

COOPER'S HILL ENGINEERING COLLEGE.

BY J. MUNRO, C.E.



HE beautiful eminence known as Cooper's Hill, which overlooks the winding Thames between the town of Staines and the village of Old Windsor, was a celebrated spot long before the Duke of Argyll pitched upon it for the site of the Royal Indian Engineering College. Sir John Denham's well-known poem had made it familiar—at least, to English-speaking people—all over the world. According to Dr. Johnson (see his "Lives of the Poets"), Sir John Denham, on resigning the Governorship of Farnham Castle, retreated to Oxford, where, in 1643, he

published "Cooper's Hill." I find, however, that there was an earlier edition of the poem published in 1642, at London, and "printed for *Tho. Walkley*," and "sold at his Shop, at the sign of the Flying Horse, between York-house and Britaines Burse, 1642." There is a copy of this edition, which is presumably the first, in the British Museum, and it shows that the poem as originally written varies considerably from its present form, the fine apostrophe to the Thames, beginning "O could I flow like thee," being quite different and very inferior to the extant lines. In both versions the poet surveys the surrounding scene from Cooper's Hill; and, after moralising on St. Paul's, with the toiling masses of London at its feet, he passes to Windsor, on the other side of the horizon, and celebrates its royal towers. The green and level meadows between the hill and the Thames then engage his attention. He describes a royal deer-hunt over them, and likens the deer at bay to King John forced by the barons to seal the Magna Carta on Runnymede, which is part of the same range of greensward, under the hill, a little towards Staines. The river Thames, however, elicits the finest lines, and leads his imagination to that mighty Empire of which it is the spring.

"My eye, descending from the Hill, surveys
Where Thames among the wanton valleys strays.
Thames! the most loved of all the ocean's sons
By his old sire, to his embraces runs,
Hasting to pay his tribute to the sea,
Like mortal life to meet eternity.

Nor are his blessings to his banks confined,
But free and common as the sea or wind;
When he, to boast, or to disperse his stores,
Visits the world, and in his flying towers
Brings home to us and makes both Indies ours;
Finds wealth where 'tis, bestows it where it wants;
Cities in deserts, woods in cities plants,
So that to us no thing, no place is strange,
While his fair bosom is the world's exchange.
O could I flow like thee, and make thy stream
My great example, as it is my theme!
Though deep, yet clear; though gentle, yet not dull;
Strong, without rage; without o'erflowing, full."

Cooper's Hill, thus rendered classic, and associated poetically with the great Indian Empire, has now become the seat where those civil arts which develop the riches of that Empire are taught to emanate.

The Indian Engineering College is a fine mansion, situated on the top of the hill, in its own grounds, and overlooking the river. It stands, in fact, on the very spot where the poet is supposed to sit. Once a private residence, the larger rooms have been fitted up as class-rooms of the ordinary College type, the smaller rooms being converted into homes for the students, dining-halls, reading-rooms, smoking-rooms, and so on. The gardens round the house are very prettily laid out; and great cedars, elms, and lime-trees cast a breezy shade over the lawns in summer, or break the force of the winter gales.

The view from the hill is very fine, perhaps one of the finest in the Thames Valley: the river winding in front, with its grassy eyots, from Runnymede up to Windsor; and behind, the umbrageous wilds of Windsor Park, with Virginia Water and the smaller lakes and ponds. There are hundreds of pretty nooks in the neighbourhood, with rural inns and country lanes, to invite the student when out for a row, or engaged in the serious work of a survey; and, altogether, the time must pass very pleasantly at Cooper's Hill during the three years of study and athletics which prepare a young man for the more arduous duties of Indian engineering.

The College is reached from Egham Station, one and a half miles distant on the Great Western Railway; the nearest telegraph office being at Englefield Green. Established under the Secretary of State for India in Council, to educate civil engineers for the Indian Public Works Department, it is prepared to take in sixty fresh students every year. But all of these need not enter the Indian Service; a few may get an engineering education here for use elsewhere. There are, in fact, only a certain number of vacancies in the Indian Service, and when the supply of students exceeds the demand, the vacancies are filled up from qualified men.

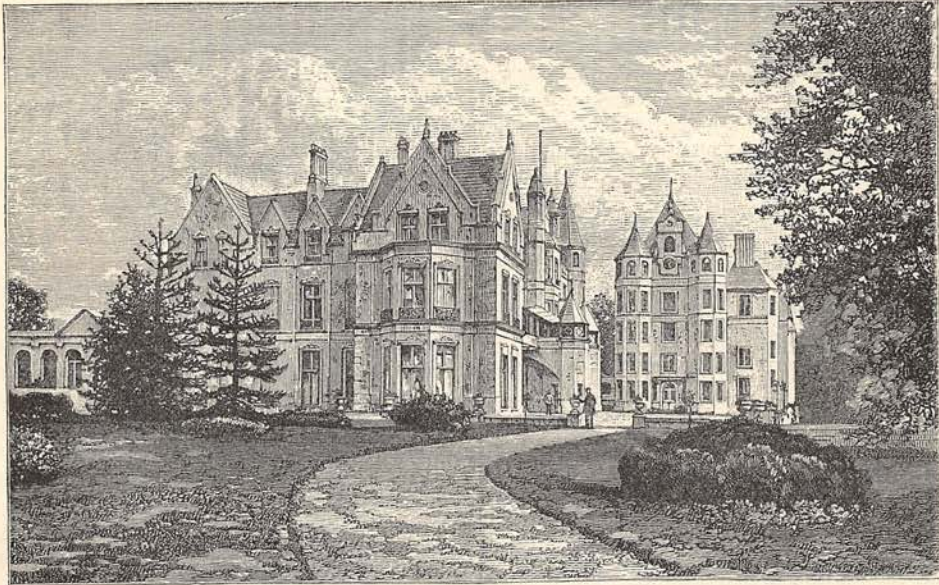
The age of students seeking admission to the College must range from seventeen to twenty-one. They must show a good moral character, and an elementary knowledge of mathematics, besides a good general school or College education. Applications for admission must be made to the Secretary of the College on or before July 1st of each year, and the Entrance Examination takes place about the end of the following June. This embraces English composition (writing and spelling grammatically and well), arithmetic, algebra (as far as quadratic equations and the binomial theorem), geometry (the 4th and 6th Books of Euclid), mensuration, and plane trigonometry (including the solution of plane triangles). Full information on this head can be obtained from the College Calendar, published

yearly ; from the Secretary ; or, better still, from some student who has passed, or tutor who prepares for the examination.

If more than sixty students pass the Entrance Examination, preference is given to those who stand highest on the list, and according to the date of their applications. A fee of £2 (not returnable) is paid by each student examined.

The College course for Civil Engineering lasts three years ; for the Telegraph Department, two years. Each annual session begins in September. There are three terms, divided from each other by a four weeks' vacation at Christmas, two weeks' at Easter, and eight weeks' in summer. The annual charge is £180 for

(including analytical geometry and the elements of the calculus), statics and dynamics, kinematics, geology, architecture, and work in the chemical laboratory and mechanical shop. During the second year, engineering and applied mechanics, geometrical and freehand drawing, surveying in the field, chemistry and physics, mathematics, geology, and architecture are taught. Students are also allowed the use of the chemical laboratory and the workshop. In the third year they are taught engineering and applied mechanics, keeping accounts, estimating for works, surveying, making projects for roads, railways, and canals, working out designs from given data, mechanical engineering, and architecture. Photography is also taught to a few who



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each student, paid in £60 instalments at the beginning of each term ; and a deposit of £5 has also to be made, as surety for damage to books or instruments, or for non-payment of College bills. The balance is returned to the student on leaving at the end of the course.

The College fees include all charges for board, lodging, washing, but not for medical attendance, wine, or beer. Students must provide their own class-books, but surveying and drawing instruments, drawing-paper, and drawing-boards are provided by the College. There is a library for the use of the students, and a reading-room, provided with current periodicals ; a gymnasium for manly exercises ; and a workshop for learning the use of the lathe, but here students must provide their own hand-tools.

The subjects of study in the first year are engineering (including a knowledge of building materials), geometrical drawing, surveying (partly in the field), freehand drawing, physics (or chemistry), mathematics

desire to learn the art ; and we should advise any one who has a taste in that direction to do so, for it may prove a pleasant recreation in India, and provide him with many interesting souvenirs of his toils and journeys. French and German are also taught during the course.

For the Indian Telegraph Service the first year's course is the same as that for civil engineers ; but the second and last year is occupied with engineering and applied mechanics, chemistry and physics, mathematics, mathematical physics, telegraphy, telegraph construction, signalling, testing materials, experimenting, the chemical laboratory, and making apparatus in the workshop.

Proficiency in these studies is tested from time to time by examinations during the session, and marks given in each subject. A minimum of marks is required for a student to pass in any subject, and a minimum total for a pass in all subjects ; but extra marks are given for exceptional merit in special sub-

jects, and students are thus encouraged to excel in those studies for which they have a more decided taste and aptitude. There is a Final Examination during the last year, in which the training of the student, not only in book but in field work, is tested, and the marks he obtains class him as an ordinary Graduate of the College, an Associate if he has taken honours, and an Honorary Fellow if he has won special distinction.

On passing the Final Examination, the student, if such is his aim, will be appointed to one of the vacancies of the Indian Service, if found of sound constitution and free from serious physical defects. Owing to the limited number of vacancies, students are appointed in the order of the merits list at the Final Examination, so it is to the student's immediate interest to stand high in this examination. His appointment is that of assistant engineer (second grade), at a salary of 4,200 rupees (Indian rate) per annum, and it dates from his leaving the College. A free passage is given him to India, provided he gets there within two months after leaving England. Sometimes he is put through another year's course of practical training in an engineer's office at home, before going to India; but he is paid a salary of £150 a year, and may earn a further bonus of £10 or £25. Before leaving home he is permitted to choose the Province he wishes to be sent to, and the branch of service he prefers, and his request will be acceded to if possible; but it is understood that he must obey the wishes of the Government at any time, both as regards place and work.

Telegraph students, after completing the first year's course, are nominated to vacancies in India, and qualify for them during the next year. They are then drafted to India, passage-paid, as assistant superintendents, at a salary of 3,000 rupees per annum (Indian rate), from the date of leaving College. Both they and the civil engineers are eligible

for furlough and pension-money from the date of leaving Cooper's Hill.

Those extra students who do not enter the Indian Service are assisted, if possible, to pupilages in a civil or mechanical engineer's office of standing, at moderate rates of premium.

Each student has a room of his own at the College; and is encouraged in manly exercises. In fact, he is required to undergo a training in military discipline, the use of the rifle, and in gymnastics, besides furnishing evidence that he can ride. An academical dress is worn when required; and good behaviour is essential. The situation of the College fortunately allows of ample facilities for all such requirements.

Once in India the career open to the young engineer is a very good one, and likely to stimulate even a dull imagination. Beginning at 4,200 rupees a year, he obtains 5,400 on rising one grade, and 11,400 on rising to be an executive engineer of the first class. The practical work is done by the executive engineer and the assistants. As superintendent engineer of the first class he earns 19,200 rupees per annum, and as chief engineer of the first class his salary is 30,000 rupees per annum. As a telegraph officer he can rise to a superintendentship of the first grade, at a salary of 1,500 rupees per mensem, and as director-general he is entitled to 3,000 rupees per mensem.

The works on which young engineers are engaged are chiefly the making and maintenance of railways, roads, and canals throughout the jungles and forests of that vast peninsula; and telegraph men are equally engaged in running new telegraph lines, or testing and repairing old ones. In time of peace, at least, it is entirely of a civil character; but, of course, the exigencies of war might at any time give it a semi-military character; and, at all times, the long distances to be traversed, the barbarous nature of the country, and the existence of military rule communicate a spice of adventure to the engineer's life in India.

A LOVE-QUARREL.

THAT scornful word, how soon 'twas said!
That slight revenged, when none was giv'n!
Then swift the tongue's sharp arrows sped,
At which, through twinned hearts deeply driv'n,
Sweet Love in terror fled.

Much tried he me, my bosom's lord,
Suspecting that and hinting this;
I raged; taunts, which my heart abhorred
When spoke, I launched, no point to miss,
And stabbed him with each word.

Come here, my greyhound, faithful thou
While faithless he who gave thee proves;
Smoothing in all my grief thy brow,
I marvel if his fancy moves
To me repentant now.

Perchance those hasty words regret
Would fain recall—each haughty look;
Patient his wish I might have met;
There! the gate clicked—doth he yet brook
Love's toils, love's gilded net?

My heart's love comes—'twere wise to pout;
A girl with spirit should behave;
And yet, methinks, I might him flout
Till Love withdrew the boon it gave,
And coldness followed doubt.

The door opes—up perplexed I start,
Timid yet confident he stands;
Begone, distrust! no more apart
Should lovers dwell—I seize his hands,
And nestle next his heart.

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