment, National Guard, State of New York, en route to Lake Mohegan. The command returned the following day. All duties were performed by Cadets, including grooming, watering, and feeding the animals. Very satisfactory road sketches were made, and all details of advance and rear guard and other requirements for security and information were strictly carried out.

* * * * *

Cavalry.—The quality of horsemanship and class of riding shown is good, though not entirely satisfactory. Efforts are being made to improve the biting and gaiting of the horses by using the four-rein bridle, and either a bit and bridoon or the regulation curb bit with second-rein ring at mouthpiece. This is producing a marked improvement in the gaits of the horses, their tractability, and manners, the injury and pain caused by the heavy, inexperienced, and numerous different hands on the curb alone being somewhat abated by the almost exclusive use of the snaffle rein. The Quartermaster-General has furnished 32 ponies that have been carefully trained and schooled and will be used in conjunction with cavalry and riding instruction to teach Cadets how to ride the pad saddle, ride cross country, and those showing superiority will be given practice and instruction in polo. The Ordnance Department has furnished 20 new and first-class pad saddles, with bridles, cavessons, and breast straps complete. These, with the 10 others already on hand, make 30 complete

outfits. To school new horses in taking obstacles and perfect old ones a jumping chute—an oval 150 feet by 75 feet, 12-foot track, fences 6 feet high, with a stone wall, water jump, hedge, and post and rail as obstacles—was constructed and has been in successful operation during the summer. The horses are first turned in without a bridle or rider and sent around as many times and as many days as necessary to have them jump easily, gracefully, and without hesitation. Cadets are then put in the saddle and instructed as to proper position of the body in jumping, and are encouraged to hold on by the saddle, mane, or straps around the horse's neck—anything to make them feel secure and increase their confidence. The horses, still without bridles, are then turned loose and sent over the obstacles. In this way the horse jumps naturally, the Cadet can not punish the horse by supporting himself on the reins, and he is gradually taught to ride with his legs alone and only to guide and steady by the reins. Both kinds of saddles are used in this instruction, with and without stirrups, and also bareback. The principle governing this instruction is, first, to teach the horse to jump; then let the horse be free to teach the man, taking every precaution to maintain and increase the rider's confidence. On the flat north of the post a simple steeple-chase course has been laid out, containing the following obstacles: Virginia rail fence, hedge, stone wall, in-and-out jump, board fence, post and rail, and water jump. The course is about half a mile long, and the turns are short enough to make it necessary to ride with the horse well in hand and avoid forming the habit of rushing at obstacles.

The summer course in equitation included instruction in the use of the longe and the proper application of the aids. This instruction was given to members of the first and third classes left over after providing for all details at the other drills taking place at the same hour—7 to 8.30 a. m. By this means 8 to 10 first-class men and 16 to 20 third-class men were given daily instruction. This was particularly advantageous in the latter case, affording an opportunity to somewhat accustom third-class men to the horse before getting



Fort Putnam.

West Point.

Constitution Island.

THE HUDSON RIVER AT WEST POINT.

The Beverly Robinson house, from which Arnold escaped to the Vulture, stood among the trees directly opposite West Point.

into the riding hall. The class is so large that the hall will scarcely accommodate one-half of them, as is customary, and the time allowed to each man will be diminished one-third and possibly one-half. This is a serious question, and it is hoped that a new division of time may be made to somewhat remedy the condition.

A regular course of lectures, covering practical duties in the several arms of the service, has been arranged for and given. Lectures also covering the subjects of military administration, customs of the service, and military etiquette, military efficiency, instruction of recruits and new Cadets, together with all other practical and theoretical subjects, have been discussed and lectured on by the various officers on duty in the department of tactics. The subject of discipline, military conduct, and general department has been presented to all Cadets by discussions and lectures by the Commandant of Cadets in person.

J.

HISTORICAL SKETCH OF THE DEPARTMENT OF PRACTICAL MILITARY ENGINEERING, 1896.

[The following report on the department of practical military engineering was prepared in 1896 by Captain James Lusk, Corps of Engineers, U. S. A., the then head of the department.]

During the early history of the Academy, and up to about 1842, instruction in practical military engineering appears to have been committed to the department of engineering and the science of war, under the title of "actual (or practical) operations on the ground." (See United States Army Regulations, 1821, art. 78, par. 40; United States Army Regulations, 1825, par. 1349; Regulations United States Military Academy, 1839, pars. 34, 35.)

In August, 1842, Capt. A. J. Swift, Corps of Engineers, was assigned to duty as instructor in practical military engineering, and his name is so borne in the Annual Register for 1843. About one year later the head of the department became a member of the academic board. (See Post Orders, No. 22, of 1844.)

From 1844 onward the department has existed without interruption, except during part of the war of the rebellion, when it was probably merged in a greater or less degree in the department of engineering and the science of war.

A detailed programme of instruction first appears in the Academic Regulations in 1853. That programme was somewhat extended in 1857, and again in 1867 and 1892.

Instruction in this branch was confined to the first class until 1867, when it was extended to include the second class. In 1891 it was still further extended to include the third class.

The regulations of 1857 prescribed that in making up the general merit roll of the first class practical military engineering should have a relative value of one-half (50), but the provision does not appear to have been carried into effect. In 1891 it was ordered, upon the recommendation of the academic board, that in making up the merit roll of the first class a weight of 45 should be assigned. This provision has been carried into effect in the merit rolls of the first class in 1892 and succeeding years to this time.

In 1863 Capt. S. T. Cushing, acting signal officer, was sent to West Point for the purpose of introducing "instruction in military signaling and telegraphy as a part of the regular course of instruction for Cadets." Under this order Captain Cushing was on duty at West Point from July 24, 1863, to January 24, 1864, but no post order appears to have been issued assigning him to duty.

Upon the recommendation of the academic board, instruction in military signaling and telegraphy was added to the course in practical military engineering in October, 1867.

STATEMENT OF THE PRESENT COURSE, ETC.

During July and August of each year the first and third classes are under instruction; in October and April, the first and second classes; and during the first week in May, the first class alone.

The scope of the course as at present taught can probably

be best outlined by the following programme of instruction for the year July 1, 1895, to June 30, 1896:

FIRST CLASS.

| | |
|---|--|
| School of the boat. | Flying trench (full scale). |
| Making knots and lashings. | Shelter trenches, various types. |
| Bridge by successive pontoons. | Russian gun pit. |
| Assembling and launching canvas pontoons. | Epaulment for breech-loading gun. |
| Trestle bridge on land. | Epaulment for muzzle-loading gun. |
| Double lock spar bridge. | Full sap. |
| Abatis. | Planting vertical palisading. |
| Fascine. | Planting inclined palisading. |
| Hurdle. | Gun platform. |
| Hoop-iron gabion. | Mortar platform. |
| Brush gabion. | Profiling. |
| Gabion revetment. | Signaling with flag. |
| Fascine revetment. | Signaling with heliograph. |
| Sand-bag revetment. | Signaling with telegraph. |
| Barrel revetment. | Use of reconnoissance instruments. |
| Wire entanglement. | Mounted reconnoissance. |
| Simple trench (one-sixth scale). | Utilization of ground and stone-walls as a means of defense. |
| Simple trench (full scale). | Use of explosives. |
| Flying trench (one-sixth scale). | |

SECOND CLASS.

| | |
|--------------------------------|-----------------------------------|
| Bridge by successive pontoons. | Planting inclined palisading. |
| Gabion revetment. | Planting fraises in scarp. |
| Sand-bag revetment. | Planting fraises in counterscarp. |
| Barrel revetment. | Gun platform. |
| Wire entanglement. | Mortar platform. |
| Making palisading. | Signaling with flag. |
| Planting vertical palisading. | Signaling with telegraph. |

THIRD CLASS.

| | |
|---|--|
| School of the boat. | Shelter trenches, various types. |
| Bridge by successive pontoons. | Signaling with flag. |
| Assembling and launching canvas pontoons. | Signaling with heliograph. |
| Trestle bridge on land. | Utilization of ground and stone walls as a means of defense. |
| Fascine revetment. | Use of explosives. |
| Gabion revetment. | |

The text-books employed are solely for reference. The list includes Ernst's Manual of Military Engineering, the Woolwich and Chatham text-books on the same subject, the United States Bridge Equipage and Drill, and various other publications bearing upon the subjects taught. The actual instruction to the Cadets in each subject is given out mainly in the form of printed cards containing concise descriptions and explanations of the work to be executed. The cards are supplemented by hectographed plans and sections and by oral explanations.

The number of drills possible each season depends to a certain extent upon the weather and upon interruptions in the way of musters, reviews, military funerals, etc., requiring the attendance of all the Cadets.

That these causes combine to lessen to a large extent the quantity of instruction possible the following comparison will show:

| | October, 1895. | April, 1896. | July and August, 1896. | Total. |
|------------------------------|-------------------|-----------------|------------------------------|--------|
| Drills possible..... | 18 | 17 | 47 | 82 |
| Lost, bad weather..... | 1 | 2 | 6 | 9 |
| Lost, military funerals..... | 1 | 1 | ..... | 2 |
| Lost, musters..... | 1 | 1 | ..... | 2 |
| Actual drills..... | 15 | 13 | 41 | 69 |
| Drills lost..... | 3 | 4 | 6 | 13 |
| Percentage lost..... | 16.7 | 23.5 | 12.8 | 15.9 |

The time devoted to instruction during the year in question was as follows:

| First class: | Hours. |
|---|-------------|
| October, 95, 15 drills, 1 hour each..... | 15 |
| April, 1896, 13 drills, 1 hour each..... | 13 |
| July and August, 1896, 41 drills, 1 ½ hours each..... | 61 ½ |
| Total..... | <u>89 ½</u> |

| | |
|--|-----------|
| Second class: | |
| October, 1895, 15 drills, 1 hour each..... | 15 |
| April, 1896, 13 drills, 1 hour each..... | 13 |
| Total..... | <u>28</u> |

| | |
|---|------|
| Third class: | |
| July and August, 1896, 41 drills, 1 ½ hours each..... | 61 ½ |

The time lost by the individual Cadets is much greater than that due to the number of lost drills. This arises from the absence of Cadets who are sick, on old and new guards (during the encampment), or detailed for other duties. Excepting the case of the first class in July and August, the attendance is by half classes on alternate days. During the first class year of the class of 1896 the maximum attendance by any member of the class was 56 drills out of a total possible of 72. The average attendance was about 46 drills out of 72.

In May each Cadet of the first class is required to attend one full day at mounted reconnoissance. This exercise involves about six and one-half hours of steady work of observing, recording notes, making a road sketch and a finished map in ink, all in the field.

No stated lectures are given in this course, but as much oral instruction is imparted as time allows. There is no distinct division of the course into advance and review, but, for the sake of proficiency, certain parts of the course are repeated to a limited extent.

3. ORGANIZATION OF DEPARTMENT, ETC.

Since the expansion of the course in 1891, and until quite recently, the number of instructors has been three—the instructor of practical military engineering and two assistants. As a rule, these three officers have all attended at every drill and have found themselves fully occupied. When the classes are large the summer drills tax the energies of the officers to the utmost.

There is no strict division of duties, the officers being assigned to different lines of instruction at different times, thus having under their observation all the Cadets of the different classes. This arrangement is believed to bring about the fairest possible results in marking and grading the classes.

4. DESCRIPTION OF A DRILL.

When a class or half class is reported to the instructor, the details are rapidly made by roster for the different kinds of work to be done. The squads are promptly marched to the working points, where instruction cards, rough drawings,

and implements are provided. When deemed necessary, oral instruction and explanation are given both before and after the squads begin working. When, in the judgment of the officer in charge, enough work has been done, the members of the squad are questioned sufficiently to ascertain their understanding of the practical features involved. The marking is done upon the method of working, the progress made, and the understanding shown of the subject. In signaling and telegraphy the marking is done upon the recorded messages turned in by each Cadet.

5. WEEKLY CLASS REPORTS, ETC.

These are made and the marks exhibited in the usual manner, the classes being divided into sections merely for the sake of convenience in marking. As a rule, transfers are not made. In general, first class men are detailed as chiefs of the working parties of the second and third classes, and are required to mark the members of their parties. The marks so given are recorded, but do not affect the final standing in the department, which is determined solely from the marks of the first class year. The members of the first class are marked by the officers alone.

6. EXAMINATIONS.

These are entirely practical, and have thus far been conducted in Fort Clinton, and with one exception (that of May, 1892) they have taken place during the period of the annual examination. As there is no room suitable for indoor examination, a postponement will undoubtedly be necessary in case of inclement weather. The mark for each day's drill having a weight of unity, the examination mark has thus far been given a weight of 3, and that for mounted reconnoissance a weight of 5. The usual standard of proficiency is required.

REVIEW OF COURSE, 1896.

The instruction now given is believed to be as full and thorough as the time allowed will permit. Several defects exist, the most important being as follows:

1. *Lost time.*—As stated in detail above, the time lost from instruction due to drills missed from various causes and to

the absence of Cadets from drills makes up a large total. To partially obviate the evil requires a wearisome repetition of certain drills. There seems to be no remedy for this state of affairs without encroaching upon the practical work of other departments, which is not recommended.

2. *The short terms of service allowed the assistant instructors and the irregularity of their tours of duty.*—These officers are not allowed as long terms of service at the Academy as those in other departments, and are assigned and relieved without reference to the academic year. The work of instruction of the department begins on July 5 and ends with the conclusion of the next annual examination. It is therefore desirable that changes of assistant instructors be made between the end of the annual examination and the succeeding 1st day of July. It is also much to be wished that these officers should have tours of duty at the Academy of not less than three years.

MEMORANDA CONCERNING DEPARTMENT OF PRACTICAL MILITARY ENGINEERING DURING THE WAR OF THE REBELLION.^a

Engineer Company A, formed for service in war with Mexico, returned to West Point June 22, 1848, and assisted in instruction of cadets until January 18, 1861, when, under command of Lieut. J. C. Duane, instructor of practical military engineering, it left West Point for Washington, D. C.

On September 30, 1861, the company returned with Capt. J. C. Duane and Lieuts. G. Weitzel and John A. Tardy, jr., and remained at West Point till October 30, 1861, when the company and officers again left to join the Army of the Potomac.

A small detachment was left behind under command of Lieut. William P. Craighill, then in the department of civil and military engineering, and remained at West Point under his orders (with a temporary absence June 21 to October 25, 1862) till June 18, 1863. From June 18, 1863, to August 19, 1863, the detachment was commanded by Lieut. J. A. Smith, then temporarily by several other officers in succession till September 10, 1863, when Capt. Miles D. McAlester joined

^aBy Captain Lusk.

as instructor of practical military engineering and commander of detachment.

During the interval between October 30, 1861, and September 10, 1863, the department of practical military engineering was probably merged in the department of civil and military engineering. The same may be true for the interval from January 18, 1861, to September 30, 1861.

The detachment of engineers above referred to was kept at West Point in department of practical military engineering till the return of A Company in 1865.

A Company remained at West Point till September 1, 1867, when a new detachment was formed and left behind till arrival of E Company on March 3, 1871.

Instructors, department of practical military engineering, signaling, and telegraphy.

| Instructor. | Assigned. | Relieved. | Remarks. |
|--|-----------------------------------|----------------------------------|---|
| Alex. J. Swift, captain, engineers | Aug. —, 1842 | Sept. 12, 1846 | On duty at West Point June 30, 1841, to Nov. 19, 1841; duty not known, but probably organizing department of practical engineering. |
| Fred. A. Smith, captain, engineers | Sept. 12, 1846 | Mar. 25, 1848 | |
| George W. Cullum, captain, engineers | Mar. 25, 1848 | May 19, 1851 | |
| Alex. H. Bowman, captain, engineers | May 19, 1851 | June 1, 1852 | |
| George W. Cullum, captain, engineers | June 1, 1852 | Jan. 1, 1855 | |
| John G. Barnard, captain, engineers | Mar. 2, 1855 | Sept. 8, 1856 | Superintendent U. S. Military Academy. |
| Andrew J. Donelson, first lieutenant, engineers. | Sept. 9, 1856 | Oct. 15, 1858 | |
| James C. Duane, first lieutenant, engineers. | { Oct. 16, 1858 Sept. 30, 1861 | { Jan. 18, 1861 Oct. 30, 1861 | |
| Miles D. McAlester, captain, engineers. | Sept. 10, 1863 | June 22, 1864 | |
| William P. Craighill, captain, engineers. | June 22, 1864 | Aug. 31, 1864 | |
| George H. Mendell, captain, engineers. | Sept. 21, 1864 | July 3, 1865 | |
| Henry M. Robert, captain, engineers | Aug. 31, 1865 | Aug. 31, 1867 | |
| Peter S. Michie, captain, engineers | Aug. 31, 1867 | Mar. 3, 1871 | Relieved Mar. 3, 1871, on account of having been appointed professor of philosophy, to date from Feb. 14, 1871. |
| Oswald H. Ernst, captain, engineers | Aug. 1, 1871 | Aug. 28, 1878 | |
| Charles W. Raymond, captain, engineers. | Aug. 28, 1878 | Aug. 28, 1881 | |
| William S. Stanton, captain, engineers. | Aug. 28, 1881 | Aug. 28, 1885 | |
| Francis V. Greene, captain, engineers. | Aug. 28, 1885 | Jan. 12, 1886 | |
| Philip M. Price, captain, engineers | Jan. 15, 1886 | Jan. 4, 1889 | |
| George McC. Derby, captain, engineers. | Jan. 4, 1889 | Mar. 4, 1893 | |
| James L. Lusk, captain, engineers | Mar. 31, 1893 | ..... |  |
| G. W. Goethals, captain, engineers . . . . | ..... | ..... |  |
| James L. Lusk, captain, engineers | Aug. 22, 1900 | ..... |  |

In 1897 instruction in this department was carried on as in 1896. In 1898 and 1899 it was considerably interfered with by the necessities of the Spanish war and the consequent transfer of troops to and from West Point. In 1900 a departure was made in the method of instructing the third class, this class not being combined with the first class, but instructed separately in practical surveying. In 1901 the instruction was given very much as in 1900, though the lack of instructors was emphasized by the head of the department, Captain Kuhn. In the revision of the curriculum, which took place in the spring of 1902, the subject of surveying was eliminated from the mathematical department and transferred to the department of practical engineering. This change made such an important improvement in this particular instruction that full extracts from the report of Captain Kuhn are appended.

[Extract from the report of Captain Kuhn on the practical surveying for the season of 1902.]

The periods of instruction, as fixed by orders, extended from June 23 to July 9, inclusive, daily except Sundays, from 7 a. m. to 12.32 p. m., and from July 10 to August 15, inclusive, except Sundays, from 8.30 a. m. to 12.30 p. m., one-third of the class attending daily, or an average attendance of 32 men. The prescribed schedule afforded a maximum of 40 drill days, of which 3 were lost by bad weather, leaving 37 actual drill days. The average number of attendances of each Cadet was 10. During the first period of instruction four instructors were available, but during the second period one instructor had to leave at 10.30 a. m. to attend to the first class.

METHOD OF INSTRUCTION.

Instruction was entirely practical and at no time were Cadets requested or advised to do any reading. As theoretical instruction in the department of mathematics had been dropped, the class was entirely ignorant of the subject at the outset, and short lectures were given daily at first, explaining the construction, adjustments, and use of the instruments. In these lectures blackboard diagrams and the instruments themselves were freely used. Immediately after the lectures the instruments were placed in the hands of the Cadets and definite problems assigned, which each man was required to perform himself.

Lectures were dispensed with as soon as fundamental principles were understood, and the Cadets were at once divided up into squads and given definite tasks with the instruments. During the entire course of

instruction questions were constantly put to the Cadets by the instructors to test their understanding of the instruments and explanations constantly made to remove all difficulties.

GROUND COVERED.

Instruction was limited to the surveyor's transit and wye level and to the operations usually performed with these instruments. The fundamental principles of construction were made clear, adjustments explained and made, and, finally, practical work with the instruments themselves undertaken. The practical work included such exercises as rod reading, profile leveling, differential leveling, and cross-section leveling with the wye level; angle reading, traversing lines, stadia surveying, and compass reading with the transit. Measurements of lines by chain and tape were involved in many of the exercises and were taught in connection with them.

CONCLUSIONS.

In my judgment the results of the season's work were most satisfactory and fully justify the change in method of instruction. I am convinced that no class at the Academy has ever acquired such a real practical working knowledge of surveying instruments as has the recent third class, and I believe that a majority of the class are as fully qualified in this particular as are the average graduates from technical schools with the degree of civil engineer.

K.

HISTORICAL SKETCH OF THE DEPARTMENT OF ORDNANCE AND GUNNERY, UNITED STATES MILITARY ACADEMY.

[The following sketch of the ordnance department, with a few omissions, is that prepared by Captain Bruff in 1896 for insertion in the report of the Superintendent of that year. Since 1896 the course of study in ordnance and gunnery has been added to and modified to keep pace with the many changes in that branch of science.

Captain Bruff, who had been the head of the department since 1891, was succeeded in August, 1900, by Capt. F. E. Hobbs. The latter has introduced, to a much greater extent than formerly prevailed, explanation and oral instruction by lecture, with lantern-slide illustrations of guns in action, the effects of fire, etc. The department is now supplied with models of very nearly all the service guns, carriages, etc. There has also been added to the equipment of this department the latest service 7-inch mortars, typical rapid-fire guns of various kinds, azimuth instruments, range finders, and other modern ordnance appliances. It may

be stated that the equipment is now such that Cadets can see practically all the modern appliances either in exact models or in full-sized service pieces.]

This department is a gradual growth from the department of artillery. In the earlier stages of development the instruction was mostly practical, and little is known of it. General Cullum gives in his account of the early history of West Point the following under the head of "Instruction:" * * * "The first principles of artillery were taught with the drill of field pieces, target practice, and a little laboratory duty. Artillery was little studied, only definitions from Scheele's Artillery were learned, practical pyrotechny and preparation of fixed ammunition taught, and the use of field pieces and mortars in drills and at target practice."

The department of artillery first appears upon the records in 1817, the first instructor being George W. Gardiner, second lieutenant, Corps of Artillery, whose tour of duty extended from September 15, 1817, to February 1, 1820. During part of this time he was also Commandant of Cadets.

Paragraph 7, Academic Regulations of 1821, prescribes: "There shall be detailed a captain or field officer and attached to the Academy as instructor of tactics; and the captain or commandant of artillery to be stationed at West Point shall perform the duty of instructor of artillery. * * *"

By paragraph 9 of the same regulations the instructor of artillery is constituted a member of the academic board.

In accordance with the above provisions, the instructor of artillery, Capt. Fabius Whiting, Corps of Artillery, appears as a member of the academic board for the first time June 30, 1821. The same provisions as to detail of instructor of artillery appear in the regulations of 1839 and also in those of 1853, except that "a captain or lieutenant may be detailed as instructor of artillery."

The department of artillery continued till 1857, and a list of the instructors in that department is given below, with the dates of their services:

List of instructors of artillery.

| Name. | Rank and regiment. | From— | To— |
|-----------------------------|--|----------------|----------------|
| George W. Gardiner . . . | Second lieutenant, Corps of Artillery | Sept. 17, 1817 | Feb. 1, 1820 |
| Fabius Whiting | Captain, Corps of Artillery | Aug. 15, 1820 | Aug. 7, 1821 |
| Z. J. D. Kinsley | Second Lieutenant, Third Artillery | Dec. 18, 1823 | Dec. 1, 1835 |
| Robert Anderson | First lieutenant, Third Artillery | Dec. 1, 1835 | Nov. 6, 1837 |
| Minor Knowlton | First lieutenant, First Artillery | Nov. 9, 1837 | July 1, 1844 |
| E. D. Keyes | Captain, Third Artillery | July 25, 1844 | Dec. 24, 1848 |
| William H. Shover | Captain, Third Artillery, and brevet major, U. S. A. | Dec. 24, 1848 | Sept. 7, 1850 |
| George H. Thomas | First lieutenant, Third Artillery, and brevet major, U. S. A. | Apr. 2, 1851 | May 1, 1854 |
| Fitz John Porter | First lieutenant, Fourth Artillery, and brevet major, U. S. A. | May 1, 1854 | Sept. 11, 1855 |
| Henry F. Clarke | First lieutenant, Second Artillery, and brevet captain, U. S. A. | Sept. 11, 1855 | Aug. 6, 1856 |

In 1857 the department of ordnance and gunnery was organized pursuant to the following resolution of the Academic Board of December 5, 1856:

6. That the portion of the present course of artillery which comprises the science of gunnery, and what is known in our service as ordnance, be disconnected from that which relates to tactics merely, and be made the subject of a separate department, and that the additional time necessary for the development and improvement of this department be taken from that now given to practical engineering in October.

And on December 9, 1856, the course was finally arranged as follows: "Ordnance and gunnery from 11 a. m. to 1 p. m. from October 1 to end of the first week in March, alternating every other week day with cavalry tactics during October and two weeks in November, and with riding during the remainder of the term."

Paragraph 5 of the Academic Regulations of 1857 provides for the detail of the instructor of ordnance and gunnery, and by paragraph 9, same regulations, he is constituted a member of the Academic Board.

Under these provisions Capt. James G. Benton, Ordnance Department, was assigned to duty at West Point and became the first instructor of ordnance and gunnery. A list of the

instructors in this department is given below with dates of service:

List of instructors of ordnance and gunnery.

| Name. | Rank and department. | From— | To— |
|---------------------------|---|----------------|----------------|
| James G. Benton | Captain, Ordnance Department | Feb. 27, 1857 | Apr. 26, 1861 |
| Stephen V. Benét | First lieutenant, Ordnance Department | Apr. 26, 1861 | Feb. 1, 1864 |
| Thomas J. Treadwell | Captain, Ordnance Department | Feb. 11, 1864 | Sept. 13, 1864 |
| George T. Balch |do | Sept. 22, 1864 | July 12, 1865 |
| Alfred Mordecai |do | July 12, 1865 | Aug. 2, 1869 |
| Theo. Edson | Major, Ordnance Department | Aug. 2, 1869 | Nov. 17, 1870 |
| Thomas C. Bradford | Captain, Ordnance Department | Jan. 1, 1871 | Jan. 12, 1872 |
| Stephen C. Lyford |do | Jan. 30, 1872 | June 28, 1872 |
| John R. McGinness |do | July 25, 1872 | Aug. 30, 1874 |
| Alfred Mordecai |do | Aug. 30, 1874 | Aug. 28, 1881 |
| Clifton Comly | Major, Ordnance Department | Aug. 28, 1881 | Aug. 28, 1886 |
| Henry Metcalfe | Captain, Ordnance Department | Aug. 28, 1886 | Aug. 8, 1891 |
| L. L. Bruff |do | Aug. 17, 1891 | Aug. 14, 1900 |

HISTORY OF COURSE.

The early history of the course from the beginning of the Academy up to 1812 has already been given. From 1812 to 1817 General Cullum states: "tactics of infantry and artillery were Captain Partridge's delight, and were well taught, but were necessarily limited, owing to the small number of Cadets to exercise and the few pieces of ordnance for drill or target practice."

From this it appears that there was very little theoretical instruction in ordnance proper, but that most of it was practical, belonging rather to the department of tactics than to that of ordnance.

In January, 1820, a committee of the Academic Board, consisting of Professors Mansfield and Crozet and Assistant Professor Douglas, was appointed to draw up a revised code of the course of studies and rules for classification. Under the subject of artillery and military science they state that this course shall consist of "the knowledge and use of the various kinds of ordnance and military projectiles, principles of gunnery, experiments on the strength of powder, and calculation of the initial velocity of balls."

Between this date and 1826 the instruction in the scientific part of the course was transferred to the department of

engineering, though the date of transfer is not fixed. It was transferred back to the department of artillery by resolution of the Academic Board of June 26, 1826.

In 1839-40 a programme of studies was drawn up by direction of the chief engineer, and the course in artillery was as follows:

Pyrotechny.—Under this head the instruction is both theoretical and practical and extends to the making of slow match, quick match, port-fires, priming tubes, cannon cartridges, musket, rifle, and pistol cartridges, canister shot, grape shot, strap shot, leaden balls, fuses, rock fire, light balls, fireballs, incendiary balls, the mousse, sulphur matches, thundering barrels, carcasses, and signal rockets; to the loading of bombs, howitzers, and grenades, and putting up ammunition for transportation. The manner of making petards, powder sacks, smoke balls, suffocating balls, alarm signals, congreve rockets, and parachute rockets is studied but not applied to practice.

Artillery tactics.—Under this head the organization of a field battery and of the company of artillerists required for its service. The school of the gunner, school of the piece, and school of the battery are learned theoretically and practically. The evolutions of the batteries are studied, but not practiced in the field.

Gunnery.—The theory of gunnery is studied and applied to practice with guns, howitzers, and mortars.

Manufacture of gunpowder, percussion powder, cannon, and projectiles.—Under this head the studies include the preparation of materials for gunpowder; the manufacture and inspection of gunpowder; the proof of gunpowder; the proof of gunpowder by the mortar eprouvette, spring eprouvette, ballistic pendulum, cannon pendulum, and rotary machine; the storage and preservation of gunpowder; the restoration of damaged gunpowder; the inflammation and properties of gunpowder; a description of the principal of the different fulminating powders; the manufacture of percussion caps and wafers; the preparation of metals used in the fabrication of arms; the manufacture of cannon of cast iron, wrought iron, and bronze; the inspection and proof of iron guns, howitzers, and mortars; the inspection and proof of guns, howitzers, and mortars of bronze; the preservation of cannon; the manufacture, inspection, and proof of shot and shell.

General subject of artillery.—Under this head are included the different kinds of guns, howitzers, and mortars; a description of the different kinds of hollow projectiles and of the manner of filling and preserving them; the description and nomenclature of gun carriages, caissons, etc., with an explanation of their forms; propositions with respect to strength and ease of draft; the manner of spiking and unspiking cannon; the manner of repairing and destroying the material of artillery; the theory

of firing; the manner of determining initial velocities; the effects of recoil; the aiming of guns, howitzers, mortars, and stone mortars; the firing of grapeshot, congreve rockets, and grenades; the throwing of hand grenades; the different modes of firing; the manner of firing by night; the causes of deviation in firing; the effect of rifling in correcting the inaccuracy of small arms; the effects produced by balls, howitzers, bombs, grapeshot, etc.; the composition of siege trains; the construction of siege batteries; the manner of battering in breach and counter battering; the construction of coast batteries and the defense of coasts.

Text books.—Instruction Théorique et Pratique, par Thiroux, upon the general subject of artillery; Exercise and Instruction of Field Artillery, a system prepared by a board of officers at Washington in 1826, by order of the Secretary of War, upon the subject of artillery tactics.

The remaining parts of the course are taught from notes prepared and lithographed at the Military Academy.

The course, according to the Regulations of 1853, is as follows:

Par. 31. *Artillery.*—Nomenclature and description of the different kinds and parts of artillery—gun carriages, caissons, and other artillery carriages—of artillerists' implements, and military projectiles; exercise of the fieldpiece and of mortars, howitzers, siege, garrison, and seacoast guns; maneuvers of a field battery of artillery; mechanical maneuvers.

Gunnery.—Theory of gunnery; target practice with the gun, howitzer, and mortar.

Pyrotechny.—Making of all kinds of musket, rifle, pistol, cannon, and howitzer cartridges; preparation of strap, grape, and canister shot, priming tubes, fuses, slow and quick match, portfire, rockets, carcasses, fireballs, light balls, and incendiary composition; loading shells, shrapnel shot, and grenades, casting musket balls; putting up stores for transportation; loading caissons, and the manner of proving powder.

Par. 50. *Manner of giving instruction in artillery.*—Artillery tactics shall be taught according to the most approved system. The instructor will be assisted in the drill by the cadets best qualified, acting as commissioned and noncommissioned officers. Select passages from the best works in the different subjects of the course shall be studied and recited. A course of practice shall be connected with the study of gunnery.

The cadets shall be taught in the laboratory its various duties, and shall by practice acquire facility and correctness in performing them.

In 1857 the course was as follows:

Par. 27. *Ordnance and science of gunnery.*—Nomenclature and description of the different kinds and parts of artillery—gun carriages, caissons,

and other artillery carriages—of artillerists' implements, and military projectiles.

Gunnery.—Theory of gunnery.

Pyrotechny.—Making musket, rifle, pistol, cannon, and howitzer cartridges; preparation of strap, grape, and canister shot, priming tubes, fuses, slow and quick match, portfire, rockets, carcasses, fireballs, light balls, and incendiary composition; loading shells, shrapnel shot, and grenades; making musket balls; putting up stores for transportation; loading caissons; and the manner of proving powder, shot, and shells, inspecting guns, etc.

Par. 53. *Ordnance and the science of gunnery and laboratory duty.*—For instruction in this branch the first class shall be divided into sections when commencing the subject according to general merit, and after the January examination according to merit in this study.

Practical instruction in the duties of the laboratory shall be given to the first class during a part of the period of the encampment, and to the fifth class between the 1st of April and the 15th of May.

In this year, as already noted, the department of ordnance and gunnery had been organized, and hence the technical part of the course had been transferred to the department of tactics.

The course in 1873 was as follows:

Par. 32. *Ordnance and gunnery.*—This course will comprise:

Ordnance.—(1) The theory and preparation of gunpowder, cannon, artillery carriages, projectiles, implements, machines, small arms, ammunition, and military fireworks. (2) Practical instruction in making musket, rifle, pistol, cannon, and howitzer cartridges; preparation of strap, grape, and canister shot, fuses, slow and quick match, portfire, signal rockets, carcasses, fireballs, light balls, and incendiary composition; loading shells, shrapnel shot, and grenades; putting up stores for transportation; loading caissons; in determining pressure on the bore of a gun; in determining the initial velocity of projectiles; in the manner of proving powder, and, when circumstances will admit of it, the operation of casting cannon, solid and hollow, casting of projectiles, and the usual method of testing gun metals will be witnessed.

Gunnery.—Embracing the study of the movements of projectiles; the theory of pointing firearms; the different kinds of fires and their effect; the art of breaching, and the composition of batteries.

Par. 59. *Ordnance and gunnery and laboratory duty.*—For instruction in this branch the first class shall be divided into sections in September according to general merit, and after January examination according to merit in ordnance and gunnery.

Practical instruction in the duties of the laboratory shall be given to the first class during a part of the period of the encampment and to the third class at such times as the Superintendent may direct.

The course in 1883 was as follows:

Par. 32. *Ordnance and gunnery*.—This course will comprise—

1. The theoretical course of ordnance and gunnery, as follows: Ordnance—The theory and preparation of explosives, projectiles, cannon metals, cannon and portable arms, artillery carriages, harness, and machines. Gunnery—The theory of the motion of projectiles within and without the piece, and their effects. The use of range finders.

2. The practical course will comprise instruction in the duties of the arsenal and experiments in gunnery. When circumstances will admit of it, the operation of fabricating ordnance material will be witnessed.

Par. 39. *Ordnance and gunnery*.—Two to 4 every other week day, Saturdays excepted, alternating with law. The month of April to be devoted to the practical part of the course, explanation of instruments, models, etc.

Par. 60. *Ordnance and gunnery and laboratory duty*.—For instruction in this branch the first class shall be divided into sections in September according to general merit, and after the January examination according to merit in ordnance and gunnery.

Practical instruction as prescribed in paragraph 32 of these regulations shall be given to the first class during the month of April, or at such times as the Superintendent may direct.

The following list of text-books in use in the department has been obtained from the best available sources, and is very imperfect, especially at the beginning of the history of the department:

Text-books in artillery.—Sheele's Treatise on Artillery.

1841. Anderson's United States Artillery Tactics; Kinsley's Pyrotechny; Thiroux's Instruction Théorique et Pratique d'Artillerie; Knowlton's Notes on Gunpowder, Percussion Powder, Cannon, and Projectiles.

1842. United States Artillery Tactics; Kinsley's Pyrotechny; Thiroux's Instruction Théorique et Pratique d'Artillerie; Knowlton's Notes on Gunpowder, Percussion Powder, Cannon, and Projectiles.

1850. Tactics for Garrison, Siege, and Field Artillery; Kinsley's Pyrotechny; Thiroux's Instruction Théorique et Pratique d'Artillerie; Knowlton's Notes on Gunpowder,

Cannon, and Projectiles; Mordecai's Experiments on Gunpowder, by means of the Gun and Ballastic Pendulum.

Text-books in ordnance and gunnery.—1859. Thiroux's Instruction Théorique et Pratique d'Artillerie; Ordnance Manual; Mordecai's Experiments on Gunpowder; Notes on Fabrication of Cannon and Projectiles.

1863 and 1864. Benton's Course of Ordnance and Gunnery.

1865 to 1870. Benton's Ordnance and Gunnery.

1870 to 1886. Benton's Ordnance and Gunnery; Mordecai's Notes and Pamphlets; Bruff's Exterior Ballistics.

1886 to 1896. Metcalfe's Ordnance and Gunnery; Metcalfe's Notes and Pamphlets.

1896 to ——. Bruff's Ordnance and Gunnery.

The development of the course of ordnance and gunnery has been as follows: First, the whole subject, under the head of artillery, was taught by the department of tactics. In the early days of the institution very little scientific knowledge on the subject of artillery and ordnance was in existence. Hence the subject was taught at first practically, great attention being given to drill and very little to the principles. As knowledge upon the subject increased more time was devoted to the theory of the subject, and somewhere between 1820 and 1826 this knowledge had increased so greatly that it was deemed proper to transfer instruction in it to another department, where more time could be given it. It was transferred back again, however, for reasons not given, and in 1839 the course as laid down deals extensively with the theory of artillery, the determination of initial velocity, proof of gunpowder, rifling, causes of deviation in firing, etc.

The greatest step in the development of the course was undoubtedly its division in 1857 into two parts, the one practical and belonging to the department of tactics, the other theoretical and belonging to ordnance proper, or the study of the theory of gunpowder, pressures, velocities, and the effect of these upon the building of guns and upon their projectiles; also the numerous questions relating to pointing, metal for guns, manufacture of ordnance stores, and many

others of this class became for the first time the subject of a separate course.

The great ability of the first instructor of ordnance and gunnery, Colonel (then Captain) J. G. Benton, Ordnance Department, gave an organization and an impetus to the department that it has always felt. His text-book, Benton's Ordnance and Gunnery, is well known almost to the present time as a model book, and it has furnished the basis of most of the subsequent revisions.

The first of these was made by Colonel Alfred Mordecai, Ordnance Department, who published a series of pamphlets, taking up the different chapters of Benton in detail and correcting them to date. His intention was upon the completion of the work to publish it in book form, but unfortunately he was relieved from duty before this work was accomplished.

The course for some years after his tour of duty consisted of his pamphlets and those parts of Benton which still applied, supplemented by notes published by Major Clifton Comly, of the Ordnance Department, who succeeded him. It was during this time that the old system of exterior ballistics, Didion's, was replaced by a more modern one, Niven's.

Captain Henry Metcalfe, who succeeded Major Comly, found that the course needed a thorough revision, and he proceeded with the work with untiring energy, and finally published his Ordnance and Gunnery, which remained a text-book up to the present year, 1896.

When Captain Metcalfe's book was written the artillery system of the United States was in embryo, and also the subject of small arms and some others. Shortly after his relief from duty, in 1891, all these factors in the ordnance problem assumed definite shape. The system of artillery, guns, and carriages became fixed, a new small arm was adopted, smokeless powders came into vogue, and many other minor changes were made.

These changes necessitated a revision of the course again, and resulted in the text-book at present adopted by the

academic board and compiled by the present instructor of ordnance and gunnery.

The present course is contained in one text-book entitled *Ordnance and Gunnery*, Bruff, and a ballistic table, compiled by Captain James M. Ingalls, First Artillery, U. S. A., whose title is *Ballistic Tables*, Ingalls.

1. Gunpowder and interior ballistics.
2. High explosives and smokeless powder.
3. Guns.
4. Projectile and armor.
5. Fuses and primers.
6. Exterior ballistics.
7. Artillery carriages; theory of recoil.
8. Pointing; probability of fire.
9. Portable arms.
10. Machine and rapid-fire guns.

All parts of the course except those purely descriptive are illustrated by problems, which are solved as a test of the thoroughness with which the principles taught are understood.

The department is organized as follows: The head of the department has the official title of "Instructor of Ordnance and Gunnery." He is generally a captain of ordnance detailed by the Secretary of War for four years upon the recommendation of the Chief of Ordnance. The detail is not limited to captains, as shown by the list of instructors. Two assistants have been for some years allowed to the department, one a lieutenant of ordnance and the other detailed from the line of the Army.

The lieutenant of ordnance is the senior assistant instructor of ordnance and gunnery, and in addition to his duties as instructor he is attached to the ordnance detachment at the post and is required to assist in the duties pertaining to that detachment, such as the care and preservation of the batteries at the post, mounting and dismounting guns and carriages, etc.

The junior assistant is not attached to the detachment, and his duties are those of instruction only as a general rule, but he may be called upon to assist the senior assistant in the performance of any of his duties.

Each of the assistants instructs from 11 a. m. to 1 p. m. daily, except the Saturdays before mentioned, and his duties as instructor also require about two hours daily correcting problems and arranging models, drawings, and subjects for the next recitations. The necessary time must also be given to the preparation of the lesson for the daily recitations.

The duties of the head of the department are a close supervision of the instruction, explanations of models, and occasionally lectures, preparation of the new matter for the course to replace such as may become obsolete, procuring of models, and preparation of drawings for different parts of the course when required. In addition he has charge of all the ordnance and ordnance stores of the post, and is responsible for the condition of the batteries and their ammunition, for the care and preservation of the various stores used in mechanical maneuvers, and for the target supplies of cadets. He has command of the post ordnance detachment and regulates their duties.

The head of the department alternates in visiting sections. He endeavors to hear each section at least once a week, and more frequently if possible. The object of his visits is to become thoroughly acquainted with the Cadets, and their methods of recitation, and mental habits; also to note the methods of the instructors, and to make such corrections or suggestions to them as may establish as nearly as possible a uniform method of instruction throughout the department.

To further this end the sections change their instructors every two weeks. This enables any inequality in the method of marking to be eliminated, and the sections also alternate every two weeks in hours of attendance, so that each Cadet may have as far as possible the same advantages and disadvantages in this respect.

In studying the subject of ordnance and gunnery there are necessarily many objects described which are complicated and difficult to understand thoroughly without the use of models and drawings. Hence the department has endeavored to procure models of all the different machines, guns, carriages, etc., referred to in the text. These are kept in the section

rooms during recitation upon the particular subject to which they refer, and the recitation is made from them.

Drawings of all the more difficult and complicated parts of the different objects are also prepared beforehand, and are used in the recitations.

After six advance lessons have been studied they are reviewed in three lessons, and at the end of each six months' course, in December and May, the whole of the previous course is reviewed generally.

The examinations have so far been oral, owing to changing text-books and lack of facilities during the erection of the new academic building, but it is believed that in future at least one of the examinations should be written, and that frequent written recitations should be held during the course. The oral examinations are conducted in the presence of a committee of the academic board, and do not differ from an ordinary recitation in the section room. If a Cadet fails upon the subject assigned him, or fails to establish his proficiency to the satisfaction of the committee, he is given a second subject, and his examination is continued until his proficiency or deficiency is established.

In case he fails to establish his proficiency he is subjected to a written examination, the questions for which are approved by the committee.

In reviewing the present course in ordnance and gunnery and comparing it with former courses, it is thought that the following points have been kept in view:

1. It has been simplified. The mathematical parts of the course, though necessarily more extensive than formerly, have been worked out more in detail. Every equation is deduced plainly and nothing left to puzzle the student. Furthermore, as a general rule all the equations introduced have some direct practical use and bearing upon ordnance, and this use and bearing are pointed out.

In the recitations no memorizing of equations or of mathematical steps is required. Every equation which is to be used in a given discussion is printed with the subject which is given to the Cadet, and in case equations are to be deduced

from those given, the various steps in the process are given in the form of a synopsis, unless these steps are perfectly obvious. The reason for this is that the object of the course is to teach ordnance and not mathematics, and in order that all the time may be given to understanding and applying the principles taught. With the description of guns, carriages, small arms, etc., the object has been to confine the description to few objects and to make the description of each thorough and general, the idea being that it is more advantageous to understand one carriage or one gun thoroughly than to have a vague idea of many. The descriptions are illustrated by copious drawings and by models, so that there is no difficulty in thoroughly understanding what is taught.

2. It has been extended to cover generally the whole ordnance field. This statement may be regarded as somewhat rash, seeing that the ordnance field covers so much at the present day, but it is safe to assert that after going over the present course there is very little on the subject of ordnance that the graduate would feel ignorant of. Many subjects have been treated to a very limited extent, but the general principles of each have been given, and it is believed there is enough of each to build upon. Care has been taken that nothing shall be taught which must be unlearned, and especial attention has been given to our own systems. But as a general rule principles are taught rather than details, wherever possible, and in describing details the reasons for them and the principles on which they depend are pointed out.

3. The instruction is at present more thorough than formerly. This is entirely owing to the fact that the department has at present, and has had for some years, two instructors instead of one. This enables the head of the department to watch the instructors constantly, to criticise and correct defects wherever they may occur, and to assist in the instruction wherever he may deem it necessary. It virtually gives three instructors instead of two, with greatly increased efficiency.

When the class is small the sections are small, and the instruction all that could be asked. With large classes the sections become large, and the thoroughness necessarily

diminishes, owing to lack of time to be given to each Cadet. But the advantage of two assistants over one is maintained for all classes.

It is difficult to compare the instruction in this department with that in any other institution, as there is really no corresponding department in any other institution. The department of ordnance and gunnery at the Naval Academy is the nearest approach to it, and that, it is understood, includes both the scientific instruction in ordnance and gunnery and practical instruction. In other words, it corresponds more nearly to the old department of artillery here. So far as the scientific part of the course goes, an examination of the textbooks in use at the Naval Academy indicates that the two courses are very nearly alike. In general the same subjects are taught, and to the same extent at both places, with the exception that field artillery and small arms are taught at the Military Academy in the place of torpedoes and some other subjects exclusively naval at the latter academy.

In conclusion it may be said that the object of the course in ordnance and gunnery, like that of other courses at the Academy, is to teach general principles and their application in this country to our service, so that the Cadet upon graduation will be enabled to take his place as an officer, with the practical knowledge which an officer should possess of the weapons he is called upon to handle, and beyond this, with a broad foundation upon which future knowledge of the subject may rest.

[PREVIOUS](#)

[NEXT](#)