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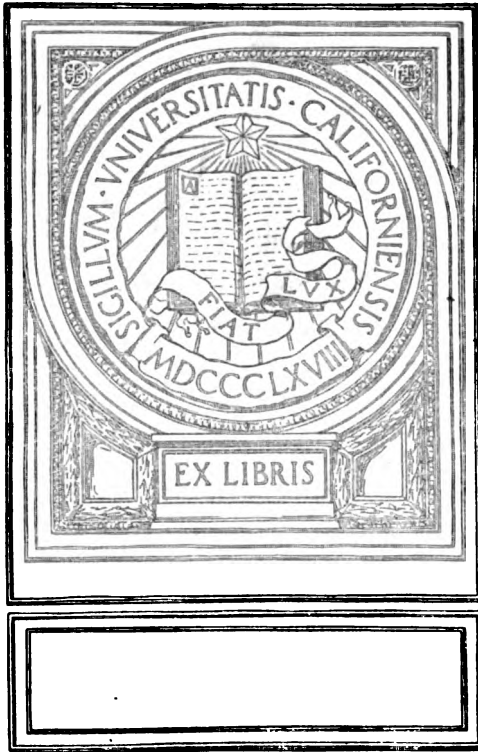
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THE
HISTORY OF THE CORPS
OF
ROYAL SAPPERS AND MINERS.

BY
T. W. J. CONNOLLY,
QUARTERMASTER-SERGEANT OF THE CORPS.

With Seventeen Coloured Illustrations.

"Of most disastrous chances,
Of moving accidents, by flood and field;
Of hair-breadth scapes ! the imminent deadly breach."—*Shakspeare.*
"There is a corps which is often about him, unseen and unsuspected, and
which is labouring as hard for him in peace as others do in war."—*The Times.*

IN TWO VOLUMES.

VOL. II.

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LIST OF ILLUSTRATIONS.

VOL. II.

IX. Uniform	1802	} <i>To face Title.</i>
X. Working-dress	1813	
XI. Uniform	1813	} <i>At the end of the Volume.</i>
XII. Uniform	1823	
XIII. Uniform and working-dress .	1825	
XIV. Uniform	1832	
XV. Uniform	1843	
XVI. Uniform	1854	
XVII. Working-dress	1854	

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HISTORY UNIV. OF OF THE CALIFORNIA

OF THE

ROYAL SAPPERS AND MINERS.

1842.

Draft to Canada—Company recalled from thence—Its services and movements—Its character—Labours of colour-sergeant Lanyon—Increase to Gibraltar—Reduction in the corps—Irish survey completed; force employed in its prosecution—Reasons for conducting it under military rule—Economy of superintendence by sappers—Their employments—Sergeants West, Doull Spalding, Keville—Corporals George Newman, Andrew Duncan—Staff appointments to the survey companies—Dangers—Hardships—Average strength of sapper force employed—Casualties—Kindness of the Irish—Gradual transfer of sappers for the English survey—Distribution; Southampton.

THE company in Canada which accompanied the troops to that province on the occasion of the unsettled state of affairs on the American frontier, was increased to a full company by the arrival of thirteen men on the 8th July, 1842.

Scarcely had the party landed before the company itself was recalled, and rejoined the corps at Woolwich on the 31st October, 1842. During its four years' service on the frontier the total of the company, with its reinforcement, counted ninety-nine of all ranks, and its casualties only amounted to eight men invalided, three discharged, and five deserted. Not a death was reported. From time to time it was stationed at Quebec, Fort Mississaqua near the Falls of Niagara, St.

Helen's Island, St. John's, and Fort Lennox, Isle aux Noix. These were its several head-quarters, and as the company was removed from one to the other, parties were detached for service to each of the other stations, and also to Amherstburgh. In repairing and improving the defences at Mississaqua and Isle aux Noix they were found of great advantage. At the other stations they were no less usefully occupied in barrack repairs and other contingent services.

From Amherstburgh the detachment rejoined the company in 1849. Whilst the latter was at St. Helen's and afterwards at St. John's, the men were exercised during the summer months in pontooning with bridges of Colonel Blanshard's construction, which had been stored at Chambly until 1840. The pontoons were found to travel well on bad roads, but the breadth of the rivers in Canada did not permit of their being often used as bridges.

After the removal of the company Colonel Oldfield, the commanding royal engineer, thus wrote of it: "The discipline of the company was not relaxed by its four summers in Canada. It had suffered the inconvenience of several times changing its captain, but it was nevertheless maintained in good order and regular conduct. Lieutenant W. C. Roberts, R.E., however, was constantly with it, to whom and colour-sergeant Lanyon¹ and the non-commissioned officers, much credit is due. The desertions only amounted to six although the company was on the frontier in daily communication with the United States. Of these six, one returned the following morning; a second

¹ Ante, p. 289, vol. i. At the new barracks built for the dragoons at Niagara, sergeant Lanyon successfully constructed a circular well, about thirty feet deep, after two or three contractors had attempted it and failed. He laboured himself in laying the stones up to his hips in water, and afforded ample work for a strong party above in preparing the stones for placement, and pumping up the water. The service was effected under many difficulties and hazards and while the weather was intensely cold. As an instance of his great strength it may be remarked, that six men complained to him of the heavy task they were subjected to in removing timbers about 15 feet long and 12 inches square for constructing a stockade at Fort Mississaqua. Lanyon made no observation, but shouldered one of the unwieldy logs, and, to the amazement of the grumblers, carried it to the spot unassisted.

would have done so but he feared the jeers of his comrades ; and the other four found when too late the falsity of the inducements which had attracted them to the States, and would gladly have come back, could they have done so." And the Colonel then concludes, " The advantages enjoyed by well-behaved men, and the *esprit de corps* which has always existed in the sappers, have been found to render desertion rare, even when exposed to greater temptation than usually falls to the lot of other soldiers."

In the meantime a second company had been removed to Gibraltar in the 'Alban' steamer under Lieutenant Theodosius Webb, R.E., and landed on the 6th July, 1842. This augmentation to the corps at that fortress was occasioned by the difficulty felt in procuring a sufficient number of mechanics for the works ; and to meet the emergency the company in Canada was recalled, as in that province works of considerable magnitude had been carried on by civil workmen, who could at all times be more easily engaged in a country receiving continual influxes by immigration than in a confined fortress like Gibraltar with a limited population.

On the return of the Niger expedition in November, to which eight rank and file had been attached, the establishment of the corps was reduced from 1,298 to 1,290 of all ranks.

The survey of Ireland upon the 6-inch scale was virtually completed in the December of this year, terminating with Bantry and the neighbourhood of Skibbereen. The directing force in that great national work was divided into three districts in charge of three captains of royal engineers in the country, and a head-quarter office for the combination and examination of the work, correspondence, engraving, printing, &c. in charge of a fourth captain. To each of these districts the survey companies were attached in relative proportion to the varied requirements and contingencies of the service, and adapted to the many modifications which particular local circumstances frequently rendered imperative. A staff of non-commissioned officers and men was also stationed at the head-quarters' office, and discharged duties of trust and importance.

In framing his instructions for the execution of the Irish survey Colonel Colby had to reject his old opinions formed from circumscribed examples of small surveys, and to encounter all the prejudices which had been fixed in the minds of practical men. The experience of these parties did not extend beyond the surveys of estates of limited space, performed without hurry and with few assistants. Colonel Colby, on the other hand, was to survey rapidly a large country, with much more accuracy. The two modes were therefore so entirely different that it took less time to train for its performance those who had no prejudice, and who had been brought up by military discipline to obey, than to endeavour to combine a heterogeneous mass of local surveyors fettered by preconceived notions and conceits, deficient in habits of accuracy and subordination, and who could not be obtained in sufficient numbers to form any material proportion of the force. Hence the survey of Ireland became essentially military in its organization and control, the officers of engineers being the directors of large parties, and the non-commissioned officers the subordinate directors of small parties.

In the later years of the Irish survey, however, the superintendence by the sappers became of much consequence and its advantages very appreciable in the reduction of expence. For the year 1827, the outlay for the survey was above 37,000*l.*, at which period the sum paid to the officers was more than one-third of the whole amount; but in 1841, when the expenditure was more than doubled, the amount for superintendence had been reduced to a twelfth part of the total expenditure.*

The general employment of the sappers and miners in this great national work embraced the whole range of the scheme for its accomplishment, and many non-commissioned officers

* 'Second Report Army and Ordnance Expenditure,' 1849, p. 500. To such an extent was the diminution in the number of the officers subsequently carried, that in 1849 the amount of expence incurred by the superintendence of officers was reduced to one twenty-second part of the total expenditure; therefore by the more general employment of sappers in the direction of the work, the amount of superintendence was reduced from one-third and one-fourth, to one twenty-second part.

and men trained in this school became superior observers, surveyors, draftsmen, levellers, contourers, and examiners. Among so many who distinguished themselves it would be almost invidious to name any, but there were a few so conspicuous for energy of character, efficiency of service, and attainments, that to omit them would be a dereliction no scruples could justify. Their names are subjoined:—

Colour-sergeant John West, celebrated as an engraver. In 1833, the Master-General, Sir James Kempt, pointed out his name on the engraving of the index map of Londonderry to His Majesty William IV. in terms of commendation; and the Master-General while West was yet a second-corporal promoted him to be supernumerary-sergeant with the pay of the rank. Most of the index maps of the counties of Ireland were executed by him, and a writer in the *United Service Journal*³ complimented him by saying that the maps already completed by him were as superior to the famous *Carte des Chasses* as the latter was to the recondite productions of Kitchen the geographer. His also was the master hand that executed the city sheet of Dublin, and his name is associated with many other maps of great national importance. The geological map of Ireland, 1839, engraved for the Railway Commissioners, was executed by him; and in all his works, which are many, he has displayed consummate skill, neatness, rigid accuracy, and beauty both of outline and topography. In October, 1846; he was pensioned at 1*s.* 10*d.* a-day and received the gratuity and medal for his meritorious services. He is now employed at the ordnance survey office, Dublin, and continues to gain admiration for the excellency of his maps.

Sergeant Alexander Doull was enlisted in 1813: After serving a station in the West Indies, he was removed to Chatham. There on the plan of 'Cobbett's Grammar,' he commenced publishing letters to his son on "Geometry," but after the second number appeared, he relinquished the undertaking. In 1825 he joined the survey companies, and was the chief non-commissioned officer at the base of Magilligan. He was a superior

³ ii., 1835, p. 454.

mathematical surveyor and draughtsman, and his advice in difficult survey questions was frequently followed and never without success. Between 1828 and 1833 he had charge of a 12-inch theodolite, observing for the secondary and minor triangulation of one of the districts, and was the first non-commissioned officer of sappers it is believed who used the instrument. In July, 1834, while employed in the revision of the work in the neighbourhood of Rathmelton, he introduced a system of surveying similar to traverse-sailing in navigation, which effected a considerable saving of time in the progress of the work, and elicited the approbation of Colonel Colby. While on the duty he invented a plotting scale,⁴ and subsequently a reflecting instrument,⁵ both simple and ingenious in construction. After a service of twenty-three years, he was discharged in January, 1838. When the tithes commutation survey was thrown into the hands of contractors, Doull got portions of the work to perform, and his maps were referred to in terms of high commendation by Edwin Chadwick, Esq.⁶ Among several towns that he surveyed, one was Woolwich, the map of which, dedicated to Lord Bloomfield, was published by him in 1843. In the proposed North Kent Railway, Mr. Doull was assistant engineer to Mr. Vignoles, and he planned a bridge of three arches, having a roadway at one side and a double line of rails at the other with an ornamental screened passage between, to span the Medway where the new bridge is now forming, to connect Strood and Rochester; which, had the proposed railway not been superseded by a rival line, would have secured an enduring fame for the designer. This was the opinion of Mr. Vignoles and Sir Charles Pasley. Afterwards when the competing companies were preparing their respective projects, Mr. Doull represented the engineering difficulties of the opposing scheme in a pamphlet under the signature of "Calculus." In this his military knowledge and experience were well exhibited, inasmuch as he showed how the fortifica-

⁴ Frome's 'Surveying,' 1840, p. 40. Simms' 'Math. Inst.,' 1st edit.

⁵ Frome's 'Surveying,' 1840, p. 44.

⁶ 'British Companion and Almanack,' 1843, p. 38.

tions at Chatham would be injured by the adoption of that line; and the railway consequently, on account of this and other influences, has never been prolonged beyond the Medway at Strood. A few years afterwards he published a small work entitled, "Railway Hints and Railway Legislation," which obtained for him, from the South-Eastern Railway Company—the one he so perseveringly opposed—the situation of assistant engineer to the line. More recently he issued a pamphlet on the subject of a railway in America,⁷ which for its boldness and lucidity gained for him the praise of a rising literary genius in the royal engineers.⁸ His last pamphlet on the subject of opening a north-west passage between the Atlantic and Pacific oceans, a distance of 2,500 miles, is more daring, and evinces more pretension and merit than any of his previous literary efforts. Mr. Doull is also known as the inventor of several improvements of the permanent way of railways,⁹ and is a member both of the Society of Civil Engineers and the Society of Arts.

Sergeant Robert Spalding was for many years employed on the survey of Ireland, from which, on account of his acquirements, he was removed to Chatham to be instructor of surveying to the young sappers. To assist him in the duty he published a small manual for the use of the students. It was not an elaborate effort, but one which detailed with freedom and simplicity the principles of the science. In 1834 he was appointed clerk of works at the Gambia, where his vigorous intellect and robust health singled him out for varied colonial employment, and his merits and exertions frequently made him the subject of official encomium. Five years he spent in that baneful and exhausting climate, and in 1840, just as he was about to sail for England, the fever seized him, and in a few days he died. In his early service as a bugler he was present

⁷ First published in a series of letters to the 'Morning Chronicle,' and then collected, with additional matter, in a pamphlet.

⁸ Synges's 'Great Britain—one Empire.'

⁹ These he patented in November, 1851. A description of the improvements, with sixteen illustrations, is given in the 'Civil Engineer and Architects' Journal,' xv., pp. 164, 165.

in much active service, and was engaged at Vittoria, San Sebastian, Bidassoa, Nivelle, Nive, Orthes, and Toulouse.

Sergeant Edward Keville was a very fair and diligent artist. He engraved the index map of the county of Louth, and assisted in the general engraving work at the ordnance survey office in Dublin. In January, 1846, he was pensioned at 1*s.* 10½*d.* a day, and obtained re-employment in the same office in which he had spent the greatest part of his military career.

Second-corporal George Newman was eminent as a draughtsman, and the unerring fineness and truthfulness of his lines and points were the more remarkable, as he was an unusually large man of great bodily weight. He died at Killarney in 1841.

Lance-corporal Andrew Duncan was a skilful and ingenious artificer. His simple contrivance for making the chains, known by the name of "Gunter's chains," is one proof of his success as an inventor. Those delicate measures, in which the greatest accuracy is required, have by Duncan's process been made for the last ten years by a labourer unused to any mechanical occupation, with an exactitude that admits of no question. The apparatus is in daily use in the survey department at Southampton, and the chains required for the service can be made by its application with great facility and rapidity. He was discharged at Dublin in September, 1843, and is now working as a superior artizan in the proof department of the royal arsenal.

Equally distinguished were sergeants William Young, William Campbell, and Andrew Bay, and privates Charles Holland and Patrick Hogan, but as their names and qualifications will be found connected with particular duties in the following pages, further allusion to them in this place is unnecessary.

Colonel Colby in his closing official report, spoke of the valuable aid which he had received from the royal sappers and miners in carrying on the survey, and as a mark of consideration for their merits, and with the view of retaining in confidential

situations the non-commissioned officers who by their integrity and talents had rendered themselves so useful and essential, he recommended the permanent appointment of quartermaster-sergeant to be awarded to the survey companies ; but this honour so ably urged was, from economical reasons, not conceded.

Seventeen years had the sappers and miners been employed on the general survey and had travelled all over Ireland. They were alike in cities and wastes, on mountain heights and in wild ravines, had traversed arid land and marshy soil, wading through streams and tracts of quagmire in the prosecution of their duties. To every vicissitude of weather they were exposed, and in storms at high altitudes subjected to personal disaster and peril. Frequently they were placed in positions of imminent danger in surveying bogs and moors, precipitous mountain faces, and craggy rocks and coasts. Boating excursions too were not without their difficulties and hazards in gaining islands almost unapproachable, and bluff isolated rocks and islets, often through quicksand and the low channels of broad sandy bays and inlets of the sea, where the tide from its strength and rapidity precluded escape unless by the exercise of extreme caution and vigilance, or by the aid of boats. Two melancholy instances of drowning occurred in these services : both were privates,—William Bennie and Joseph Maxwell ; the former by the upsetting of a boat while he was employed in surveying the islands of Loch Strangford, and the latter at Valentia Island. This island consisted of projecting rocks very difficult of access, and when private Maxwell was engaged in the very last act of finishing the survey a surf swept him off the rock. A lad named Conway, his labourer, was borne away by the same wave. The devoted private had been immersed in a previous wave by which his note-book was lost, and while stopping with anxiety, to see if he could recover it, another furious wave dashed up the point and carried him into the sea.¹⁰

¹⁰ In consideration of this event, the Board of Ordnance granted his widow a donation of 20/.; and she was, moreover, assisted by a very handsome subscription from the officers and men of the district in which her husband had served.

Hardship and toil were the common incidents of their every-day routine, for on mountain duty theirs was a career of trial and vicissitude. Comforts they had none, and what with the want of accommodation and amusement in a wild country, on a dizzy height, theirs was not an enviable situation. Covered only by a canvas tent or marquee they were barely closed in from the biting cold and the raging storm; and repeatedly tents, stores, and all, have been swept away by the wind or consumed by fire, while the hardy tenants, left on the bleak mountain top, have remained for days together half naked and unsheltered. Even on the less exposed employments of the survey, the men were subjected to many discomforts and fatigues. The marching was harassing; miles to and from work were daily tramped, frequently in a drenching rain; and in this weather soaked to the skin, they have continued to work. Night after night for two or three weeks together, have these men returned to their quarters dripping wet; and when, in frosty weather, their clothes have frozen on their backs, the removal of boots and trousers have only been accomplished by immersing the legs in warm water.

The average strength of the three companies set apart for the survey, for each year from 1825 to 1842, is subjoined:—

	Least Strength.	Greatest Strength.	Average for each 12 Months.
1825 . . .	61 . . .	109 . . .	86
1826 . . .	106 . . .	134 . . .	115
1827 . . .	129 . . .	220 . . .	177
1828 . . .	232 . . .	259 . . .	248
1829 . . .	234 . . .	257 . . .	242
1830 . . .	233 . . .	258 . . .	247
1831 . . .	248 . . .	268 . . .	255
1832 . . .	230 . . .	256 . . .	242
1833 . . .	211 . . .	231 . . .	220
1834 . . .	204 . . .	215 . . .	209
1835 . . .	199 . . .	204 . . .	201
1836 . . .	195 . . .	198 . . .	196
1837 . . .	191 . . .	213 . . .	199
1838 . . .	208 . . .	217 . . .	213
1839 . . .	199 . . .	220 . . .	206
1840 . . .	183 . . .	213 . . .	197
1841 . . .	87 . . .	179 . . .	142
1842 . . .	31 . . .	74 . . .	56

During the above period the casualties by death in Ireland only amounted to twenty-nine of all ranks, proving the general healthiness of their occupation. Of these, three were untimely: two by drowning as shown in a preceding paragraph, and one killed—private John Crockett—by falling from a car while proceeding on duty from Leixlip to Chapelizod.

Here it should be noted that the sappers, in the prosecution of their duty, necessarily mixed with all descriptions of society, and were invariably treated with respect, civility, and hospitality. The spirit of agrarianism, the bigotry of religion, or the natural irritable temperament of the people, were seldom evinced against the companies in abuse or conflict.

As the work was drawing to a close the sappers by rapid removals augmented the force employed in the survey of Great Britain, so that at the termination of 1841 there were no less than 143 men chiefly in the northern counties of England, and thirty-four carrying on the triangulation of Scotland, leaving for the residual work of the Irish survey only eighty-seven men of all ranks.

In June, 1842, the payment of the companies in England commenced on a system of consolidating the detachments into a series of vouchers prepared for their respective companies. At that time the force in Ireland, left for the revisionary survey of Dublin and the northern counties and for the engraving office at Mountjoy, reached a total of six sergeants and forty-one rank and file; while the absorbing work of the survey of Great Britain had on its rolls a strength of 217 of all ranks. Southampton, in consequence of the destruction of the map office at the Tower of London by fire, was established as the head-quarters of the survey companies; and in the institution formerly known as the royal military asylum for the orphan daughters of soldiers, are now carried on those scientific and extensive duties which regulate with such beautiful accuracy and order the whole system of the national survey.

1843.

Falkland Islands; services of the detachment there—Exploration trips—Seat of government changed—Turner's Stream—Bull-fight—Round Down Cliff, near Dover—Boundary line in North America—Sergeant-major Forbes—Operations for removing the wreck of the 'Royal George'—Exertions of the party—Private Girvan—Sagacity of corporal Jones—Success of the divers—Exertions to recover the missing guns—Wreck of the 'Edgar,' and corporal Jones—Cessation of the work—Conduct of the detachment employed in it—Sir George Murray's commendation—Longitude of Valentia—Rebellion in Ireland—Colour-sergeant Lanyon explores the passages under Dublin Castle—Fever at Bermuda—Burning of the 'Missouri' steamer at Gibraltar—Hong-Kong—Inspection at Woolwich by the Grand Duke Michael of Russia—Percussion carbine and accoutrements.

THE settlement at Port Louis, in the Falkland Islands, was daily growing into importance, and works applicable to every conceivable emergency were executed. This year the old government-house was thoroughly repaired, and a new substantial barrack for the detachment erected. Unlike the other buildings of the colony, the foundation-stone was laid by the Governor with the usual ceremony, and in a chamber was placed a bottle of English coins of the reign of Queen Victoria. There were also built houses for baking, cooking, and to hold boats. A butcher's shop was likewise run up, and cottages erected for the guachos and their major-domo, as well as a small calf-house on Long Island and a large wooden peat-house at Town Moss. To add to the variety of their employment the sappers repaired the pass-house, put the pinnace in fine sailing condition, and constructed a jetty of rough stones for boats. Other services of less note but equally necessary were performed, such as quarrying stone, building a sod-wall to enclose a space for garden purposes, stacking peat for the

winter, and removing stores and provisions from the newly-arrived ships, &c.

Parties were detached on exploring services to North Camp and Mare Harbour. In both places wild cattle abounded and troops of horses made no attempt to scamper away. On one excursion sergeant Hearnden and corporal Watts accompanied Mr. Robinson to Port St. Salvador in the face of a snow-storm, opposed by a cutting wind. Several wild horses and a herd of savage bulls were met in the trip; and geese, too, crossed their track in vast numbers, merely waddling out of the way to prevent the horsemen crushing them. Night at length spread over them. To return in such weather was impossible; and looking about they discovered a heap of stones, which turned out to be a sealer's hut. The ribs of a whale were its rafters and turf and stones served the purpose of tiles. Leashing their horses and fastening them in a grassy district some four miles from the hut, Hearnden at once repaired the roof of the desolate hermitage, and Mr. Robinson with his companions crept into it through a small aperture on their hands and knees. Here they passed a bitter night; and so intense was the cold that four of the five dogs taken with them perished. Next day they returned to the settlement with less appearance of suffering than cheerfulness, and with a heavy supply of brent and upland geese and some wild rabbits.

Notwithstanding the inclement weather, the health of the detachment continued to be robust. Fourteen months they had been at the Falkland Islands without a doctor; but in March one was added to the settlement from the 'Philomel.'

After having erected comfortable residences for nearly the whole of the official establishment, the seat of government by orders from the Colonial Office, was removed to Port William. The proclamation for this purpose was read to the inhabitants of Port Louis by sergeant Hearnden on the 18th August, 1843. Jackson's Harbour was selected by the Lieutenant-Governor for the future settlement. Soon afterwards, the detachment marched overland to the spot, and continued there during the remainder of the year—except when temporary service

required their presence at Port Louis—preparing the location for the Governor and the official officers. A sed-hut was soon run up for one of the married families, and the rest were tented on boggy ground about twenty yards from the river. In stormy weather the shaky ground would rock with the fury of the wind; and what with the whistling of the gale through the cordage, the flapping of the tents, and the roaring of the waves, the men at night were scarcely free from the hallucination of fancying themselves at sea.

Their early operations at Jackson's Harbour were very harassing, much of the material required for building having to be brought from a distance; but before the close of the year a two-roomed wooden cottage was erected with some convenient outhouses for domestic purposes. A portable house for the surveyor was also constructed, and one built in Mare Harbour. A rough jetty of planks, piles, and casks was likewise made, and the high grass for miles about the settlement was burnt down. This service was not accomplished without difficulty, for the continual rains having saturated both grass and ground, prevented the spread of the flames, and required unceasing efforts for more than a month to insure eventual success.

While out on this duty sergeant Hearnden discovered a good ford for horses about 150 yards from Turner's Stream, and marked the spot by a pile of stones, the summit of which was on a level with high-water mark. Turner's Stream was named in compliment to a private of that name, who carried the Governor in his journeys over the shallow waters and lagoons that intersected his track.

Much discomfort and some privation were experienced by the men in the first months of their encampment at Jackson's Harbour. To get meat they usually travelled to Port Harriet, or some eight or nine miles from the location. The bulls they shot were always cut up on the spot and their several parts deposited under stones till required for use at the camp. In these expeditions the bulls were frequently seen in herds and wild horses in troops, sometimes as many as fifteen in a group. Once the camp was attacked by a number of wild horses and

four savage bulls. The party, about four in number, were at breakfast at the time they approached, and, at once seizing their loaded rifles, ran out of the tent to meet them. Two of the bulls only stood their ground; and though struck by two bullets, rushed on furiously, and forced the party to beat a hasty retreat. A position was rapidly taken up among some barrels and timber, under cover of which the men were reloading; but the onslaught of the bulls was so impetuous that the operation was interrupted and the party driven into the tents. One of the animals now trotted off; but the other, still pursuing, bolted after the men into the marquee. A ball from private Biggs's rifle fortunately stopped his career, and, turning round, the infuriated animal tore up the tent, committed great havoc through the camp, and made a plunge at private Yates, who dexterously stepped aside, and, firing, shot the bull in the head and the combat ceased.

Lance-corporal John Rae and private Thomas Smith were employed in January under Lieutenant G. R. Hutchinson, R.E., in the demolition and removal by blasting of a portion of the Round Down Cliff, near Dover, for the purpose of continuing the South Eastern Railway in an open line, supported by a sea-wall, up to the mouth of Shakspeare Tunnel. The summit of the cliff was about 380 feet above high-water mark, and 70 feet above that of Shakspeare Cliff. The two sappers had the executive superintendence of the mines, the placement of the charges, and various duties connected with the management of the voltaic apparatus and wires. No less than 180 barrels of gunpowder were expended in the operation; and the explosion by electric galvanism brought down, in one stupendous fall, a mass of chalk—about 400,000 cubic yards—which covered a space of $15\frac{1}{2}$ acres, varying in depth from 15 to 25 feet, and saved the south eastern railway company the sum of 7,000*l*.

Six corporals under Captain Robinson, R.E., with Lieutenant Pipon, were attached, under orders from Lord Aberdeen, to the commission of which Lieutenant-Colonel Estcourt was the chief, for tracing the boundary line between the British dominions in North America and the United States, as settled by

the Ashburton treaty. Dressed in plain clothes, they embarked at Liverpool on the 19th April, and arriving at Halifax on the 2nd May, proceeded by Boston and New York to the Kennebec road and entered the woods late in the month. In May, 1844, the party was increased to twenty men by the arrival of fourteen non-commissioned officers and privates from the English survey companies. The co-operation of this party was urged as of paramount importance. It enabled the work, so says the official communication, to be carried on over a large portion of country at once with energy and rapidity, and in such a manner as to insure a more vigorous and correct execution of it than if the Commissioners were left to depend on the assistance to be met with on the spot, and which, although greatly inferior in quality, would have entailed more expense on the public than the employment of the military surveyors. Each sapper was selected as being competent to work by himself, and to survey and run lines of levels, besides keeping in constant employment a staff of labourers.

Sergeant-major James Forbes retired from the corps on the 11th of April on a pension of 2*s.* 2*d.* a-day. He was succeeded by colour-sergeant George Allan,¹ an excellent drill non-commissioned officer, who was appointed to the staff at Chatham, vice sergeant-major Jenkin Jones, removed to the staff at Woolwich.

The merits of sergeant-major Forbes have been frequently alluded to in these pages, but there still remain some other points in his history to be noticed. To the royal military college at Sandhurst, he presented several models made by himself, on military subjects. About two years before his retirement he invented the equilateral pontoon, a vessel of a very ingenious character. Its sides consist of portions of cylinders, supposed to be applied to three sides of an equilateral triangular prism, each side of the triangle being two feet eight inches long; so that the cylindrical portions meet in three edges parallel to the axis of the pontoon. The sagitta, or versed sine of the curvature being about one-fifth of the side of the

¹ Now quartermaster of the royal engineer establishment at Chatham.

triangle, it follows that each side of the pontoon forms, in a transverse section, an arc of nearly 90° . Each end of the pontoon consists of three curved surfaces, corresponding to the sides of the vessel, and meeting in a point, as if formed on the sides of a triangular pyramid.³ "The form," says Sir Howard Douglas, "appears to be well adapted for the purposes of a good pontoon; as whichever side is uppermost it presents a boat-like section to the water, and a broad deck for the superstructure. It possesses also the advantage of a horizontal section gradually enlarging to the highest point of displacement, by which means stability and steadiness in the water are obtained in a high degree. The area of a transverse section of this pontoon is greater than that of the present cylindrical pontoon; and the greater capacity produces more than a compensation, in buoyancy, to the small excess of weight above that of a cylindrical pontoon."³ A raft of this form of pontoon was prepared under the eye of the sergeant-major and sent to Chatham for trial, but although it gained much favour for its decided excellences, it was finally set aside on account of some inconvenience in the management causing a preference to be given to those of the established cylindrical pontoon.⁴ He was however awarded by the Board of Ordnance, in consideration of his trouble and as a tribute to his skill, the sum of one hundred guineas.

On leaving the royal sappers and miners, he was appointed surveyor to a district of the Trent and Mersey canal, at a salary of 215*l.* a year, with a fine residence and five acres of land attached. He was also allowed forage for two horses, and all his taxes and travelling expences were paid. Some two years afterwards his salary was increased to 280*l.* a year, and in 1846, so highly appreciated were his services, that the Directors of the company proposed him to fill the office of engineer to the canal. His integrity however was such, that he would not be tempted by the great increase of salary the promotion promised, and declined it, from a modest feeling that he might not be able

³ Sir Howard Douglas, 'On Military Bridges,' 3rd edit., p. 32.

³ Ibid., 33.

⁴ Ibid.

to do justice to so important and onerous a charge. Quickly upon this, he received the thanks of the Directors, accompanied by a special grant of 100*l*. Determining upon other arrangements for the execution of their works, the company disbanded its establishment of workmen and superintendents, retaining only the engineer and Mr. Forbes, and such was his character for alacrity, resolution, and discrimination, that the Directors appointed him to superintend all the works undertaken for the company, both on the canal and the North Staffordshire Railway, which was now incorporated with the Trent and Mersey Canal proprietary. This alteration in the company's affairs, caused his removal from Middlewich to a commodious residence in Etruria, in Staffordshire, where his energy and influence in the parish soon gained him the post of churchwarden, and the honour of being invited to a public breakfast, at which, while the bishop of Lichfield held the chair, he had the distinction of filling the vice-chair. Latterly he has appeared before the public as a writer. His pamphlet on the National Defences, proposing a locomotive artillery, addressed to Lord John Russell, was perused by that nobleman and received the attention of Sir John Burgoyne. Frequently he has written in the public journals on pontoons. He has also published a pamphlet on the subject, and another relative to a cylindrical life raft which he has invented. The latter is of great interest and may yet receive the attention its ingenious suggestions deserve. On the 6th of May, 1853, he was elected an Associate of the Institution of Civil Engineers, for which honour he was proposed by the great Robert Stevenson and Mr. S. P. Bidder, the two leading civil engineers of this country. Within the last year, he has been advanced to the post of engineer to the company, and he enjoys the perfect satisfaction and confidence of his employers. His salary and emoluments exceed 400*l*. a year.

The operations against the wreck of the 'Royal George' were resumed, for the fifth time, early in May, with a detachment of fifteen royal sappers and miners, eight East India company's sappers, and about eighty seamen, riggers, &c., under the direction of Major-General Pasley, with Lieutenant

G. R. Hutchinson, R.E., as the executive officer. At the end of 1842, almost all the floor timbers had been got up and 101 feet of the keel, leaving only about 50 feet more at the bottom; and out of 126 tons of pig-iron ballast, 103 tons had been safely wharfed. There was therefore confident reason to expect the entire removal of the wreck before the close of the season, and such indeed was the success of the enterprise, that Major-General Pasley, on quitting the work in November, declared that the anchorage ground, where the wreck had lain, was as safe and fit for the use of ships as any other part of Spithead. At first four divers went down regularly, and afterwards five or six were at work at every slack tide, generally three times a day.

After a few weeks of unsuccessful effort, the firing of three charges of more than 600 lbs. of powder, in puncheons, removed a bank of shingle which chiefly interfered with the divers' success. These charges were fixed by corporals Harris and Jones, and private Girvan. In one week afterwards, the divers effected as much as in the five weeks previously, for not only were the keel and bottom planking somewhat bared, but a great deal of the remaining iron ballast was rendered accessible. Six other charges, of 720 lbs. of powder each, and numerous smaller charges, were subsequently fired, with results that gave ample employment for all the divers and the detachment on board.

One or two failures occurred which arose from want of experience in firing conjunct charges at Spithead; but in other respects, the operation, which was exceedingly difficult, was conducted with skill and success, owing to the able arrangements of Lieutenant Hutchinson, assisted by the leading riggers, and by lance-corporal Rae and private Alexander Cleghorn, who had the preparation of the charges and the voltaic batteries. The divers, too, did everything necessary at the bottom, and were well seconded in every department by the sappers and others employed. In short, adds the narrative,⁵ the operation, including the separation of the two mooring lighters before the explosion and bringing them together afterwards, could not, in

⁵ 'United Service Journal,' iii., 1843, p. 139.

consequence of the severe weather, have possibly succeeded, if all the men had not, from long experience, known their respective duties well and entered into them with laudable zeal.

On the 9th of July private John Girvan slung the largest and most remarkable piece of the wreck that had been met with during the season. It consisted of the fore foot and part of the stern connected by two very large horse-shoe copper clamps bolted together; the boxing by which it had been connected with the fore part of the keel was perfect, from which joint six feet of the gripe had extended horizontally, and terminated in the curve of the stern, which was sheathed with lead. The length of this fragment was sixteen feet, measured obliquely, and its extreme width five feet.⁶

By corporal Jones, on the 17th following, was slung a large piece of iron, which on being brought on deck was observed by him to show marks of having been in contact with brass. He therefore rightly conjectured there must be a brass gun at the spot, and descending again recovered a brass 24-pounder, nine and a half feet long, of the year 1748.⁷

On the 31st of July private Girvan discovered a gun under the mud, but it was not till the 3rd of August that he succeeded in slinging it, assisted by corporal Jones, with whom he generally worked in concert this season;⁸ and shortly afterwards, the latter diver recovered the last remnant of the keel, twenty-one feet in length, corporal Harris having previously sent up portions of it in the early part of the summer amounting in length to thirty-six feet.⁹

Increased exertions were now made to recover the guns which were embedded some depth in the mud, and the divers cleared the way by sending up everything they could meet with, until nothing but insignificant fragments could be found. To assist them, two frigate anchors and the half anchor creepers with some auxiliary instruments, drawn backwards and forwards and transversely over the site of the wreck, were made to do effectual work. The East India company's sappers had been

⁶ 'United Service Journal,' iii., 1843, p. 138.

⁷ *Ibid.*, p. 138.

⁸ *Ibid.*, p. 139.

⁹ *Ibid.*, pp. 137, 140.

removed before these labours began; the whole of the diving therefore was exclusively carried on by the royal sappers and miners,¹⁰ and to their vigilance of observation and unceasing zeal, was attributed the recovery of thirteen guns late in the season. Of these, corporal Harris got up three iron and six brass guns, corporal Jones three brass, and private Girvan one iron.¹¹

After the removal of the 'Royal George' had been effected, but while the search for the guns was going on, Major-General Pasley detached to the wreck of the 'Edgar'¹² the 'Drake' lighter, with thirteen petty officers and seamen of Her Majesty's ship 'Excellent,' to learn the art of diving. Corporal Jones was attached to the party to instruct them. Violent gales prevailed at this period, which repeatedly drove the 'Drake' from her moorings, not without damage, and at other times caused her to drift in such a manner that guns, discovered by a diver late in a slack, could not be found when the weather permitted his subsequent descent. Hence only five iron guns of this wreck were got up during the season, with a piece of the keel and a floor timber. These were all recovered by corporal Jones, who had also been engaged one tide in finding an anchor that had been lost. Private Girvan relieved corporal Jones at the 'Edgar' on the 16th October, and got up the breech part of an iron 32-pounder, which had been cut in two a little in front of the trunnions.¹³

On the 4th November the divers descended for the last time, as the water had become so cold that their hands—the only part exposed—were completely benumbed, so that they

¹⁰ 'United Service Journal,' i., 1844, p. 143.

¹¹ Here it should be explained how much more successful than the others corporal Harris was in recovering guns, though the other divers, corporal Jones and privates Girvan and Trevail, had been equally successful in all the previous operations. Corporal Harris fell in with a nest of guns, and it was a rule agreed upon that each first-class diver should have his own district at the bottom, with which the others were not to interfere.—'United Service Journal,' i., 1844, p. 146.

¹² This ill-fated ship was wrecked by an explosion, in 1711, and every soul on board perished.

¹³ 'United Service Journal,' i., 1844, p. 145.

could no longer work to advantage; and then, the operations ceasing from necessity, the detachment of the corps rejoined their companies at Woolwich.

Major-General Pasley in according his praises to the various individuals and parties employed at Spithead, spoke highly of sergeant George Lindsay in subordinate charge, and the whole detachment; but more particularly of the intelligent and enterprising men to whom the important task of preparing all the charges fired by the voltaic battery was confided. The charges were numerous and of various quantities, amounting in all to 19,193 lbs. of powder, or nearly 214 barrels. The soldiers alluded to were lance-corporal John Rae and private Alexander Cleghorn who were promoted for their services. The still more arduous duty of diving gave the General every satisfaction. Frequently the duty was embarrassing and dangerous, and carried on under circumstances calculated to test most severely their courage and resources; and so indefatigable were their exertions, and so successful their services, that the military divers gained the character of being "second to none in the world."¹⁴ Most of the party this season attempted to dive, but, from the oppression felt under water by some, only two or three beyond the regular divers could persevere in the duty.

Upon the report made by Major-General Pasley of the conduct of the detachment engaged in the operations, Sir George Murray, the Master-General, was pleased thus to remark: "It has given me no less pleasure to be made acquainted with the very commendable conduct of the non-commissioned officers and privates of the sappers and miners who have been employed under Major-General Pasley, and have rendered so much useful service in the important undertaking conducted under his management."

From June to September about eight men under Lieutenant Gosset, R.E., assisted in the undertaking for determining the longitude of Valentia by the transmission of chronometers. Thirty chronometers were conveyed in every transmission; and

¹⁴ 'United Service Journal,' iii., 1843, p. 141.

to privates Robert Penton and John M'Fadden was entrusted the service of bearing the chronometers, and winding them up at stated times and places. On receiving the chronometers from Liverpool the reciprocations took place repeatedly between Kingston and Valentia island; one private being responsible for their safe transit a portion of the route, and the other for the remaining distance to and from the station at Feagh Main. Professor Sheepshanks and Lieutenant Gosset carried out the scientific purposes of the service, while the sappers not engaged with the chronometers attended to the duties of the camp and observatory at Feagh Main, under the subordinate superintendence of corporal B. Keen Spencer. The professor instructed this non-commissioned officer in the mode of taking observations with the transit instrument; and further, in testimony of his satisfaction, gave generous gratuities to privates Penton and M'Fadden. Professor Airy, in speaking of the former, alludes to the perfect reliance he placed on his care, "and in winding the chronometers," adds, "he has no doubt the service was most correctly performed."¹⁵ The duty was one in which extreme caution and care were required, to prevent accident or derangement to the instruments.

Agitation for a repeal of the union, headed by O'Connell, was now the great excitement of Ireland and a rising of the masses to enforce it was daily expected. With the reinforcement of troops sent there to preserve order was the first company of sappers, which was despatched by rapid conveyances, *viâ* Liverpool to Dublin, where it arrived on the 26th July. The company consisted of ninety men of all ranks, and their duties embraced repairs to the barracks and the planting of stockades in the rear of the castle, to prevent the ingress, in case of revolt, of the rebels.¹⁶ They also prepared several

¹⁵ Airy's 'Longitude of Valentia,' p. xi.

¹⁶ Owing to a rumour that the castle at Dublin could be entered by a subterranean passage or sewer from the Liffey, colour-sergeant Lanyon was directed to explore it. He did so, and found that a strong iron grating existed in the passage, which would effectually prevent the supposed entrance. In this duty, being much exposed to the influence of noxious vapours, he soon afterwards was seized with fever and jaundice, which shortened his days.

thousands of sand-bags for breastworks. Detachments of one sergeant and twenty rank and file were sent to Limerick and Athlone in November, where they strengthened the barracks and loopholed the outside walls for musketry. The store-rooms of the artillery barracks were also loopholed. Effectually, however, was the anticipated outbreak suppressed, and, under the authority of Sir James Graham, the Home Secretary, the company was recalled to England and arrived at Woolwich on the 22nd August, 1844.

The yellow fever broke out at Bermuda in August, and continued with unabated virulence and fatality until the middle of September. In that brief period, out of a strength of 165 men, it carried off no less than thirty-three men of the eighth company and four men of the fourth, besides Captain Robert Fenwick, R.E., in command of the latter, and Lieutenant James Jenkin, the Adjutant.¹⁷ The two companies were distributed to St. George's and Ireland Island; at the former, where the fever chiefly raged, was the eighth company, about ninety strong, and at the latter the fourth. Eighty-eight men had been seized with the malady, of whom twenty-four were admitted with relapses, and four had suffered three seizures, none of whom died. Dr. Hunter, a civil physician, attended the cases in the absence of a military medical officer. With the civil population his practice was remarkably successful; for out of 101 natives who took the fever only one died. He therefore concluded that the artillery, who lost nine men, and the sappers thirty-seven, fell easy victims to the epidemic from their intemperate habits. No comparison, however, was justifiable between coloured people, upon whom the fever had but little effect, and Europeans; but an analysis of the cases, as far as the sappers were concerned, confirmed the doctor's views

¹⁷ Mr. James Dawson, foreman of masons, formerly colour-sergeant in the corps, also died during the fever. He was a clever tradesman and overseer, and while in the sappers did good service at St. Helena, Corfu, and Bermuda. He was succeeded as foreman by sergeant John McKean, who was discharged in November, 1843, and still fills the appointment with ability and faithfulness.

to the extent of sixteen men. The remainder, twenty-one, were men of sobriety and general good conduct.

Lance-corporal Frederick Hibling being the only non-commissioned officer *not* attacked, performed the whole duties of the eighth company, and for his exertions and exemplary conduct was promoted to the rank of second-corporal. Seven widows and twenty-two orphans were left destitute by this calamity, among whom a subscription (quickly made through the corps, assisted by many officers of royal engineers, nearly amounting to 200*l.*) was distributed, in proportion to their necessities—one woman with six children receiving as much as 33*l.* The lowest gift was 14*l.* to a widow without children. A monument of chaste and beautiful design, consisting of a fluted column surmounted by an exploded bomb, resting on a neat and finely proportioned pedestal, was erected in the military burial-ground at St. George's, in mournful commemoration of the victims. On three panels of the pedestal were inscribed their names, and on the fourth was sculptured the royal arms and supporters. The work was executed by the surviving stonemasons of the company, and the royal arms were cut by private Walter Aitchison.

On the 26th August, in the evening, the 'Missouri,' United States' steamer, Captain Newton, took fire in the bay of Gibraltar, and a detachment of the corps at the Rock was sent out by Sir Robert Wilson, the Governor, in charge of two engines under Captain A. Gordon, R.E., to assist in extinguishing the flames; but all their diligence and intrepidity were unavailing, for the vessel was soon afterwards burnt to the water's edge. During the service the men were in much danger from falling masts and spars, and from the explosion of a powder-magazine on board. The Governor, in orders, thanked Captain Gordon and other officers of royal engineers, and the non-commissioned officers and privates of royal sappers and miners, for the creditable and useful zeal displayed by them on the occasion; and added, "that the marines, military, and boatmen of Gibraltar have the consoling reflection that nothing was left undone to save the vessel, and that the gallant

crew was preserved by their united labour and devotedness." To each sapper employed at the fire was issued a pint of wine by his Excellency's order.

One sergeant and thirty-three rank and file under Lieutenant T. B. Collinson, R.E., sailed for China in the 'Mount Stuart Elphinstone,' and landed at Hong Kong the 7th October. A party of variable strength had been stationed there, employed superintending the Chinese artificers in carrying on the public works until July, 1854, when the sappers were recalled to England. Some of their first services embraced the construction of roads and sewers, the erection of barracks for the troops and quarters for the officers, with various military conveniences, such as stores, guard-houses, &c. A residence was also built for the General in command, and a sea-wall of granite to the cantonment on the north shore of the island. They also directed the Chinese in cutting away a mountain to a plateau, of about eight acres, for a parade-ground, much of which was granite; and the several explosions rendered necessary to dislodge the mass were fired solely by sergeant Joseph Blaik. A company of Madras sappers also assisted in the superintendence of the coolies, who sometimes exceeded a thousand in number. The working pay of the royal sappers and miners was 1s. 6d. a-day each until the removal of the East India company's establishment, when the allowance was reduced to the ordinary payment of 1s. each. Before the party was quartered in barracks it was housed for a time in a bamboo hut and afterwards in a bungalow. The smiths and plumbers were invariably employed at their trades, as the Chinese were very incompetent in these branches of handicraft.¹⁸

On the 9th October his Imperial Highness the Grand Duke Michael of Russia inspected the troops at Woolwich, on the common. The royal sappers and miners at the station were

¹⁸ In May, 1851, when the tour of service of the detachment had expired, only six men were at the station to be relieved. The remainder comprised one discharged in China, who soon afterwards died, twelve invalided to England, and fifteen deaths.

also drawn up with them, and marched past. Next day the Grand Duke, accompanied by Lord Bloomfield, visited the sappers' barracks, walked through the rooms, examined the carbine of the corps, and then looked over, with every mark of attention, the small museum of the non-commissioned officers attached to the library. On leaving, he expressed his gratification at what he saw, and of the efforts made by the soldiers to improve themselves.

The percussion carbine and sword-bayonet, the same as at present in use, were generally adopted in the corps this year, superseding the flint-lock musket and bayonet.¹⁹ The length of the musket with bayonet fixed was six feet two inches, but the carbine with sword was constructed an inch shorter. The carbine itself is nine inches and a-half shorter than the musket was, but to make up for this reduction, and to enable a soldier to take his place in a charge, the sword-bayonet measures ten inches longer than the rapier-bayonet did.²⁰

The shoulder-belt for the bayonet for all ranks was at this time abolished, and a waist-belt two inches broad, with cap-bag and sliding frog, substituted. This new accoutrement is the same as the present one; and the breast-plate then, as now, bore the royal arms without supporters, within a union wreath, based by the word "*Ubique*," and surmounted by a crown. The sword-bayonet was this year worn vertically for the first time, instead of obliquely as formerly.

The pouch-belt was not altered, but the pouch, the same as at present worn, reduced in dimensions, was made to contain thirty instead of sixty rounds of ball ammunition. The brush and pricker were now abolished.

The sergeants' swords were also withdrawn, and their arms and appointments made to correspond with the rank and file,

¹⁹ Arms of the percussion principle had been on trial in the corps since July, 1840.

²⁰ These figures would seem to make the new carbine and sword $1\frac{1}{2}$ inches longer than the old musket, but the loss of the supposed additional length is occasioned by the greater depth of the socket required to give strength and stability to the weapon. The comparative weight of the two arms gave a reduction in favour of the carbine of 2 lbs. $3\frac{1}{2}$ ozs.

the only difference being the addition of appropriate ornaments on the pouch-belt, which, with the waist-plate, were washed with gilt. The ornaments comprised a grenade bearing on the bomb part the royal arms and supporters; detached from this, underneath, was a scroll inscribed "*Royal Sappers and Miners*," to which a ring was affixed sustaining a chain united to a whistle, resembling an old round watch tower; the whistle itself forming the battlemented crown, inscribed with the motto "*Ubique*." These ornaments, the suggestion of Major—now Colonel—Sandham, are still worn by the sergeants.

The buglers' short sword with three guards was replaced this year by one after the pattern of the Ceylon rifles' band. The hilt formed an ornamental Maltese cross with fleury terminations, and on the flat between the horizontal arms, above the blade, was an exploded grenade. The blade was straight, two feet ten inches long, and the mounting on the scabbard was chased and embellished. The weapon is still worn by the buglers, and is altogether neat, pretty, and convenient.—See Plate XVII., 1854.

1844.

Remeasurement of La Caille's arc at the Cape—Reconnoitring excursion of sergeant Hemming—Falkland Islands—Draft to Bermuda—Inspection at Gibraltar by General Sir Robert Wilson—Final operations against the 'Royal George'—and the 'Edgar'—Success of corporal Jones—Injury to a diver—Private Skelton drowned—Conduct of the detachment employed in the work—Submarine repairs to the 'Tay' steamer at Bermuda by corporal Harris—Widening and deepening the ship channel at St. George's—Intrepidity of corporal Harris—Accidents from mining experiments at Chatham—Notice of corporal John Wood—Inspection at Hong-Kong by Major-General D'Aguilar.

THE detachment set apart to measure the base line on Zwartland Plain at the Cape commenced the second season in September, 1841. It opened under a somewhat different arrangement with respect to the issue of provisions. Captain Henderson managed it in 1840, Mr. Maclean in 1841, and sergeant Hemming was appointed to act as his quartermaster-sergeant. Captain Henderson left the work in December and returned to England.

As soon as the base was measured, the triangulation began, and was carried on, with the exception of the winter interval, until January, 1842. Then the work was completed to the north extremity of La Caille's arc in the vicinity of St. Helena Bay. A few months were now spent in effecting the triangulation to the south as far as Cape Point, and in December, 1842, the work was resumed to the northward.¹

In January, 1843, the triangulation commenced at a headland north of St. Helena Bay, latitude about 32° S., and continued nearly parallel to the coast line, and about thirty miles

¹ 'Professional Papers,' N. S., i. p. 32.

from it until it reached Kamiesberg a little south of Lat. 30°. Here the arc was expected to terminate. The difficulties encountered this season were of a formidable kind, and the care required in the transport of Bradley's zenith sector and a large theodolite, occasioned much tedious anxiety for their preservation. The party, too, was formed of different materials; the infantry soldiers had quitted, and the shipwrecked crew of the 'Abercrombie Robinson' had been engaged in their stead. Most of these sailors were rough, ill-behaved fellows, and therefore the chief responsibility of the preparations and the conveyances devolved upon the sappers. In addition to this, the country passed over north of the Oliphant river was a mere desert, and the points used were at high altitudes—one of which exceeded 7,000 feet.²

In its progress northward, the party crossed the Oliphant or Elephant river on the 15th June, 1843, and the day being Sunday, encamped on its north bank to spend the sabbath. Six days afterwards the expedition arrived at the foot of the Kamiesberg, where fell heavy rain for three days and two nights; and when the march was recommenced, the ground was so saturated, that the whole train had to be dug out of the mud repeatedly every day. In three days only eighteen miles were accomplished and that with great exertion. The oxen were now so knocked up that the farmers refused to go any further, and a fresh supply was procured at a missionary establishment twelve miles distant. When nearing that institution, the provisions were very low, and the difficulties of the expedition in this respect were greatly augmented by a heavy fall of snow. For the whole day the party were without food, nor could they make a fire to warm themselves.³ They however laboured with excellent spirit, and succeeded that night in bringing three of the waggons to the missionary station; but the other two, sticking fast, were not brought up till the next day. The men were badly shod, and suffered greatly. About a week afterwards the

² 'Professional Papers,' N. S., i., p. 32.

³ About twelve miles from the sea ice was found three-eighths of an inch thick.

instruments were fixed and the observations commenced, which continued until October 1843, when the party returned to Cape Town,⁴ and afterwards marched up the country to join their company.

The objects used for reflecting or observing were heliostats about 7 inches in diameter, and were chiefly attended to by the sappers, who were sometimes detached on this duty for several months at a time, with a couple of natives under them to assist. On account of the heat, the observations were discontinued at 11 A.M., and not renewed until 3 P.M. Notwithstanding this intermission, the signal duties were oppressive. All supplies were got from a distance, which fully occupied the two natives in procuring them. The sappers were also entrusted with large sums of public money to pay all demands as the work progressed. On the Kamiesberg mountain they helped in the observatory in working the great sector to determine the position of some stars. Two stone-cutters of the number were detached from the Kamiesberg to Zwartland and Groenckloof to cut and build a pillar of stone at each end of the line, to mark the termini of the newly-measured base; and all, as the general service of the expedition permitted, erected at every fixed point a strong pile of twenty feet high, secured to a base of twenty feet, to indicate the sites of the several trigonometrical stations.⁵

Sergeant Hemming, before the close of the duty, was sent by the colonial astronomer on a reconnoitring excursion to discover a track from the neighbourhood of St. Helena Bay along the mountain range to the eastward, to Cape L'Agulhas on the coast. He was out fourteen days exploring the country, but from its inaccessible nature he returned not only disappointed and exhausted, but unsuccessful.⁶ In March, 1844, his connection with the astronomical department ceased.⁷

⁴ 'Professional Papers,' i., N. S., p. 32.

⁵ *Ibid.*, p. 35.

⁶ *Ibid.*, p. 33.

⁷ These particulars are chiefly collected from a paper by sergeant Hemming in the 'Royal Engineer Professional Papers,' i., pp. 31, 39. This non-commissioned officer was pensioned at 1s. 8d. a-day, in May, 1845. Of his

The detachment at the Falkland Islands continued throughout the year to labour in the establishment of the new settlement at Port William, which was situated on the south side of Jackson's Harbour, and sloped from the shore to a ridge of rocks about a quarter of a mile distant. Notwithstanding the stormy character of the seasons, the detachment constructed three good jetties, made roads and pathways, and formed several ditches to drain the land and mark the different boundaries. They also erected and finished with interior fittings, the Governor's house, and besides building a temporary barracks for the party with workshops and other convenient premises attached, small commodious cottages were run up for persons in official employment. Of the services and intelligence of sergeant Hearnden the Governor wrote in terms of unqualified praise. Both as a soldier and private individual, the influence of his example was felt in the colony, and he is stated to have been in an eminent degree faithful and successful in the discharge of his duty. Most of the men were also well spoken of for their excellent behaviour and zeal; and amid the innumerable inconveniences of their situation and services, they maintained their military character and discipline unimpaired. This was the more commendable as the temptation to drunkenness—the prevailing vice in the colony—was, from the absence of the common recreations so usual in England, and the inclemency of the weather, almost irresistible.

On the 16th February forty-four rank and file embarked for Bermuda under the command of Lieutenant C. R. Binney, R.E., to fill up the vacancies occasioned by the epidemic in the previous year, and landed from the 'Prince George' transport

survey services Colonel Portlock gives an interesting outline in his prefatory remarks to the sergeant's paper. His duties appear to have been confined chiefly to the mountains of Ireland, where in winter he was exposed to fearful inclemency and subjected to much hardship. "On one occasion," says the Colonel, "I had to place a young gentleman, who had graduated at Cambridge under the sergeant for instruction, to whose zeal, intelligence, and respectability the pupil warmly bore testimony. Before receiving his discharge, he was appointed clerk and storekeeper to the road department in Cape Town, and some idea of the responsibility of his office may be inferred from the fact that he expended in four years, 1844-48, upwards of 36,000!."

on the 8th April. Corporal David Harris, the chief military diver, under Major-General Pasley at Spithead, was in subordinate charge of the party.

Sir Robert Wilson, the Governor of Gibraltar, inspected the companies of the corps at the fortress in common with the other troops under his command, in May and October, and on each occasion made a flattering allusion to their conduct and discipline. On the 13th May, after some general remarks of commendation, Sir Robert Wilson adds—"All the corps and battalions merited unqualified approbation, and the Governor bestows it with pride and pleasure. The royal sappers and miners, however, whose laborious daily duties occupy their whole time, except the afternoons of alternate Saturdays, deserve, without any invidious preference, particular commendation for preserving a soldier-like mien, and exercising as if they had been in the habit of daily practice." And again, on the 13th October, he wrote:—"The practice of the royal artillery yesterday was highly satisfactory and impressive, and the royal sappers and miners, including the detachment which arrived only the night before, presented under arms an appearance and proficiency which corresponded with the character established by the capacity and assiduous labours that have distinguished this corps during its employment on the works of the fortifications since the Governor has had the honour to command."

Early in May Major-General Pasley resumed, for the sixth and last time, his operations at Spithead. Lieutenant H. W. Barlow, R.E., was the executive officer under whose charge were placed sergeant George Lindsay and thirteen rank and file of the corps, with a small party of the East India company's sappers, and a number of seamen, riggers, &c. The removal of the 'Royal George,' notwithstanding that there still remained several guns of that wreck at the bottom, was reported to be perfectly accomplished, and the roadstead quite safe for the anchorage of shipping. The Major-General, therefore, turned his attention to the recovery of the guns of the 'Edgar,' which was blown up at Spithead in 1711. The great mass of

timber, embedded in mud, composing the centre of the hull of the wreck, was discovered on the 23rd May, and stood thirteen and a half feet higher than the general level of the bottom. Before the close of the season the whole of this mass was got up, by the continual removal of pieces loosened by frequent small explosions. Almost the whole of the keel was likewise sent up, with innumerable fragments of timber, spars, &c., and many guns, eight of which had been recovered in one week. The first was found by corporal Richard P. Jones. A great number of sinkers or large stones, by which the wreck buoys were moored, and a number of small anchors were also recovered. In the early part of August the operations were much retarded by some very violent gales, preventing the divers working from time to time; but as soon as the weather moderated, corporal Jones, with his usual zeal, taking down with him a large crate, sent up at one haul, besides a load of staves of casks, &c., ninety-one shot of various sizes. The guns of the 'Edgar' were much scattered at the bottom by the explosion of her magazines, and the unexpected distances to which they were thrown, rendered a more extended sphere of action necessary. This was attended with great success, so much so, that nearly the whole of the guns and wreck were sent up and deposited in the dockyard before the 31st October, when the season closed. The party rejoined the corps at Woolwich on the 2nd November.⁸

During the season corporal Jones got up nineteen guns, besides an immense pile of other articles in endless variety; and when the rough and generally unfavourable state of the weather which prevailed is taken into account, his activity and industry appear strikingly prominent. "Whatever success," writes General Pasley, "has attended our operations, is chiefly to be attributed to the exertions of corporal Jones, of whom as a diver I cannot speak too highly."⁹

⁸ The 'Times,' August 19, 1844.

⁹ With the reputation of being the best diver in Europe, he sailed for China in February, 1845. In April, 1847, he was present in the expedition to Canton, and took part in the capture of the Bogue and other forts. Soon after-

Corporal Girvan was also very successful as a diver while health permitted, but he was prevented from rendering any particular assistance after the 27th July, from an accident occasioned by the air-pipe of his apparatus blowing off the pump on deck. He was aware that something had gone wrong, and making the signal, was drawn up sensible, but much injured about the throat and head. The air rushed violently out of his helmet, as if no safety valve had been attached to it. This arose from the valve not having been taken to pieces since the commencement of the season, and, moreover, being clogged with verdigris, could not be properly shut, and hence the air was enabled to escape.¹⁰

Private John Skelton, so frequently praised for his ingenuity as a workman and for his daring as a diver, was during the operations drowned by accident off Southsea Castle.

The conduct and exertions of the whole detachment were flatteringly spoken of by Major-General Pasley, particularly sergeant Lindsay,¹¹ who, next to the officer in command, had the chief superintendence. Corporal John Rae¹² and private Alexander Cleghorn were also named for their intelligence and services in the management of the voltaic batteries and firing of

wards he was reduced from sergeant, but his energy of character and perseverance brought him again into favour, and he is now a sergeant in the corps at Chatham, and usefully employed as an instructor in the royal engineer establishment. He was present during the summer of 1854 at the capture of the Aland Islands, including the demolition of the forts of Bomarsund.

¹⁰ The 'Times', August 19, 1844.

¹¹ Discharged, with a pension of 1s. 10d. a-day, in April, 1848, and obtained from the Surveyor-General of Prisons the appointment of foreman over the contractors, on the part of the Government, at 5s. a-day. Subsequently he was removed by promotion to be foreman of works in the convict establishment at Woolwich, which embraces the supervision of the convicts working both in the arsenal and dock-yard. His salary, with rent and rations, exceeds 130l. a-year.

¹² Subsequently became a sergeant, and was employed on special duty at Round Down Cliff, Dover, and in the drainage works at Windsor. After passing five terms at Sandhurst, he was rewarded for his intelligence and good service, with a handsome case of drawing-instruments; and in September, 1848, was promoted to the rank of staff-sergeant at the College. Several interesting models, made by himself, of military importance, he presented to that institution.

the charges, and their duties, next to the divers, were the most important. The divers occasionally went down as many as twenty times in a tide, and the remuneration of each was from 1*s.* 3*d.* to 2*s.* a tide, besides the usual working pay of 1*s.* a-day. This enabled each first class-diver to realize between 5*s.* and 6*s.* a-day, exclusive of his regimental allowances.

The royal mail steamer 'Tay,' on her passage to Bermuda, sustained some damage to her bottom by running on shore on the Cuban coast. On her arrival at Bermuda on the 16th August, corporal Harris was employed to examine her. Supplied with a diving-helmet and suit from the dockyard, he went down and found part of her cutwater and keel and about twelve feet of planking on her starboard side carried away. Forty-one times he dived in repairing the injury, and in three days so effectually finished his work that the vessel was enabled to return safely to England with the mails.

By an order from the Secretary of State for the Colonies, then Lord Stanley, this non-commissioned officer was attached, late in the year, to the department of the Naval Inspector of Works at Bermuda, for the purpose of removing, by submarine mining, coral reefs from the entrances of harbours, so as to make them accessible to ordinary vessels. Lieutenant-Colonel Reid, R.E., the Governor of the Island, carried on a correspondence which extended over a period of eighteen months, to obtain the services of this diver.¹³ The first work undertaken by him was widening and deepening the ship channel leading into the harbour of St. George. For three or four years he confined his exertions to this point, and so well planned and skilfully executed were his operations that all natural impediments militating against the safety of the channel, were at length completely removed by the explosions of innumerable charges of gunpowder, fired through the agency of voltaic electricity. Under Colonel Barry, the commanding royal engineer who had the superintendence of the service for most of the period, the work was successfully prosecuted. The spaciousness of the channel for the passage of steam-vessels of

¹³ 'Second Report, Army and Ordnance Expenditure,' 1849, p. 607.

large tonnage and great draught of water, was practically tested on the 26th February, 1848, by Her Majesty's steamer 'Growler,' of 1,200 tons, Captain Hall. The vessel steamed into the harbour against wind and tide, drawing fifteen and one-third feet of water, and effected the passage with ease and steadiness, having beneath her keel when passing "the bar," the worst part of the channel, at least five feet of water.¹⁴ These signally successful operations saved the Government several thousands of pounds; and in the event of Hamilton losing its commercial importance, the harbour of St. George will, no doubt, be selected as the chief water for the passage of the mails and the trade and marine of the Islands.

At Chatham late in the year, some mining operations were carried on under Colonel Sir Frederick Smith, the director of the royal engineer establishment. The works were pushed under the glacis in front of the left face of the ravelin, and the right face of the Duke of Cumberland's Bastion. All the corps at the station, with the East India company's sappers, were present, working night and day in three reliefs of six hours each, and the numerous explosions that took place, and the attempts made to render abortive the schemes of opposing parties, invested the operations with the character in many essential respects of subterranean warfare. The exciting experiments, however, were not concluded without casualty, for on one occasion from inhaling foul air, a sapper of the East India company was killed, and three of the royal sappers were drawn out in a state of dangerous insensibility. These were privates John Murphy, John A. Harris, and Edward Bailey. Lieutenant Moggeridge, R.E., who had charge of the party, also fainted, but he was saved from serious injury by colour-sergeant George Shepherd rushing into the gallery and bringing him out. At the time of the accident, the miners were about one hundred and fifty feet from the mouth of the shaft; and several who went in to rescue their comrades suffered more or less from the air. Singular, however, as it may appear, lights were burning near the ground the whole time, and instantly after-

¹⁴ The 'Bermudian,' March 1, 1848.

wards the last man was carried out of the gallery, it was traversed in its whole length by lance-corporal John Wood,¹⁵ who carried a light in his hand and experienced no great difficulty in breathing.¹⁶

The Hong Kong party under Major Aldrich, R.E., was inspected in the autumn by Major-General D'Aguilar, C.B., in command of the troops in China; and his Excellency in his official report regretted that a detachment of so much importance, and so well constituted, should have been reduced by six deaths and three invalided during the half year, and that the men present should, in their appearance, show the effects of climate. In December following the detachment was ordered to be increased to a half company, and the reinforcement of fifteen rank and file, sailing from the West India Docks in the 'William Shand' freight-ship, in February, 1845, landed at Victoria on the 28th June following. In May, 1851, the party returned to England, but its strength was reduced by casualties to six men only. Of the remainder, four were invalided, three died, one was drowned on passage from Victoria to Macao, and one was killed by falling over a precipice.

¹⁵ Joined the corps from the military asylum at Chelsea. By his attainments and merits he was in time promoted to the rank of corporal. His career, however, was marked by occasional intemperance, which at length settled into confirmed drunkenness and mental eccentricity. Unable to control his propensity to intoxication, he became a useless soldier, and after twenty years' service was discharged without a pension. He is now a vagrant and a beggar.

¹⁶ The 'Times.' 'Professional Papers,' viii., pp. 156—180, in which will be found an interesting detail of the operations.

1845.

Sheerness—Increase to the corps at the Cape—Survey of Windsor—Skill of privates Holland and Hogan as draughtsmen—Inspection at Gibraltar by Sir Robert Wilson—Falkland Islands—Discharges in the survey during the railway mania.

On the 15th May twelve rank and file were detached to Sheerness, and, with little variation in its strength, continued to work there till April, 1849. The men were employed at their trades, and assisted in carrying out some boring experiments to ascertain the nature of the strata. Corporal Charles Hawkins, who discharged the duty of foreman of works, was highly spoken of for his activity and ability, and the men were praised for their good conduct and exertions.

A company was added to the strength of the corps at the Cape of Good Hope by the arrival from Woolwich of the ninth company under the command of Captain R. Howorth, R.E., on the 20th August. On landing at Algoa Bay, the reinforcement was removed to the different military posts on the frontier.¹ The two companies in the colony now reached a total of 174 of all ranks. This addition to the command did not occasion an

¹ The voyage was full of incident. On the freight-ship, 'Gilbert Henderson,' sailing from Woolwich, the crew mutinied and left her at the Nore. A fresh crew, chiefly foreigners, unable to speak English, was engaged, and soon after putting again to sea, she took fire, but the exertions of the company soon extinguished it. Near Dungeness she ran on a sand-bank, but by working all night, she was got off. When about a fortnight's sail from Port Elizabeth, she was overtaken by a heavy squall, which carried away the greater part of her gear, and her fore and main masts. To complete the chapter of accidents, the disembarkation took place in a heavy surf, and as boats refused to venture out, the men, women, and children were borne to land on the backs of nude blacks.

augmentation to the corps, but reduced one company of the disposable force at home.

The survey of Windsor, including the Home Park, Castle, Frogmore, and the Royal Gardens, undertaken by Her Majesty's command in 1843 by a party of about twenty non-commissioned officers and men of the survey companies, was completed in the summer of this year. Captain Tucker, R.E., had the direction of the work, and colour-sergeant Joseph Smith the executive charge. The drawings were accurately and very beautifully executed on a scale of five feet to a mile, which admitted of the fretwork of the ceilings being panned in for each apartment of the castle. So exquisitely was the work performed, that the drawings by privates Charles Holland² and Patrick S. Hogan³ were constantly mistaken for engravings; and Prince Albert, to mark his approbation of their merits, presented each with a useful and elegant case of mathematical drawing instruments. The plans were made to show the contour levels at every four vertical feet above and two vertical feet below the flood-line of 1841. Several sectional plans were also executed by the party to assist Sir Henry de la Beche in the drainage of the town and

² Became a second-corporal, and after being pensioned in April, 1847, returned as a draughtsman to the ordnance map office at Southampton. He is the best man of his class, and his drawings are always executed with fidelity and beauty. Frequently their neatness, and richness of colouring and ornament, give them an effect truly artistic and pictorial.

³ Made an etching of the 'Adelaide Oak,' in the Home Park, which, submitted by Sir Henry de la Beche to Lord Liverpool, obtained for him a complimentary introduction to Prince Albert. His Royal Highness accepted the etching, and expressed himself much pleased with the beauty and minuteness of the execution.—*Morning Post*, Saturday, August 19, 1843. The tree had a pretty seat hut nearly half round the bottom of its trunk, and in another part of it was a remarkable hollow occasioned by time. Her Majesty the Queen Dowager had been known frequently to sit reading under its ample shade, and on that account it was considered to be her favourite oak. Hogan afterwards presented, through Colonel Wyld, an etching of the 'Victoria Oak,' in the Green Park, to the Prince; and his Royal Highness, in thanking the giver, expressed the admiration he felt for his talents as an artist, and rewarded him with the sum of 5*l.* These handsome pair of etchings are now the property of Her Majesty. Hogan never received promotion in the corps, as he was unqualified for command, and being discharged, on the usual pension in January, 1845, soon afterwards emigrated to South Australia.

castle, which, at the time, was considered very defective. The plan for the office of Woods and Forests, designed with a view to the improvement of the sewerage, was drawn on a sheet eleven feet square; and a reduced plan was also drawn for the library of the Prince Consort. His Royal Highness and other distinguished personages frequently visited the office to view the progress of the work, and never quitted without graciously commending the party for their zeal and proficiency.

Sir Robert Wilson inspected the companies at Gibraltar in October, and when he concluded was pleased to write thus of them, "that on parade they showed they had duly attended to their military acquirements whilst employed at work, which," he added, "will be a lasting monument to their merits."

The Falkland Islands' detachment was still toiling in the formation of the colony, subjected to all the inconveniences and vicissitudes of a bad and depressing climate. Their duties embraced every variety of hard and laborious service, such as making excavations, drains, roads, jetties, building houses, huts, &c. Carrying heavy burdens of stores, and loading and unloading boats, were among their roughest tasks, accompanied as they were with the necessity of wading in the water on sharp stony beaches, which destroyed in a week or two the strongest boots. The wear and tear of clothes was almost ruinous; and to make up for the expenses incurred in replacing them, and in purchasing provisions which were dear, working pay, exclusive of their regimental allowance, was granted to them from 1*s.* 6*d.* to 4*s.* 6*d.* a-day. The sergeant received the highest rate, the privates the lowest. In winter they were mostly in tents, with snow around and a humid soil beneath; and being constantly at work out of doors, they frequently returned at night, wet through, to a small cheerless fire, never lending heat enough to dry their dripping clothes. At times they were on short allowance; and when flour was selling at 6*l.* 10*s.* per barrel of 192*lbs.*, the men were glad of the chance of buying a small handkerchief-full of damaged biscuit for 4*s.* 4*d.* To the recklessness of a wretched and lawless community, composed of men of the lowest class, was opposed the five or six gentlemen in official

appointments and the sappers. The latter, however, from constantly working with them, were incessantly exposed to every kind of evil influence; and without amusement or subjects of interest to occupy their attention in the intervals of labour, four of the party gradually yielded to the prevailing corruption and were removed from the settlement. The residue were highly commended for their "esprit du corps," and sergeant Hearnden in particular, for his admirable conduct, was specially noticed in the Governor's despatches to the Secretary of State for the Colonies. The sergeant's trials were very great, his exertions unflagging, and his unrestricted devotion of every hour to the public weal was frequently warmly acknowledged by the Governor.

A mania for railways set in this year which caused an excessive demand for surveyors to trace and survey the lines. This occasioned the withdrawal of more than 200 civil assistants and about 60 labourers, besides 1 sergeant, 1 corporal, 6 second-corporals, and 19 privates, who were discharged from the survey companies at their own request. Many of those who quitted, possessed superior abilities as surveyors and draughtsmen. The offers made were too tempting to be resisted; and some of the men secured employment, which enabled them to realize an income of more than six guineas a-week. To make up for the loss in the survey force, Colonel Colby proposed the augmentation of another company for the duty; but the measure was not acceded to till April, 1848.

1846.

Boundary surveys in North America—Duties of the party engaged in it—Mode of ascertaining longitudes—Trials of the party; Owen Lonergan—Official recognition of its services—Sergeant James Mulligan—Kafir war—Corporal B. Castledine—Parties employed at the guns—Fort Brown—Patrols—Bridge over the Fish river—Field services with the second division—Dodo's kraal—Waterloo Bay—Field services with the first division—Patrol under Lieutenant Bourchier—Conduct of corps in the campaign—Alterations in the dress—Drainage of Windsor—Detachment to Hudson's Bay—Its organization—Journey to Fort Garry—Sergeant Philip Clark—Private R. Penton—Corporal T. M'Pherson—Lower Fort Garry—Particular services—Return to England.

THE survey of the boundary between the British possessions in North America and the United States, as settled by the treaty of Washington, was completed this year. Six non-commissioned officers selected for the duty embarked at Liverpool in April, 1843, and landing at Boston, thence re-embarked on board a coasting steamer, and sailed to St. John's, New Brunswick. By boat they then passed on to Fredericton, and on the 1st June commenced operations at the Grand Falls. All were dressed in plain clothes. Corporals James Mulligan, Daniel Rock, and Alfred Garnham had been for three months at the Royal Observatory at Greenwich, and were instructed in the mode of making and computing astronomical observations.¹ Very soon the detachment "drew forth the praise and admiration of the American party. The Americans," adds the despatch, "had no persons to stand in the place of them." So useful were they found in the service, that, in the second season, when the work of the commission had to be extended, the detachment was increased to twenty men of all ranks.

¹ 'Military Annual,' 1844.

Captains Broughton, Robinson, and Pipon, R.E., commanded the party under Lieutenant-Colonel Estcourt, the chief commissioner ; and at the close of the second season, the survey had so far progressed, that nine men were removed from the duty, and arrived at Woolwich in January, 1845. The services of three other men were dispensed with at the close of 1845, and reaching head-quarters in December, they were followed, on the 9th July, 1846, by four more. Three were discharged in Canada, and the twentieth man, corporal Garnham, arrived in England 10th September, 1846.

A few details of the service would seem to be required to explain the nature of the duties entrusted to the men. Having once entered the woods, the survey was continued, without interruption, until the termination of the out-door operations of 1845. Occasionally the men worked in concert with the officers of the United States' topographical engineers. Two non-commissioned officers were constantly employed under Captains Robinson and Pipon, in taking and calculating observations for latitudes and longitudes, and for absolute longitudes by lunar transits and culminating stars, to discover the azimuthal bearings of the line, as pointed out by the treaty of Washington. They also ascertained the comparative heights of astronomical stations, &c., at various points of the line from barometrical observations. One non-commissioned officer for many months was attached to the American party to see that they effected their survey according to the treaty ; one carried the chronometers between the astronomical camps ; and the remainder were employed singly in charge of parties of labourers and axemen, carrying on the general business of marking out the boundary, and of surveying and levelling it. Embraced in the operations also was the survey of the waters, roads, and other prominent objects in the vicinity of the line, essential to the discovery of the boundary at any time, by reference to the natural features of the country ; and when the survey closed in 1845, seven of the party were, for more than eight months, stationed with the commission at Washington, and engaged in the duty of computing and registering astronomical observations, also

in laying down and plotting the work and finishing the plans of the line.

The process of surveying and levelling is too well known to need notice, but it may be desirable to afford an idea of one description of work, to show in what respect assistance was given to obtain the longitude of a particular place. Between the north-west branch-station and Quebec, it was required to ascertain the difference of longitude ; but as the usual method of finding it by the interchange of chronometers could not be resorted to, a hill some twenty miles away from the branch station, which could be seen from Quebec, was selected as the station for an observing party. Captain Pipon, therefore, left the woods, and established his transit instrument on the Plains of Abraham. With a pocket chronometer, tent, provisions, gunpowder, &c., sergeant Bernard M'Guckin removed to a range of hills from the Lake Hill station, and encamped himself and his labourers on the highest point of the range, which was covered to the top with dense wood. Climbing the height, and finding he could see back to the Lake Hill and forward to Quebec, he set his labourers to clear away the summit, except one high tree which he stript of all the leaves and branches likely to intercept the free range of the observations. At the base of this tree he constructed a high platform, and every evening for two hours, at intervals of ten minutes, the sergeant fired flashes of gunpowder, by hoisting the charge, with the assistance of a pulley, to the top of the tree with a burning slow match attached. The quantity of powder used for each flash varied from a quarter to half a pound. Some of the nights the wind blew strongly, and the charge exploded before reaching the top of the tree. On a clear night the flashes could be seen with the naked eye at the Quebec observatory, forty miles distant. Simultaneous observations were made on six different evenings, and forty-six flashes were noted, sufficient to give a good difference of longitude. The result of the experiment was most successful. An attempt was afterwards made to find the difference of longitude between the stations, by the transmission of chronometers ; but the effect deduced was worthless

compared with that obtained from the flashes. When the observations were completed, Captain Robinson left the woods and placed his chronometers in charge of a non-commissioned officer of sappers at Montreal, who wound them up and compared them during the winter.³

The accuracy of this means of observation was further tested by the operations of corporal Bastard, who, in August, 1845, having selected the highest summit on Mount Rougement, near Chambly, for a station, reciprocated flashes with Major Graham of the U. S. topographical engineers at Rouse's Point, with great precision and success.³ The same was done by corporal Thomas Forbes from the top of Jay's Peak in Vermont, who flashed at ten-minute intervals from the surface of a piece of flat board. In six fine nights eighty flashes were observed in common. These series of observations connected the points of St. Regis and St. Helen's, and the latter again with Rouse's, testing at the same time the difference of longitude between the several stations.⁴

When not in tents a sort of hut constructed on the spot was the only habitation of the surveyors, and twigs of the spruce tree, felled by the axemen, formed their bed. They had, however, good blankets and warm clothing; but such was the severity of the weather, and such the inconvenience of their bivouac, that frequently in the morning they arose for work either with stiffened limbs, or soaked with melted snow. For the most part, however, the detachment was free from sickness despite the intense cold in winter, and the great heat in summer. Locked as they were in a thick forest, covered by an impenetrable foliage, the oppressive heat of midsummer was almost insupportable. In the spring scurvy was common among them, accompanied with sore gums, loose teeth, discoloured legs, and emaciated frames, but some well-known simple specifics soon restored them to health. Only one man, became an invalid on the duty, arising from an injury he sustained by falling from a

³ 'Corps Papers,' i., pp. 125—154.

³ *Ibid.*, i., p. 155.

⁴ *Ibid.*, i., p. 128.

shelving bank, on account of which he was sent home and discharged.

Scrambling through an unbroken forest with snow-shoes on, interrupted at every step by stunted underwood, not a little augmented the fatigues of the men. Often the snow was hip deep; and when the melting commenced the obstacles and toils of travelling became greater. The snow-shoes then became useless, and yet without them the men sank above their knees in half-thawed snow, and then had to wade through the swamp. The streams in these seasons became rivers, and the rivers deep torrents; and such was the difficulty of pushing through the snow, that one party was four days going ten miles.⁵ There were perils too encountered of a serious character, which only stout frames and sturdy hearts could have conquered. On one occasion, corporal Owen Lonergan was sent to measure three check lines; it was biting cold at the time, and the ground was covered with snow some two or three feet deep. Though encumbered with an instrument, a greatcoat, and heavy clothes, he entered with spirit upon his work and rapidly completed two of the checks, but on commencing the third he was obliged to relinquish it, as his hands, painfully benumbed, had lost their power. The snow by this time was very high, and it was only by a superhuman effort, sustained for several hours, that he succeeded in mastering the difficulties of his situation, and regaining his hut before nightfall.

At the termination of the survey, Lieutenant-Colonel Estcourt thus wrote of the conduct and services of the detachment: "I beg to acknowledge the valuable assistance they have rendered. The character of the duties entrusted to them has been such as must have been given to an officer had they not been attached to the commission, entailing thereby a great additional expense, not only on the score of wages, but also of equipment and assistance; and I doubt whether the work would have been better executed. All that was expected, therefore, from their employment has been fully realized; their efficiency in the field, and their general good conduct and respectability,

⁵ 'Corps Papers,' i., p. 128.

have been very creditable to them and to their corps. Those who are now about to leave us, and have been at Washington during all our residence here, deserve the highest commendation for their uniform good conduct. In no single instance has there been the least occasion for complaint or even remark." In his orders to the detachment at parting, he reiterated the substance of the above tribute, and spoke of the unmixed satisfaction he would look back upon the whole of his intercourse with the sappers. The survey pay of the men, in addition to their regimental pay, ranged between 2s. 10d. and 3s. 9d. a day, and free rations and hotel expenses were also allowed them.⁶

The war in Kaffirland again broke out this year and afforded ample employment for the two companies of the corps, which were scattered in sections to the several posts on the frontier. A small detachment of sappers appears to have been the first troops to meet with hostile interruption in the prosecution of its duties, and the circumstance is quaintly alluded to in the following free metrical effusion of a facetious alarmist:—

"There was a stir in Kaffirland one morning,
A chief with Government some ground disputed;
And then he very fairly sent us warning
Our plans and his were totally unsuited.
So Colonel Hare, as did of old, Mahomet,
Call'd for his boots, and flar'd up like a comet.

"Meanwhile Sandeli, who's a lad of mettle,
Swore that the sappers should not light a fire
To cook their dinners or to boil their kettle;
And so—denouncing on them vengeance dire,—
He bid them pack their tools, and strike their tents,
And 'made believe' to seize their instruments."⁷

⁶ The senior non-commissioned officer, sergeant James Mulligan, was much noticed for his attainments and exertions. His duties with the commission were of a nature to require the exercise of patience and resolution, and demanded always a scrupulous, unremitting attention. In this he was never found to fail, but rendered valuable services, "which," adds Colonel Estcourt, "few civilians could have undertaken, or, if capable, would not have undertaken, but for the highest salary." Mulligan's survey-pay was 3s. 9d. a-day. After his discharge, in September, 1846, he was awarded, for his high merit, a silver medal, and a special gratuity of 25*l.* On leaving the corps he retired, with ample pecuniary means, to Ireland.

⁷ "The Alarm," in 'United Service Magazine,' 1846, ii., p. 383.

The nature of the service upon which the companies were employed precluded them from taking any very active or prominent share in the operations of the campaign, or of their numbers being collected in any force to render their movements conspicuous; nevertheless, as opportunities offered of withdrawing them from their more pacific duties, they were made to participate with the other troops in the harassing war which, without intermission, continued with vigour until the winter.

Corporal Benjamin Castledine, ordered to proceed from Fort Beaufort to Post Victoria, started on the 21st March, 1846, with a gunner of the royal artillery who was armed with a sword only, in charge of a waggon with twelve oxen and two natives—a driver and a leader—who had one musket between them. In crossing a drift, after marching seven miles, the oxen were knocked up, and the corporal sent the driver back for more cattle. At night the corporal took turn as sentry with the artilleryman. Next morning at daylight, the leader was ordered to collect the cattle then grazing about three hundred yards off; but while away, shots were heard in the direction he had taken. The corporal, leaving the waggon in charge of the artilleryman, ran to the banks of the drift, and before he had time to seek cover in the bush, was met by a volley from several armed Kaffirs, who had already wounded the leader and taken his gun. The corporal stood his ground, and wounding two of their number by his correct firing, the rest carried off the injured men and drove away the corporal's cattle. Luckily, soon afterwards, a patrol of one sergeant and seven men of the 7th dragoon guards came up, and hearing what had happened, they pursued the Kaffirs and retook the oxen. The corporal with his escort and cattle, except two of the latter, which were lost on the road from exhaustion, resumed the route and reached Post Victoria on the 22nd March. Colonel Somerset, then commanding the frontier, hearing through Lieutenant Stokes, R.E. of the affair, gave corporal Castledine much credit for his conduct. This was the first skirmish in the war.

From the 16th to 18th April three men served with a demi-battery of artillery as gunners, during Colonel Somerset's

operations in the Amatola mountains, and retreat from Burn's hill to Block drift, where they were present in a smart action.

Ten men took part with the artillery at the guns, from 20th April to 29th September, at Victoria, Fort Beaufort, and Block drift. At these forts the men for weeks together lay down in their clothes and accoutrements ready to meet any sudden attack. At Beaufort, four guns were manned by them, two 9-pounders and two 5½-inch howitzers: one of these had horses attached, which were mounted by the sappers.

On the 23rd April, under Lieutenant Bouchier, R.E., fifty-one non-commissioned officers and men repulsed an attack by the enemy on the Farmers' camp near Fort Brown. The action lasted about four hours, and though the night was extremely dark, the sappers, serving both as infantry and artillery in charge of two field-pieces, beat off the enemy with the loss, as was afterwards acknowledged by the chief *Stock*, of thirty killed. The sappers *only* were engaged in this affair, and their spirited and gallant conduct was reported by Lieutenant Bouchier.

On the 17th and 31st May and 1st and 18th June, about forty non-commissioned officers and men, sent from Fort Brown under Lieutenant Bouchier, went in pursuit of marauding parties of the enemy. From Double drift under the same officer, four other parties were despatched through the bush after the Kaffirs on the 25th June, 7th July, and 7th and 18th August. Sergeant Thomas P. Cook and corporal John Campbell were reported to have shown great determination and intelligence in following the enemy in their fastnesses. The former accompanied six of the patrols and the latter seven. Near Fort Brown, three Kaffir spies, discovered creeping up to the place to reconnoitre, were shot; two of these were brought down by privates Alexander Irvine and John Patterson.

From 3rd June to 13th July, ten men with a company of the 90th regiment, fifty marines and some sailors, under Lieutenant Owen, R.E., constructed a flying bridge of boats, &c. for crossing the Fish river mouth, and threw up a field-work on the right bank. In this service private John Vance, a superior

carpenter, "showed remarkable zeal, skill, and intelligence." The work was undertaken to establish an open line of communication to Fort Peddie.

Under Lieutenant Stokes, R.E., twelve men shared in the operations with the second division in the field and at the passage at the mouth of the Keiskama river from the 6th to 16th July. From the latter date to the 13th September, under the same officer, six other privates served with the second division during Sir Peregrine Maitland's attack upon the Amatola mountains, and constructed a field-work for the protection of the camp at Perie.

On the 15th and 16th July, sixteen non-commissioned officers and men under Lieutenant Bouchier were present in action with the enemy at Dodo's kraal, under the command of Captain Hogg, 7th dragoon guards.

From the 16th July to 13th September, twelve men constructed a field-work for the protection of the camp at Waterloo Bay under Lieutenant Owen, R.E.

From 20th July to 12th September, thirty-eight non-commissioned officers and men served in the field with the first division during Sir Peregrine Maitland's attack on the Amatola mountains; and under the direction of Captain Howorth, R.E., restored Fort Cox. On the 29th July the camp on the Amatola flats was attacked by the enemy, and sergeant Joseph Barns of the corps was killed.

Seven men under Lieutenant Bouchier were present, from the 25th to 30th August, with Colonel Somerset's patrol between the Fish river and the Keiskama.

These comprise the active services of the companies during the year, in which, though the parties do not appear to have gained any mention in despatches or reports for their conduct and efficiency, they always behaved like good soldiers, and spared no exertion to accomplish the objects for which they were employed. They were likewise much harassed on varied escort duty, such as conveying from fort to fort waggons with ammunition, provisions, and wounded men, and took part in all those multifarious services, carried on at twenty different fron-

tier posts and forts, which the character of that desultory and peculiar warfare continually exacted.

In April, the small blocked epaulettes were superseded by others with loose twisted cords of three inches long suspended from a raised corded crescent. Those for the sergeants and staff-sergeants were of the artillery pattern—loose long gold fringe and gilt crescent to correspond with the privates' epaulettes. The shoulder-strap for the sergeants and other ranks was of blue cloth. The staff-sergeants' epaulettes continued boxed as before, with a full laced gold strap edged with raised embroidered wire, and a gilt crescent, but the bullion was longer than formerly. The collar of the coatee for all ranks, which had a triangular-shaped piece of scarlet cloth at the back, was this year entirely of blue cloth, but laced as before, with rectangular loops. The alteration was made to give, in appearance, breadth and squareness to the men's shoulders.

Corporal John Rae, second-corporal John Mealey and eighteen men, were employed from the 8th June to the 17th August, in executing some underground works for the drainage of Windsor. These consisted of a tunnel or cutting from the entrance of the long walk to the north side of the quadrangle of the castle, and also the excavation of a driftway under the north front, moving east and west. The tunnel was approached from several circular shafts 4 feet 6 inches in diameter, of an average depth of about 25 feet, and the gallery—the height of which was 6 feet, and width 4 feet 6 inches—was driven between 750 and 800 feet through chalk, flint, made earth, old moats, and crumbling vaults and foundations; and, notwithstanding the difficulties of the work, was prosecuted with such exactness, that the line of driving between the shafts, was rarely more than an inch or two out of its true level. Indeed, it was remarked that the tunnel, commenced at opposite sides of the castle, was so correct in its progress, that on reaching the centre, there did not exist two inches of difference where the tunnels merged into one.^a In hazardous earth, mining frames and sheeting were resorted to, but even these

^a The 'Times,' August 19, 1846.

expedients, at times, did not prevent the earth from falling and impeding the workmen. Thirty civil labourers worked the windlasses and drove the barrows for the party. All hands worked from five in the morning until half-past six in the evening, and made by their exertions, seven days and a half a-week, at 1s. 6d. each a-day. Captain Vetch, late R.E., was the engineer for the work, and Lieutenant the Honourable H. F. Keane, commanded the detachment. The Board of Woods and Forests paid the expenses of the undertaking, and praised the skill and energy with which the excavations had been conducted and completed. The Lords Commissioners of Her Majesty's Treasury also acknowledged the great advantage which resulted from the employment of the sappers on the occasion.

Sergeant Philip Clark and eleven rank and file embarked at Deptford, in the 'Blenheim,' on the 3rd of June, 1846, for the territories of the Hudson's Bay Company. A detachment of artillery, and three companies of the 6th foot, under the command of Lieutenant-Colonel Crofton, were also with the expedition. The employment of this small force on the Red River was occasioned by the menacing hauteur of the Americans respecting the Oregon territory, which at this period was a momentous question between the two countries; but fortunately, the dispute terminated in a treaty which amicably settled the national differences.

The party was composed of excellent mechanics and well-conducted men, two of whom were also good surveyors and draughtsmen. Three chronometers and barometers, with measuring chains and surveying instruments, were placed in charge of sergeant Clark. Captain H. C. B. Moody, R.E., took command of the party on its landing at York Factory on the 14th of August, and subsequently, for about a year, the command was held by Captain Beatty, R.E.

It was not intended to attach the sappers to the divisions of the troops in pushing up the country, but to employ them on services for which they were more peculiarly adapted, such as measuring the heights of the several falls in the course of

the rivers that occasion the necessity for the portages, and improving the latter whenever any short proceeding would give them facilities for doing it: also cutting, on prominent objects, bench marks to show the height of the water for the information of travellers, and embodying in memoranda a description of the nature of the ground traversed and the features of the country, with suggestions for improving the passage. Owing, however, to the scarcity of officers, the colonel in command could not permit the employment of the detachment in this manner. Accordingly, eight men accompanied the first division of the force, two the second, and two, with Captain Moody, the third. The first party took the barometers; and the chronometers were taken by the two surveyors in the 3rd brigade. In concert with the troops, they tracked, hauled, rowed, and poled the boats the whole way to Fort Garry; and, notwithstanding the intensity of the cold, such was the nature of the duty, it required them in its execution, to go barefooted, with their trousers tied above the knee. At night, for a few hours only, they slept under canvas frequently in wet clothes, upon the damp snow-covered ground. The distance traversed was about 400 miles, through swamps and rapids, over rocky islets, and up and down steep and slippery banks and declivities; and the operation, one of immense difficulty and peril, was not achieved without much labour and discomfort.

At each portage, sergeant Clark himself carried the chronometers, and, after examining them, placed a sentry to watch them. He also measured the heights of the falls and took the difference of the levels. In shoal water, or in running the several rapids, the delicate instruments were invariably removed from the boats to save them from shocks by bumping against hidden rocks and impediments. The chronometers were wound up every morning at nine o'clock, and the results and comparative differences registered. Three times a day the indications of the barometers, the changes in the atmosphere, and the force and direction of the wind were registered, and these observations were recorded until the expedition quitted the settlement.

Serjeant Clark and private Robert Penton, showed great zeal and intelligence in the manner they carried out their scientific duties on the route, and corporal Thomas R. Macpherson, who had charge of the party that accompanied the first brigade from York Factory, was commended for the notes he took of the route, and for the report he framed thereon.

At Lower Fort Garry, the troops, under the officers of engineers with the sappers as overseers, made a trench round the fortress, and cleared away the wood contiguous to it for 300 yards in every direction. A varying party was detached with corporal Macpherson to Upper Fort Garry, and at both places, the sappers carried out all those services which the nature of the settlement and the weather made indispensable for the health and accommodation of the troops. While at work the detachment wore leather jackets and trousers.

In the second year of the station, corporal Macpherson with one sapper was sent to York Factory, and returned in charge of the magnetic and other instruments left there the year before. Although the intricacies of the passage were considerable, increased by the necessity of personally carrying the cases over the portages, he safely conveyed them to the fort without detriment or derangement. Some of the party were employed at intervals, in the survey of portions of the Assiniboine, Saskatchewan and Red rivers, and corporal Macpherson⁹ and second-corporal Penton,

⁹ In the life of some men there happen singular incidents, which give either a romantic or a strangely degraded cast to their career. In this category corporal Macpherson may be fairly included. He was a very talented and superior artificer, and his general knowledge and experience made his services conspicuous. At Hythe he deserted, and leaving his clothes on the bank of the canal a belief prevailed that he was drowned; he, however, turned up about a year afterwards, and was convicted of the offence. But soon gaining favour by his diligence and talents, he rose rapidly to the rank of sergeant, and was intrusted with responsible duties at Gibraltar, Hudson's Bay, and finally in Nova Scotia. At Halifax he again deserted, with 206*l.* of the public money, but being apprehended at Annapolis, with the whole sum in his pocket, he was tried and sentenced to fourteen years' transportation. This was remitted, only to be followed by the basest ingratitude and crime. A few months elapsed, and the forgiven felon a *third time* deserted. On the passage to the States he robbed a gentleman with whom he got into conversation, but as the theft was discovered before the debarkation took place, the gentleman repossessed his money, and a gold watch supposed to be stolen. On landing, the gentleman took steps for the

under Captain Moody, examined and explored the country in the vicinity of the boundary line of the United States at Pambina.

On the 3rd of August, 1848, the sappers quitted Fort Garry under the command of Captain Blackwood Price, R.A.—Captain Moody having then returned to Canada—and after completing the arduous and fatiguing descent to York Factory, they embarked there on the 24th of August, and landed at Woolwich, 18th of October, 1848. Both Lieutenant-Colonel Crofton, and Major Griffiths, his successor in command, awarded an honourable meed of approbation to the detachment for its exemplary conduct and services; but sergeant Clark was particularly noticed by the former for his attainments and ready zeal. “His exertions,” adds the Colonel, “were never wanting, even in matters not in immediate connexion with the corps, and to him I owe the good arrangements made for the garrison library, in aid of which, his services as librarian were cheerfully given without gratuity.”¹⁰ Sergeant Clerk, corporal Macpherson and second-corporal Penton,¹¹ received promotion for their useful exertions on this expedition.

apprehension of the delinquent, but, by artful remonstrances, he made the public believe that the reason of his arrest was not for theft as alleged, but for desertion from the British service. At once the mob sympathized with his fate, rescued him from custody, and he is now at large in the States. The gold watch, brought to Halifax by the gentleman, proved to be the property of a comrade.

¹⁰ Sergeant Clark was brought up in the royal military asylum. He was for some years on the survey of Ireland, and by subsequent application, became a fair surveyor and draughtsman. He served a station at Corfu, before going to Hudson's Bay, and is now colour-sergeant of the 20th company, at Freemantle, Western Australia.

¹¹ An enterprising and superior surveyor. He was importantly employed in 1843 in the determination of the longitude of Valentia, and is now a sergeant at Halifax, Nova Scotia, whither he was sent to superintend the laying of asphalt.

1846.

Exploration survey for a railway in North America—Services of the party employed on it—Personal services of sergeant A. Calder—Augmentation to the corps—Reinforcement to China—Recall of a company from Bermuda—Royal presents to the reading-room at Southampton—Inspection at Gibraltar by Sir Robert Wilson—Third company placed at the disposal of the Board of Works in Ireland—Sergeant J. Baston—Services of the company—Distinguished from the works controlled by the civilians—Gallantry of private G. Windsor—Coolness of private E. West—Intrepid and useful services of private James Baker—Survey of Southampton, and its incomparable map.

SERGEANT ALEXANDER CALDER and seven rank and file of the survey companies embarked at Liverpool in the 'Britannia' steam ship, and landed at Halifax, 2nd July. Subsequently, the party was increased by the arrival of four rank and file who had been employed on the boundary survey in the state of Maine. This detachment, with two pensioner non-commissioned officers of the corps, served under the direction of Captain Pison,¹ and afterwards of Lieutenant E. Y. W. Henderson and Major Robinson, R. E., in surveying the country between Quebec and Halifax, to ascertain the best route for a railway to connect the provinces. The party was dressed in plain clothes, and for the service of the woods, fur caps, pea-coats, and over-boots were added.

Five different routes, the projects of rival interests, were surveyed, and the neighbouring forests and wilds, abounding with wood and water, explored. The forests were in their primeval state—dense and rugged. Pine trees were the chief

¹ Accidentally drowned in the Restigouche, 28th October, 1846. His body was identified by private John Ashplant, and taken charge of by him and sergeant Calder until its removal from Campbelltown to Fredericton, where it was interred in the public cemetery.

growth, and the ground, encumbered with sharp-pointed branches thrown down by time or the violence of winds, formed a regular abattis, and with a thick undergrowth of shrubs and bushes rendered the woods almost impervious. Parties exploring, as soon as they left the rivers or beaten tracks, had to cut their way before them. The difficulties of carrying out the service were considerable. The hills being as much covered with the forest as the plains and valleys, views of the surrounding country could not easily be obtained. Generally this object was effected by climbing, in which some of the sappers became very expert, and, assisted by creepers—a contrivance of iron spikes buckled to the feet—could climb well.² To wander in the least degree from the path cut or marked was dangerous, as the chances of being benighted or lost in the prairie were very great.³

The detachment was divided into parties of two each as assistant-surveyors, with ten or twelve labourers, under a civil surveyor of the country. Each party had a particular line to explore. The sappers carried either two or three barometers and detached thermometers with them; also a 5-inch theodolite, a measuring chain, pocket compasses, &c. As the lines were cut out by the axemen and labourers the sappers measured them, and took the angles for direction, and also for elevation or depression. The barometers were registered at the summits of ridges and bottoms of valleys. Somewhere in the neighbourhood of the exploring parties, a sapper was stationed with a standard barometer, who did not move from his post until ordered to do so. His duty was to register his barometer and thermometer every hour during the day.⁴

The result of the surveys and investigations was an able report from Major Robinson, describing a range of country through which a railway could beneficially pass, extending in length to 635 miles, from Halifax to Quebec. The proposed route was determined with reference to the resources of the tract to be traversed, its accessibility, and facility of adapta-

² 'Professional Papers,' N. S., ii., p. 36.

³ *Ibid.*, p. 38.

⁴ *Ibid.*, p. 37.

tion to the purpose, as well as its military and general advantages.

After completing the plans and sections of the lines explored, the party, in September, 1848, returned to England, and rejoined the survey department.

The personal services of sergeant Calder on this duty are sufficiently interesting to receive notice in this place ; and, with some little difference in points of duty and incident, may be taken as an average type of the individual adventures of the rest of the party. From Halifax to Folly Village, he surveyed a line of seventy-five miles with the barometer, and from thence, for twenty-five miles, measured the roads from the high-water mark of the Bay of Fundy, by taking the heights with the theodolite, using the angle of elevation and depression, and checking the same simultaneously, by barometrical observation. He afterwards traversed a varied country for about sixty miles, to Amherst, from whence he carried on the survey, barometrically, to Mirimichi. The completion of another rough road of ten miles now took him fully into the wilderness, where he continued his work till the winter set in. During his labours in the woods he ran short of provisions. He was then in charge of twelve men, carrying with them 3 lbs. of pork, 1 lb. of oatmeal, and a small bag of ginger. Upon this scanty fare the party subsisted for three days ; and, harassed as they were by hard travelling through a mountainous country, entangled with a tissue of bush and branches and covered with deep snow, their fatigues and privations were considerably increased. Heavy loads also they carried, and so closely were the trees packed together, in the exuberant vegetation of the forest, that the adventurers not only had to tear themselves through the thicket, but continually impeded by logs of fallen trees and tufts of stubborn underwood. On the evening of the third day the hunger of the men began to show its effects in emaciation and despondency. At this moment sergeant Calder found it necessary to relieve the party of the stores and abandon them in the woods. The theodolite and barometers he attached in a safe position to a tree. He then directed the men to use their utmost exer-

tions in tracking a spot where provisions could be found. Scrambling down the banks of a large river they hurried onwards some six miles, when a newly-blazed tree was discovered, indicating the proximity of a lumbering camp. The blazed marks were followed further on for about five miles, and then, to the unbounded joy of the party, a light seen through the chinks of a log-hut on the opposite shore drew the men in the dark on a fallen tree across the stream to the desired camp, where their wants were appeased and their exhausted strength restored. Sergeant Calder acted with coolness and kindness throughout, and maintained the strictest discipline and order. He afterwards recovered the instruments and stores left in the woods, which his men, from weakness and want, had been unable to carry.

In the second season the sergeant returned to the Cobiquid Mountains, the scene of his former exertions. This range was the vertebræ of the country and the hinging point of an important tract in the route of the proposed railway. Some doubts were entertained as to the practicability of accurately ascertaining the gradients of this dangerous and unknown district, and had they not been determined, the scheme must have proved abortive; but sergeant Calder undertook the service, and accomplished it by means of rods and the spirit-level, to the entire satisfaction of his officers, verifying at the same time the correctness of his former investigations in connexion with the survey of the hills. After this, travelling 200 miles to Cape Canso, he surveyed a branch line along a rugged coast and through an intricate wilderness, to within a few miles of Pictou. In conducting this work one of his labourers was seized with fever. Calder took especial care of the man's comforts, which, however, from the necessity of crossing rivers and lakes of great breadth on catamarans, or rafts of logs, were unavoidably much restricted. As he proceeded, the trials of the sergeant and his men multiplied, both from the fatigue of travelling and the want of provisions. Wild berries were eaten to supply the cravings of hunger; but to assuage the more fastidious necessities of the sick man, the berries were taken by him with a little

sugar. What was most distressing at this time was the absence of all shelter from the inclement weather, and both hale and sick were therefore forced to stretch their limbs under the snow-laden boughs of some dwarf trees, exposed to the keenness of the night frost. At last the party arrived at a district known as the "Garden of Paradise"—a rugged and inhospitable region, where the men were benevolently entertained by some wild Highland settlers. Soon afterwards the sergeant journeyed to Halifax, where he completed the plans and sections of his surveys, and returned to England after a service with the exploration expedition of two years and three months.⁵

A large increase to the army and artillery led to a proportionate increase to the royal sappers and miners. This was suggested by Sir John Burgoyne, the inspector-general of fortifications, to maintain a sufficient disposable force for employment in any military services rendered necessary by the exigencies of the times. Eight companies were ordered to be added to the corps, but their formation was spread over three or four years. The first addition gave, on the 1st April, 1846, 1 sergeant, 1 corporal, 1 second-corporal, and 8 privates to each of the 10 service companies; and a company numbered the 12th, of 100 non-commissioned officers and men, was formed at the same time. The corps was thus raised in establishment from 1,290 to 1,500, and on the 1st September it was further increased to 1,600, by the formation of the 15th company. The Corfu company remained at its original establishment of 62 sergeants and rank and file.

⁵ This non-commissioned officer acquired, in his early service, a sound knowledge of surveying in all its branches. For more than eighteen years he had charge of large parties of surveyors and draughtsmen, and his systematic habits and intelligence rendered his assistance of great advantage. Well adapted for carrying out any arrangement connected with the survey, and for conducting the beneficial employment of large parties over extensive districts, he was, in 1846, selected for the exploration duty above referred to; and his report on a portion of the line, which embraced the intricate parts of the Cobiquid Mountains, was considered of sufficient interest to receive a place in the 'Parliamentary Blue Book,' on the subject of that railway. In April, 1853, he was pensioned at 1s. 11d. a-day, and, on quitting the corps, settled in Canada.

On the 22nd July, eighteen rank and file embarked for China, and landed at Hong-Kong on the 26th December. This was the third reinforcement to that command. When relieved in November, 1852, the party had dwindled away to 8 men: 7 had died, 2 deserted, and 1 was invalided. The total deaths in the three parties, whose united strength was 67, amounted to 27 men.

The abandonment of the execution of some extensive works in Bermuda permitted the recall to England of the eighth company, which arrived at Woolwich on the 5th August, 1846. The strength of the company on landing at Bermuda was seventy-nine of all ranks. Of this number eight were invalided, thirty-eight had died, one was drowned, one killed, and one transported for desertion. Only thirty-one men, therefore, regained our shores.

A reading-room was established for the corps at Southampton in the summer, which obtained much attention from distinguished visitors. The Marquis of Anglesey—then Master-General—presented an engraving of himself to the room, and the Queen also patronized it by presenting an engraving of his Royal Highness, Prince Albert.⁶ In placing the gift in the room, Colonel Colby thus recorded the fact in a general order to the companies under his command:—"The valuable services of this distinguished corps, having been brought under Her Most Gracious Majesty's notice by the ordnance surveys of Great Britain and Ireland, the demarcation of the boundary line between the British dominions and those of the United States in America, and more especially by the survey of the royal domains at Windsor and the duchy of Lancaster, Her Majesty has condescended to mark her gracious approval of these services, by ordering the presentation of a portrait of the Prince Albert to be placed in the reading-room."

Twice this year the second and eleventh companies were inspected by General Sir Robert Wilson, the Governor of Gibraltar—on the 16th May and 17th October. On both occasions they presented a very creditable appearance under

⁶ A companion plate to Chalon's portrait of Her Majesty.

arms. "The progress of the new work," observes his Excellency, "attests their skill and indefatigable diligence, and their merits become the reputation of the service to which they belong."

The third company of three sergeants and forty-five rank and file, under Captain Wynne, R.E., received orders at ten o'clock at night on the 21st September, and in seven hours afterwards was on route *via* Liverpool for Dublin, where it arrived on the 24th. Placed at the disposal of the Irish Board of Works to oversee the poor during the continuance of the famine, which, from the failure of the potato crop was now the scourge of Ireland, the company was instantly removed in small parties to Limerick, Castlebar, Roscommon, Newcastle, Boyle and Castlerea, retaining at Dublin as storekeeper and accountant for the Board sergeant John Baston.⁷ From these several stations the men were again dispersed over districts of wild country, where the poor, clamorous for subsistence and life, were in a state of revolt. Numbers of these turbulent but starving people were employed on the construction of public roads, &c.; and the sappers, appointed their overseers, not only laid out their work, but instructed them in its performance. To this general duty several of them united the office of steward and inspecting check clerk; and besides controlling the check clerks, superintended and examined the measurements of tasks, and had a general supervision of all arrangements in the field. More than six months they continued on this duty, and returned to Woolwich on the 8th April 1847 with a high character.

⁷ Had charge of the implement store, at 48, City-quay, which embraced the receipts and issues of thousands of wheelbarrows and hand-carts, and a great assortment of road and draining tools. These sergeant Baston was often employed to purchase, and to obtain them he perambulated both town and country. The duties intrusted to him were performed with promptitude, accuracy, and fidelity. Mr. M'Mahon, the civil engineer, found him an exceedingly useful and zealous assistant. He is now colour-sergeant in the corps; is a well-read and talented man, and his qualifications as an artificer and overseer have rendered him capable of much higher employment. He joined the corps a lad, from the royal military asylum, and his acquirements and usefulness have entirely arisen from his own application. Besides his home services, he has passed with credit about sixteen years at Halifax, Nova Scotia, and Corfu.

The works superintended by them were always distinguished from other works by the superior order and discipline which they enforced, not unfrequently in circumstances of great personal danger, and during a winter of unusual severity. In detecting frauds and correcting abuses they were found particularly valuable; and their uniform zeal, ability and good conduct, met with the perfect satisfaction of the Board of Works and the Lords of the Treasury. Even Daniel O'Connell spoke favourably of their employment.⁸ The working pay of the men while under the relief board ranged between 1s. and 2s. 6d. a-day.

While on this novel service, private George Windsor, from the upright way in which he performed his duty, made himself obnoxious to the peasantry in the lawless district of Croom; and but for the gallantry with which he defended himself, would probably have lost his life.⁹ On the 26th December this private was employed in the barony of Cashma on the Pullough line of road, and on passing down the line in advance of the check clerk and a number of labourers, &c., was met by two persons dressed in women's clothes, with veils hanging from their bonnets covering their faces. One was armed with a gun, the other with a pistol. Presenting their pieces, they ordered him to kneel, but this the private refused, and though he was unarmed, the ruffians at once closed upon him. At this moment Windsor seized the person armed with the pistol, (dexterously thrusting his finger between the trigger and the guard,) and getting hold of his throat with the other hand, they fell together, fortunately in such a way that the desperado with the gun could not, without injuring his accomplice, shoot the sapper. He, therefore, beat Windsor with the butt-end of his piece. Several minutes the struggle was maintained strangely enough in the presence of a large number of stewards and labourers; and had he met with the slightest assistance from any of them, he would have captured both the offenders; but incredulous as it may appear, it must be added to the disgrace of Irishmen that, just

⁸ The 'Times, November 4, 1846.

⁹ 'Limerick Chronicle,' December 30, 1846.

as he had overpowered the ruffian with the pistol, a man named Joseph Lindsay¹⁰—brother to the check clerk—came forward, and dislodging Windsor's grasp, aided the parties to decamp! For his spirited and manly conduct in the attack, private Windsor was promoted to be second-corporal.

Private Edward West received three threatening notices through the post-office warning him not to appear at work again on pain of death, adding that, if he did, he should "drop into a bit of a hole already dug for his carcase." Unmoved by these missives, the private was always the first on the line; and when the labourers were collected, he told them he had received the notices, and then burning them in their presence, observed in a loud voice, "that would be the way his intended murderers would be served at another time." Once he was attacked by a party from behind a hedge with stones. Struck on the head, he was stunned for a few moments, and nearly fell. On recovering, he boldly dashed over the hedge to meet his assailants, but the cowards made a precipitate retreat. Thirty men suspected of being concerned in the assault were at once dismissed from employment.

Six other men were promoted for their coolness, as well as tact and fidelity, in carrying on their appointed services. Of these private James Baker was perhaps the most conspicuous. A brief detail of his services will show the nature of his duties and the difficulties he had to contend with. Detached to Shonkeragh, eight Irish miles from Roscommon, he was placed over a number of labourers who were in the last stage of insubordination. At first they took their own time of going to work and quitting it, although the regulations required them to be present from 7 A.M. till 5 P.M. To train them to punctuality was not an easy matter, but by checking them and carrying out a firm discipline he soon gained his point. That there should be no excuse for absence, he employed a strong boy to blow a tin horn on the top of the highest hill, central among the cabins

¹⁰ Afterwards tried and convicted for the offence at the Limerick Spring Assizes, 1847.—'Saunders's News-Letter,' March 9, 1847.

of the workmen, to call them to work, and at its sound the rapid gathering of the poor at the rendezvous, on all occasions, showed their willingness to be guided by any useful reform.

This command over a half-civilized class of men made his services very desirable in irregular districts; and among several places where he was beneficially employed was Drumshanaugh—a desolate spot where a knot of Molly Maguires held sway, and obtained payment without work, by intimidating the civil overseers, who feared the consequences of not yielding to their exactions. The farmers' sons and others who had plenty of cattle were receiving 4*d.* a day more than the people who really did work, and 300*l.* in this way were paid for bad labour not worth 50*l.* With these labourers he had a trying duty to perform; but, amid threats and insubordination he calmly effected his purpose, and suppressed both the spirit of turbulence and the practice of fraud.

The labourers received from 4*d.* to 8*d.* and 9*d.* a day, and the rough wall builders 1*s.* 6*d.*, in strict proportion to the work executed. When task-work was introduced, it was difficult to remove the prejudices which set in against the change, and quicken into zeal the indolence which followed. To carry out the instructions of the Board of Works, private Baker selected some of the mildest men of his party to work at easy tasks, by which they earned 11*d.* a day—3*d.* more than formerly. At the end of the week the overseer made a point of this, and paying his choice men first, made suitable remarks as they received their money. Next came the day-men, who being checked for wet days and lost time, only averaged about 3*s.* 2*d.* a week. The disparity of the payments had a wonderful effect, and ever afterwards the system of task labour was eagerly preferred by the peasantry.

Deception, however, soon crept into the tasks, which it required some tact and alertness to detect. In excavations, the labourers frequently came in contact with stone, and for such quantities as they dug out and heaped up, they were paid by the cubic yard; but often these heaps were merely

superficial. In every such case private Baker had the mass pulled down and solidly repiled. Acts of repetition were followed by the dismissal of the delinquents, despite the danger it involved. When this cheat failed they resorted to another, by rolling large stones into the heaps from adjacent places; but as these always bore unmistakeable evidence of exposure to rain and wear, the private never omitted to reject them from the pile.

On several occasions when threatening notices of death were posted up prohibiting the civil overseers and check-clerks from returning to a particular line, a car was despatched, even at midnight, to bring private Baker to the excited district. Next morning, appearing at his dangerous post, unarmed, he would pacify or humour the desperadoes into order and tranquillity.

When a pay-clerk was discharged the regular payments were for a time interrupted, and the labourers would clamour for a settlement. In Baker's district there were four lines, three of which were superintended by civilians: the labourers on them were about 700. These threatened daily to go in a body to Boyle, and, should they fail to get their pay, to take the lives of the engineer and his clerks, and burn down the town. Baker represented the state of affairs to the authorities; and on his own recommendation obtained permission from Boyle to give checks for meal upon a tradesman in Carrick-on-Shannon. By this means he fed the people, and kept their irritation in successful check. These periods of disorder occurred two or three times, till pay-clerks were appointed to succeed those who were discharged or had resigned. The pay-clerks seldom paid without the protection of a sapper, who frequently, in instances of dispute, took the bag with its responsibilities and perils, and served out the wages himself. So well did private Baker manage the matter at a wild place in Cashel, that the labourers stood round like soldiers to receive their earnings; and to prevent litigation or seizure, the money was handed to the recipients through an aperture in the pay-hut.

Frauds were very common; and when detected, the offenders

were dismissed. Several civil overseers were, however, afraid to place themselves in opposition to the populace; and a sapper working on one line has in such instances been sent to another to perform the duty. This, of course, produced much ill-feeling against the sappers; but beyond a few threats and an occasional attack, the sappers passed from the country without material hurt.

The survey of Southampton was completed late this year for the Southampton Improvement Board. A detachment of the corps, directed by Captain Yolland, R.E., under the local superintendence of sergeant William Campbell, executed the work. The map, on a scale of 60 inches to a mile, occupies thirty-five large sheets, which have been magnificently bound in bureau folio, and placed in the municipal archives of the town. Sergeant Campbell attended at a meeting of the Commissioners on the 31st March, 1847, and presented the map, on the part of the Ordnance to the Corporation. The work is one of extreme beauty. A more artistical display of ornamental surveying does not exist. The stonework of the pavement, the styles of the public buildings, the masonry of the graving-dock, the undulation of the silt on the shores, and small streams of water running into it from the coast, the gardens of private houses, and the trees and shrubberies of the common, are all delineated with a minuteness of detail and beauty of colouring unexampled in any town map in England. Even the map of Windsor, which obtained the approbation of Her Majesty for its accuracy and exquisite finish, is much inferior to the map of Southampton. The draughtsmen were second-corporals Charles Holland¹¹ and George Vincent, with Patrick Hogan,¹¹ late royal sappers and miners, and Mr. Maclachlan.¹² The Commissioners of the town gave a unanimous vote of thanks to Captain Yolland, the sappers, and the assistants for the survey

¹¹ Each received a case of instruments from Prince Albert for merit in the execution of a drawing of Windsor.

¹² 'Hampshire Telegraph,' January 7—30, 1847; 'Hampshire Advertiser,' April 3, 1847.

and map of the borough, and also expressed "the high sense they entertained of the great ability and unrivalled skill displayed in the execution of the work." A committee was formed to take steps for rewarding Captain Yolland and sergeant Campbell "with an adequate testimonial of the Commissioners' high approbation of the work;" but the intended honour, on military grounds, was declined.¹⁸

¹⁸ 'Hampshire Advertiser,' April 3, 1847.

1847.

Detachments in South Australia—Corporal W. Forrest—Augmentation to the corps—Destruction of the Bogue and other forts—Services of the detachment at Canton—First detachment to New Zealand—Survey of Dover and Winchelsea—Also of Pembroke—Flattering allusion to the corps—Sir John Richardson's expedition to the Arctic regions—Cedar Lake—Private Geddes's encounter with the bear—Winter-quarters at Cumberland House—Road-making in Zetland—Active services at the Cape—Company to Portsmouth

THE detachment in South Australia was, in July, 1845, on the representation of his Excellency Lieutenant-Governor Grey, ordered to be reduced, its employment being considered no longer necessary or advantageous to the province. Scarcely had steps been taken to effect its disbandment, when Governor Grey, removed to another settlement, was succeeded by Colonel Robe, who, taking a different view of the services of the party, submitted the desirableness of its immediate completion to the authorized establishment. In this suggestion Earl Grey concurred, regarding it of the greatest importance that the survey department in the province should not be permitted to fall into arrear in its work; and under authority, dated 22nd October, 1846, a party of seven mechanics, who were also surveyors and draughtsmen, sailed for Port Adelaide in February and landed there the 30th June.¹

¹ One of the party discharged under Governor Grey's order was corporal William Forrest. Governor Robe, in a despatch to Earl Grey, spoke of his entire approbation of the corporal's conduct, both as a soldier and surveyor. Captain Frome, the surveyor-general, attributed the rapid progress of the field surveys, and the general correctness of the work, to his steady zeal and talent. At first he superintended four or five detached survey parties, and laid out and corrected their work; but when a sufficient quantity of land had been divided into sections, corporal Forrest was transferred to the triangula-

The corps was increased by 200 men this year, on account of the formation of a company on the 1st April, and another on the 1st December. These companies were numbered the seventeenth and eighteenth; and the establishment now reached a total of 1,800 officers and soldiers. When the estimates for the year were under consideration in the House of Commons, Colonel Anson, the surveyor-general of the Ordnance, in claiming an increased amount to cover the augmentation, passed a high eulogium on the corps. After speaking in flattering terms of the royal engineers, the Colonel added, "He might say as much for the sappers and miners. This body was composed of most intelligent men, who applied themselves most assiduously to the discharge of their duties, and were equal to any services which they might be called upon to perform."²

Thirty-five non-commissioned officers and men accompanied the expedition from Hong Kong to Canton, under Captain Durnford and Lieutenant Da Costa, R.E., and were present at the capture of the Bogue and other forts in the Canton river on the 2nd and 3rd April. The forts taken were fourteen in number, and 865 heavy guns were rendered useless by spiking, while a number of barbaric weapons were captured.³

The sappers were in advance, and opened the gates of the forts for the assaults, and afterwards destroyed the magazines and assisted to spike the guns. Privates James Cummins and James Smith placed the powder-bags on the gates.⁴ Corporal Hugh Smith⁵ laid the trains to two forts, and was favourably

tion of the known portions of the colony, and connected all the detached surveys with the trigonometrical stations. This service he conducted in a most satisfactory and creditable manner. Returning to England, he was discharged in April, 1848, and is now living, in ease and comfort, at Edinburgh on his pension and his savings.

² Debates in the 'Times,' March 6, 1847.

³ About twenty of these curious arms, all of the spear form, but grotesquely varied, are in the non-commissioned officers' library and museum at Woolwich.

⁴ Both died in China; the former on the 15th August, and the latter 15th September, 1847.

⁵ Discharged 8th October, 1850. He was then a sergeant. See *ante*, Syria, 1841.

mentioned by Major Aldrich, R.E., to Sir John Davis, the Governor, and Major-General D'Aguilar. Sergeants Joseph Blaik⁶ and Benjamin Darley⁷ conspicuously distinguished themselves: the former blew in the gate of Zigzag Fort, and the latter blew up the magazine at Napier's Fort.

At Canton the sappers were employed in barricading streets, making scaling-ladders, &c., and pulling down houses, walls, and other obstructions required to be removed. "My own observations," wrote Colonel Phillpotts, the commanding royal engineer in China, "of the cheerful and ready manner in which they at all times performed their various and arduous duties by day, and often by night, demands my most marked approbation." The gallant conduct of sergeant Blaik attracted the notice of Major-General D'Aguilar, for which he was promoted to the rank of colour-sergeant. The whole detachment remained at Canton until the 8th April; but on the troops quitting for Hong Kong four of the sappers were left behind, and assisted Lieutenant Da Costa, R.E., in making a survey of the European factories at that commercial emporium, until the 14th May, 1847, when they rejoined the detachment at Victoria.

On the 10th April one sergeant and twelve rank and file embarked at Deptford, on board the 'Ramilies,' and landed at Auckland, New Zealand, on the 9th August. This was the first party of the corps detached to that remote settlement.

From April to June one sergeant and twelve rank and file from Chatham, under Captain McKerlie, R.E., assisted in the survey and contouring of Dover, within a range of a thousand yards from the fortifications. Early in the previous year five non-commissioned officers and men were employed in a military survey of portions of Winchelsea.

Pembroke was also surveyed by a party of one sergeant and eight men from the survey companies, between April and December, under Captain Chaytor, R.E. This survey included the docks, dockyard, and property in its immediate

⁶ Died at Hong-Kong, 15th August, 1848.

⁷ Now colour-sergeant in the corps stationed at New Zealand.

vicinity, to enable measures to be taken for raising essential defensive works to protect the place. The survey was well executed; and private John Wall,⁸ who remained at the duty until March 1848, executed with neatness and accuracy, the required plans.

About this period the survey operations of the corps, both in the triangulation and the detail duty, were very conspicuous, and drew from the greatest of the daily London journals, in a leader, a high commendation for its services and trials. The language of the article is too forcible and brilliant to justify abridgment, and the complimentary passage is therefore given entire.—“An Englishman has a constitutional repugnance to the intrusion of soldiers into civil duties; he would rather pay them to walk about than to work, and he chooses to make a separate and private hiring of his own police. Ordinarily, soldiers are unwelcome visitors to him, seldom appearing but at the back of some scared sheriff or meddling mayor, to correct his refractory disposition. But there is a corps which is often about him, unseen and unsuspected, and which is labouring as hard for him in peace as others do in war. If he lives near a cathedral city, he may perhaps have occasionally observed a small wooden cradle perched on the very summit of the spire or tower, and he may have pitied, perhaps, the adventurous mason who had undertaken the job. That cradle contained three sappers and miners, stationed there for five or six weeks to make surveys, and who only quitted their abode for another equally isolated and airy. Within these last five years, a handful of these men, with an engineer officer, have been frozen upon the peak of a Welsh mountain, on an allowance of provisions fit for the sixth month of a siege, and with no more possibility of communicating with the scanty natives of the place, than if they had been shipwrecked on the Sandwich Islands.”⁹

A party of fifteen men, selected from a number of volunteers

⁸ Discharged October, 1848, and is now employed with advantage as a draughtsman on the Ordnance Survey.

⁹ The ‘Times,’ 8th March, 1847.

by Sir John Richardson, joined the expedition under his orders to the Arctic seas in June. The object of the mission was to search for Sir John Franklin and his crews, by tracing the coast between the Mackenzie and Coppermine rivers, and the shores also of Victoria and Wollaston lands, lying opposite to Cape Krusenstern. All the men were intelligent artisans, accustomed to boat service and laborious employment. They were, moreover, strongly built, of good physical powers, and, with one exception, bore excellent characters. The defaulter was addicted to drinking, but in other respects he was a good and active workman. Knowing that there would be no means of obtaining intoxicating drinks in Rupert's Land, Sir John Richardson accepted his services, and he turned out an invaluable man. Seven of the party were carpenters, joiners, and sawyers, one was a miner, one a painter, and six were blacksmiths, armourers, and engineers, who were found useful in repairing the boats, working up iron, constructing the buildings for the winter residence of the expedition, and making the furniture.¹⁰ Each man was provided with a flannel jacket and trousers, a stout blue Guernsey frock, a waterproof overcoat and cap, and a pair of leggings. They also wore mocassins and leather coats when the nature of the season and their employment rendered it necessary.

On the 4th June the men were discharged from the corps, and sailed on the 15th from the Thames, in the 'Prince of Wales,' and the 'Westminster.' Delayed much by ice in Hudson's Straits, they had a long passage, and it was not until about the middle of September that the stores for the journey were wholly landed.¹¹ As soon as this service was effected, the expedition, with a number of hired men, quitted Norway House in five boats, which, from being often stranded and broken in the shallow waters, caused frequent detention for repairs. Overtaken by winter in Cedar Lake, Mr. Bell, who had charge of the expedition until Sir John Richardson arrived, made this a depôt, where he stored the boats and goods in a

¹⁰ Sir John Richardson's 'Journal of a Boat Voyage through Rupert's Land and the Arctic,' edit. 1851, p. 43.

¹¹ *Ibid.*, p. 45.

suitable house constructed by the sappers. Several of the party were left here to take care of the *matériel*, and also the women and children, who were unequal to a long journey over the snow.

In October the bulk of the expedition started for Cumberland House, and reached it on the eighth day after leaving Cedar Lake. On the first day's journey private Hugh Geddes and a half-caste Indian were attacked by a bear on Muddy Lake. The latter fired three times at the beast without bringing him down. Neither of them now had any ammunition; but Geddes, who was incapable of much exertion from an axe wound in the foot, anticipating the peril, forgot his pains and felled two young birch trees, one of which he handed to his companion: with these formidable defensors both made a desperate onslaught on the raging bear, but it was not until after much labour and hazard that they succeeded in slaying it. In due time they sleighed his huge carcass to the rendezvous at Cedar Lake.

At Cumberland House one of the divisions passed the winter, and was kept in constant employment by attending to several seasonable occupations, such as cutting firewood, driving sledges with meat or fish, and fulfilling a round of services no less laborious than necessary. They also established a fishery on the Beaver Lake, two days' march north of the *dépôt*.¹²

From July to December three rank and file were employed under Captain T. Webb, R.E., in surveying and laying out roads in Zetland, in connection with the Central Board for the relief of Destitution in the Islands of Scotland. This service was ordered by the Home Government, and the party returned to Woolwich when the winter had fairly set in. Second-corporal Harnett was well reported of for his intelligence and capabilities, and the two privates for their industry and exertions.

At the Cape of Good Hope the two companies were distributed to fifteen posts and forts on the frontier. On the 2nd May the sapper force there was increased to 198 of all ranks

¹² Sir John Richardson's 'Journal of a Boat Voyage through Rupert's Land and the Arctic,' edit. 1851, p. 45.

by the arrival of thirty-five men, under Lieutenant Jesse, R.E. Between the 14th September and 23rd December one sergeant and sixteen rank and file were in the field, under Captain Walpole, R.E. They had with them an assortment of carpenters' and smiths' tools, engineer stores, and a quantity of intrenching tools, besides a large five-oared cutter, and the materials and gear to form a raft of casks. From the 1st to 6th December, eleven of these men were actively employed in transporting men and provisions to a large portion of the division on the left bank of the Kei, under Lieutenant Jervis, R.E., at a time when the rise of the river prevented any intercourse by waggons. During the six days, the party exerted themselves in a most praiseworthy manner, and sergeant Alexander McLeod was particularly active and zealous. Between the 21st November and 1st December, three sappers, with a party of the line, under Lieutenant Stokes, R.E., opened a road for waggons in the Amatola mountains, and constructed a temporary bridge across the Keiskama. Before the execution of this service provisions were conveyed to the camp in the mountains on mules, and hence the transit was slow and uncertain.

On the representation of Colonel Lewis, R.E., a company of full strength was removed from Chatham to Portsmouth, on the 22nd December. Its employment was confined to the erection and repair of such works as could not be undertaken by contract, such as strengthening the fortifications, repairing gates, laying platforms, curbs, &c. It was also considered indispensable to retain a company in that command, to execute, in the event of a war suddenly breaking out, the numerous wants likely to occur in such an emergency.

1848.

Staff appointments—Survey of London—Colour-sergeant Smith—Sergeant Bay—Trigonometrical operations—Opposition to the military survey—Observatory above St. Paul's; the scaffolding—Privates Pemble and Porteous—Sergeant Steel—Industry and conduct of the Sappers in the Metropolitan survey—Preliminary arrangements of the Arctic expedition—Privates Waddell and Sulter—Corporal Mackie—Expedition starts; corporal McLaren—Coasting journeys and services—Overland march—Winter at Fort Confidence—Party detached to Great Bear Lake—Close of the search for Sir John Franklin and his crews.

SERGEANT-MAJOR JENKIN JONES was commissioned to be quartermaster to the corps on the 11th January, 1848, *vice* Hilton retired. These pages amply testify to the merits of Mr. Jones. A more indefatigable non-commissioned officer never served his country, nor one more worthy of the honours conferred upon him. Colour-sergeant Michael Bradford, a good soldier and foreman, succeeded him as sergeant-major at Woolwich.

With a view to establish a system for the sanitary improvement of the drainage of London, a survey of the metropolis, under the auspices of the Commissioners of Sewers, was commenced in January, 1848, and continued with a fluctuating detachment—once as many as forty-three strong, and as few as two men only—until January, 1850. Captain Yolland, R.E., had the direction of the work, and colour-sergeant Joseph Smith¹ was first appointed to the executive charge, but he

¹ For some twenty years he was in charge of office and field parties on the detail survey and plan drawing. He had the local superintendence and direction, under Captain Williams, R.E., of the survey of the property belonging to the duchy of Lancaster at Langeinor, in South Wales, and of the royal domain of Windsor Castle, under Major Tucker, R.E. His qualifications, as

being soon afterwards discharged, it then fell upon sergeant Andrew Bay.² With this survey was connected the determination of the relative levels of all parts of London.

The great triangulation was the first point attended to. That wonderful specimen of skill, the scaffolding on and around the ball and cross of St. Paul's, put up in the spring, was the main station for observations. The summits of Primrose and other hills, the towers, steeples, and roofs of churches, the parapets or terraces of public buildings or houses, were made available as sites for signal-staffs, visible from each other

displayed in the direction of these surveys, led to his selection for the charge of the London survey, but his connection with it on the part of the Ordnance, was early broken, by his receiving, in July, 1848, the appointment of surveyor to the Metropolitan Commissioners of Sewers, at 200*l.* a-year, which salary has since been considerably increased. On leaving the corps he received a silver medal and gratuity for his long services and exemplary conduct. Ever since his discharge he has had the superintendence of a large staff of draughtsmen and men surveying underground in the sewers. In February, 1851, seven hundred miles of sewers had been thoroughly examined, and the levels of the different parts minutely ascertained. "The result of this," observed Sir Henry de la Beche, "is, that they had documents connected with the condition of these seven hundred miles of sewerage, such as were not possessed by any metropolis in Europe. It was but justice," adds Sir Henry, "in referring to the work as examined, to call attention to the officer who had charge of it—Mr. Joseph Smith, who had executed his task with an ability, a zeal, and perseverance, deserving the highest eulogiums both of that court and the inhabitants of the whole metropolis."—*The Times*, 1st February, 1851. Mr. Smith afterwards became conspicuous for his report condemning the construction of the Victoria Sewer, which was nullified by an entirely antagonistic report from Mr. Foster, the engineer, and gave rise to some little discussion in the House of Commons between Sir Benjamin Hall and Lord Ebrington.

² Remarkable for his great endurance of fatigue and exertion, and as being one of the best and quickest surveyors in the Ordnance. In his early career in Ireland he walked twenty-two miles to work, surveyed twelve miles of lines, and returned the same evening—twenty-two miles—to his quarters! This was considered at the time to be fair progress for six days; indeed, it was facetiously said of him that he carried on his work by *moonlight*. He was also clever as an observer with the two-feet theodolite, and the accuracy of his arcs was so rigidly faithful, that an officer visited him specially to watch his work, and test the value of his services. More than twenty-one years he took part in the national surveys, and had the local superintendence for many years of large parties dispersed over extensive districts. He also assisted with much credit in the survey of the disputed territory in North America; and, receiving for his good conduct and long services a gratuity and silver medal, was discharged from the corps in January, 1851. Soon afterwards he emigrated to Canada.

and from St. Paul's. By these observations the relative angular portions of the several points were obtained, from which, as the basis of the work, a detailed survey was made, embracing not only the principal streets and squares, but the minutiae of alleys and single buildings. Of every street the slope or ascent was ascertained, and also the exact height of every spot above the assumed datum or base-line.³ The bench marks to show the permanent points of the survey and levels were cut in stone, or on the most prominent objects, by the sappers, who, though not brought up to that work, became very expert in the use of the mallet and chisel. At least twelve parties with twelve-inch instruments were scattered to the most conspicuous places in the metropolis and its vicinage, to complete the observations; and sergeant James Donelan, with the great three-foot instrument, visited some of the old stations celebrated by the labours of General Roy and other officers, to check the smaller triangles formed by the operation of the twelve-inch instruments. Some of those stations were at Hanger's Hill near Twyford, Banstead Downs, Severndroog Castle on Shooter's Hill, &c. The survey, including the city, extended to a distance of eight miles in every direction from St. Paul's.⁴

London was unaccustomed to see soldiers employed in so important a work as the metropolitan survey, and much excitement was caused by their unobtrusive and peaceful operations. The jealousy of a class of surveyors was at once called into angry activity, and under the name of the "Associated Civil Surveyors," they formed themselves into a body, and opposed by meeting, petition, and remonstrance, the continuance of the sappers on the duty.⁵ The Metropolitan Commissioners did the Association the honour calmly to investigate their grievance; but from the lucid and truthful statements of Mr. Edwin Chadwick and others, the continuance of the sappers on the duty was confirmed and justified, not only on the score of com-

³ 'Companion to Almanack,' 1849, p. 37.

⁴ Ibid.

⁵ 'The Observer,' April 9, and June 24, 1848; 'Civil Engineer and Architectural Journal,' and some of the London press.

petency, but of policy, from the disciplined experience of the men, and the perfection of the Ordnance system of responsibility and resource.⁶

The particular objects which elicited from the public the most attention were the observatories on the summit of the north-west tower of Westminster Abbey, and above the cross of St. Paul's. The latter, from the dexterity with which the construction of the cradle at that dizzy height was pursued, supported only by the architectural ornaments of the structure, excited much curiosity and wonder. The scaffolding was of rough poles; the stage, ten feet square, formed of planks, which supported the observatory, rested on the golden gallery on the top of the great cone. The four lower posts, twenty-nine feet long, stood upon short planks bedded on the stone footway; and the top supported the angles of four horizontal planks, each twenty-three feet long, bolted together at the angles. From these planks a screen of boards was erected to prevent materials, &c., from falling. The base of the four upper posts, fifty-three feet long, rested on the angles of the above planks; and the scaffold, in addition to these posts, consisted of four sets of horizontal and four sets of transverse braces on each of the four sides, the whole being fastened together with spikes and ropes. Fifty-six of the uprights were double poles, placed base and point, and bound together with hoop iron and wedges, and with bolts and hoop iron at the splices. The height from base to floor was eighty-two feet, and to the extreme top of the observatory ninety-two feet. A railing, roughly but securely put up, surrounded the "crow's-nest." The ascent was by the inside of the tower or lantern to the circular opening, then to the outside of the foot ladders set at the north-east corner, parallel to the north-east principal post inside the scaffold. The whole of the

⁶ The 'Times,' June 10, 1848. "The example of the employment of this corps," said Mr. Chadwick, "on beneficial public works, qualifying them for civil employment, was worthy of public note, for in their case, the discharge from the military service was not, as he had in Poor Law administration too frequent occasion to observe, the creation of paupers, or mendicants, or worse. There was no class of persons who so soon got into productive civil service."—Ibid.

materials were drawn up from the floor by a permanent windlass erected in the tower, to the golden gallery, and thence passed to the outside, horizontally, through an aperture thirty-two inches wide, and finally were drawn up and put into position by purchase erected for the purpose. The whole construction weighed about five tons, and though designed by sergeant James Steel, was erected by sergeant James Beaton, the most successful builder of these aerial fabrics, assisted by privates Richard Pemble and John Porteous,⁷ and some civil labourers, under the direction of Captain Yolland.⁸ The time occupied in going up the ladder was about seven minutes, but the descent required only four or five.⁹ On the 2nd November the last piece of the scaffolding was removed and carted away. In the hazardous and intricate operation of building and dismantling it, not the slightest accident¹⁰ to human life or limb—not even the breaking of a single pane of glass—occurred.

The observations were taken by sergeant James Steel with an eighteen-inch theodolite, both at Westminster Abbey and St. Paul's. When not prevented by haze, the sergeant attended

⁷ The privates here named have died under rather singular circumstances: Porteous *suddenly*, in September, 1853, when encamped on Brandon-hill; Pemble in June, 1854, at Elvanfoot, in Lanarkshire, from exhaustion and exposure to stormy weather. The latter had been sent from the camp to build a pile for trigonometrical purposes, and next evening, after a fatiguing day's work, he was returning to the station, when he lay down to rest himself by the side of a mountain stream, and perished. Both these soldiers, skilful and courageous, were the chief practical workmen in the formation of the structures for the observatories. At lofty heights, where the senses of most men would paralyze, borne up on shaking props or slender supports, they calmly carried on their dangerous operations with spirit, activity, and ingenuity.

⁸ 'Illustrated London News,' June 24, 1848; 'Historical Times,' January 19, 1849. In both of which are spirited cuts of the scaffolding, &c.

⁹ The 'Times,' November 4, 1848.

¹⁰ *Ibid.* Here, however, it should be noted, that a pole about four feet long, on being let down into the boarded screen below, struck on a moulding and went down whirling. In its descent it struck the great dome, where it received a shell-like range, and dashed off, at a sharp angle, to the North Transept, where it made a hole through the lead of the roof, similar to what a ball of the same diameter would have done if let fall from the same height. In taking down the scaffolding, an eight-foot plank fell on its flat side from the lantern to the pavement in the area of the Cathedral, and the report was like the booming of a piece of ordnance from the deck of a ship of war.

to his duty, frequently when the breeze shook his small location to a perilous degree, with a coolness, perseverance, and accuracy that were highly praiseworthy. Sometimes he and his assistant sapper—private John Wotherspoon—ascended to the observatory at St. Paul's as often as three times a-day, and this carried through a period of four months—between the 17th June and 16th October—with unflinching resolution and assiduity, made the sergeant and the sappers objects of much interest and of curious and anxious inquiry. The observations taken from this height comprised between 8,000 and 10,000. In many instances the same subject was gone over as many as six times, none less than three or four, and the utmost distance obtained was twenty-six miles.

To carry on the survey during the day in crowded streets, with an unbroken stream of vehicles in double transit, was an extremely difficult and irksome operation; but to be free as much as possible from this interruption, the sappers went to work every morning as soon as day broke, and pushed the survey while the metropolis was still at rest. The survey was completed in January, 1850, and the mapping finished at Southampton. For the merit and talent with which the work was conducted, the periodical press frequently expressed its admiration; and Sir Henry de la Beche and Mr. Edwin Chadwick—two of the Commissioners of the highest authority—praised the survey as being one of extreme success.¹¹ At another time the former gentleman observed at a special court of the Commissioners, that “the Ordnance undertook the work of the surface. A triangulation of no common order, but such as they might have expected from that distinguished service, was undertaken and executed; and upon that triangulation was founded a block plan of extreme efficiency and completeness; and it was also no common map, for it always had reference to that great triangulation to which he had already referred.”¹²

The arctic expedition, which halted in October, 1847, for

¹¹ ‘Builder,’ 7th April, 1849.

¹² The ‘Times,’ February 1, 1851.

the winter, detached in the spring of 1848 a party of sappers to Cedar Lake to repair the boats, first cutting the wood for the purpose. When this preliminary service was accomplished, six of the party were selected to drag three planks each to Cedar Lake. Each man took with him ten days' provisions; but from the weary labour and fatigue of carrying such heavy burdens, and the snow-blindness that affected the men, the journey was not completed under sixteen days. The party consequently suffered great privation. After the boats were made thoroughly seaworthy, the sappers brought them and the stores up to Cumberland House on the first opening of the Saskatchewan.

Privates James Waddell and John Sulter afterwards started from Cumberland House without a guide, considering the half-disclosed tracts of a previous party to be sufficient for their purpose. They were going to Cedar Lake. At Point Partridge, however, the snow having fallen heavily, the track was missed and they lost their way. For several days they continued to travel, and were wholly without food for more than seventy-two hours. Hunger pressed them to resort to expedients to mitigate their cravings. In this extremity Waddell, who had a spare pair of mocassins and a morsel of buffalo grease, consigned both to the canteen. When boiled, the old boots were speedily devoured, and the soup, equally divided among the famished adventurers, formed a novel but refreshing repast. Onwards the party went, winding through the woods and trending through the deep snow, when after a journey of about four miles they gained an Indian encampment, where the natives provided them with musk-rats to eat, and one of their number guided them to the lake.

It is right also to record another little adventure in which lance-corporal Robert Mackie was the actor. He strayed in the winter on Cedar Lake. Overpowered by exertion and weariness he laid down on his planks and fell asleep. When he awoke two of his toes were frozen. Nothing dismayed by this untoward affliction, he started off to seek a retreat from his difficulties. A native sent to search for him, found the

wanderer composedly steering for the moon, which being near the horizon and gleaming red through the forest, was mistaken by him for the fire of the men's bivouac. The snow which covered the ground at the time fortunately enabled the Indian who went in pursuit of him to trace his steps before he had gone many miles.¹³

Reinforced by the party from Cedar Lake, the expedition started in May, 1848, from Cumberland House, with boats fully laden, leaving two sappers behind who were incompetent for the labours of the voyage. One had received an injury in the hand by which he lost a joint of one of his fingers, and the other suffered from pains of the bones. Both were sent to England by the first conveyance after their arrival at York Factory; and the expedition thus lost the services of second-corporal James McLaren, a man of enlarged intelligence and experience, and active zeal.

Very prosperously the expedition now moved on, crossing rivers, lakes, and streams, pulling the boats over difficult and rugged portages, and bearing heavy burdens. For three days they were delayed by ice in Beaver Lake, and then pressing on anew, tracked the course to Methy Lake, where on the 27th June Sir John Richardson reached his men. They had encamped at the landing-place the previous day, and were advanced one stage of different lengths according to the physical capabilities of the respective individuals. On visiting the men, Sir John found two or three sappers lame from the fatigue of crossing the numerous carrying places on Churchill River, and unfit for any labour on the long Methy portage.¹⁴

The baggage, which it was indispensable to carry with the expedition, was equally distributed, which gave to each man a burden of 450 lbs., exclusive of his clothing and bedding. This was an enormous load, and was borne day after day under constantly varying circumstances of trial and fatigue. The boats with their masts, sails, anchors, &c., were also carried by the whole party at every portage.

On the 3rd July the baggage and the boats were brought to

¹³ Sir John Richardson, ii., p. 141.

¹⁴ *Ibid.*, i., p. 110.

the banks of the Little Lake; and on the 6th, everything having been taken over to Clear-water River, the expedition descended from the Cockscomb, where they had been encamped for two days, and in nine days completed the laborious passage of the Methy portage. The transport of the boats was made on the men's shoulders, and occupied two days and a half.¹⁵

On the 7th two of the boats were broken in crossing the portage of the woods, but, being repaired with some dexterity by the sappers, they were ready for proceeding the following morning. Athabasca Lake was entered on the 11th July, but two of the boats taking a more easterly branch of the river in the night, delayed the arrival at Fort Chipewyan. In these missing boats were the chief artificers of the sappers, and the accident prevented the boats being completely repaired and furnished with false keels. All leaks, however, were stopped, and some damaged planks replaced, which enabled the party to start again on the 12th July.¹⁶

Many days were now spent in effecting the clearance of numerous portages over broken and rocky prominences, and through narrow channels blocked up by immense rafts of drift timber, the accumulation of years, which could not be set free without very great and long-continued exertion.¹⁷ A boat was upset in one of the portages by lowering it down a narrow channel, when several articles of marine importance were lost or damaged, among which were the indispensable oars, which, however, were soon replaced by the assiduity of the sappers. Fort Resolution was gained on the 17th July, from which, by rapid marches and toilsome industry, they made, on the 24th, the first range of the Rocky Mountains. Hurried stages, through intricate courses and over rocky chasms, brought them on the 2nd August to Point Encounter, where they encamped for the night, and on the 3rd they reached the estuary of the Mackenzie River, where a horde of Esquimaux visited the boats. The interview on the part of the natives was characterised by a spirit of intrigue and hostility, but terminated without serious

¹⁵ Sir John Richardson, i., p. 115.

¹⁶ *Ibid.*, p. 131.

¹⁷ *Ibid.*, p. 141.

consequences ; and, striking out from the shore, the boats pushed on to Copland Hutchison Inlet, Cape Bathurst, Point Deas Thomson, and Cape Young, where the expedition went ashore to repair the boats, which had been rendered unseaworthy by the ice tearing the planks into leaks. The damage was repaired by the sappers in the evening.

Near Point Cockburn, on the 22nd August, a storm overtook the party. The sky was dark and lowering, heavy showers fell, and a waterspout was seen on shore. The passage among the ice-floes was very intricate, and the perpendicular walls of the masses were too high to allow of landing or seeing over them. To meet this elemental strife the canvas was reduced to the goosewing of the mainsail, under which the boats scudded for an hour, and entered among large masses of ice about two miles from Point Cockburn, where the wayfarers found shelter under some pieces that had grounded. To encamp was impracticable, for the shore was flat, and they passed a bitter night in the boats. The ice-cold sea-water chilled the men as they waded to and fro ; and, as the wind was too strong to admit of the employment of any expedient to shelter them, no protection could be afforded against the biting bleakness of the storm.¹⁸

On the 26th August the expedition was at Lambert Island. A frosty night covered the sea with young ice, and cemented all the floes, so that the tide was no longer of service. Assisted by the seamen, the sappers launched the boats and carried the cargo ashore, devoting the greater part of the day to the operation of cutting through tongues of ice, dragging the boats over the floes, moving large stones that intersected the route, and resorting to every conceivable expedient to make progress. Two more portages were also crossed ; and in that day of severe toil and unremitting zeal a journey of five miles only was accomplished. Heavy snow-storms now succeeded, the cold became intense, and the surface of the pools of sea-water was converted into a consistency like paste, which demanded great physical exertion in pushing on the boats. On the 28th, three

¹ Sir John Richardson, i., p. 289.

hours were spent in moving forward about one hundred yards, owing to the intense coldness paralysing the physical energies of the men.¹⁹

With little incentive to spirit and none to amusement, save what the incidents of arctic travel were calculated to produce, the men relaxed no effort, and avoided no danger, in their endeavour to achieve the great purpose of their enterprise. Against obstacles both by land and sea, from wind and storm, they bore an undismayed front, and, driving on day by day, they gained Basil Hall Bay, and encamped about eight miles from Cape Kendall. In dragging the boats over the floes in these parts they were greatly shattered, the planks being torn and broken, although they had been strengthened by the sappers to the water-line with sheets of tin beat out from the pemican cases.²⁰

Here terminated the coasting voyage, some distance from the Coppermine River, on account of the ice having, from the severity of the weather, become too thick and firm to admit the continuance of the ascent, without jeopardising the safety of the expedition, in the few frail boats employed in their along-shore adventures. An overland journey in quest of Sir John Franklin and his missing crews was therefore decided upon, and arrangements for the march were at once entered into. Thirteen days' provisions were packed up for the party, with cooking utensils, bedding, snow-shoes, fowling-pieces, a portable boat, &c. The burdens were apportioned by lot, each load being calculated to weigh about 70 lbs.²¹ The boats, tents, stores, &c., that could not be taken on were abandoned on the coast; and on the 3rd September, after breakfast, prayers being read to propitiate guidance and protection from a gracious Providence, the march commenced. With few exceptions, the men walked badly, and lightened their loads by leaving their carbines behind. About seven miles from Cape Kendall a halt was made, and the men slept at night in the cold air, among some towering blocks of basalt 200 feet high.

¹⁹ Sir John Richardson, i., p. 294.

²⁰ *Ibid.*, p. 299.

²¹ *Ibid.*, p. 300.

Private Donald Fraser this day sprained his knee, and on the next he was so unfit for his task that his burden was eased by throwing away his large hatchet, and distributing, for carriage, a portion of his pemican among the other travellers. Several of the men straggled and made but slow progress. Rae's and Richardson's Rivers being crossed—the latter by a portable boat fastened to a hawser—the expedition reached, on the 5th September, the Coppermine River and bivouacked about three miles above the Bloody Fall.²³

On the 6th the weather was clear, with a hard frost, but the sun, which had been a stranger for more than a fortnight, now shone brilliantly. Generally, the party walked briskly, but two of the sappers and three of the seamen were so lame it was necessary to make long and frequent halts to allow them to close up; so much so, that they were unable to accomplish two geographical miles in the hour. To spare their strength a camp was formed which greatly refreshed them; and next day they resumed the march in the face of a snowstorm, heightened by a piercing northerly wind.²³ Two rapid torrents, full of boulders, were forded in the course of the day's journey, and the discomforts of the march were greatly augmented by the men's clothes, which had been saturated in crossing the streams, freezing on their backs. In the vicinity of the narrow lakes the expedition encamped, and here, as in other places, they arranged a bivouac by placing small branches between the frozen ground and their blankets. The following day found them resting near the Copper Mountains, crossing which, they walked onwards in snow-shoes, not without much difficulty and fatigue; and those of the travellers who lagged were assisted on their way by easing them of everything but their blankets, spare clothing, and a few pounds of pemican.²⁴

The Kendall River was crossed on the 11th by a raft made on the spot of dry timber by the sappers. It supported in its transit three at a time. A fresh disposition of the burdens was made here, and the carriage of some books and dried plants

²³ Sir John Richardson, i., pp. 309—318.

²³ *Ibid.*, p. 321.

²⁴ *Ibid.*, p. 326.

relinquished. The raft was also broken up to recover the cordage by which the timbers were lashed together. This done the course of the party was shaped across the country for Dease's River. They started in a fog, which became denser as they proceeded, so that at length an object three yards in advance could not be seen. The compass was necessarily used to steer by; all wended onwards in Indian file, and though the pace was brisk none fell back. The lakes which barred their way had a dreary aspect, for they were not seen until the travellers came to the brink of the rocks which bounded them, when the contrast of the dark surface of the water with the unbroken snow of their borders, combined with the loss of all definite outline in the fog, caused them to resemble hideous pits sinking to an unknown depth. The intersection of their track by these lakes was very hazardous, and it was a wonder none of the straggling explorers fell into the abysses and met their fate. At night they spread their blankets on a rock, and without a supper, or the cheering gleams of a fire to give solace to their spirits, sought to snatch some repose. Snow fell on their exposed bodies as they lay. Many groaned bitterly with pain, and but few could sleep. Next morning, however, all were early afoot, and before the day fairly opened, they had marched three hours, and forded up to their waists a tributary of the Kendall, by which they were all more or less benumbed.²⁵

In a country like the arctic region much is uncertain, and extremes may be experienced with almost incredible rapidity. Here a supperless night was succeeded by one which gave a sumptuous meal of venison, and a sound night's rest in a snug encampment. With light loads, full stomachs, and a long halt in prospect, the spirits of the party received a barometrical rise that indicated alike their satisfaction and cheerfulness. Hill after hill they mounted; and traversed, with unusual alacrity and ardour, stretches of undulated country. Now they were wading through a swamp, now treading a rough hummocky tract of land, now scaling a difficult height, and then forcing across an expanse of deep snow. The journey was trying and

²⁵ Sir John Richardson, i., p. 331.

harassing, and each night, the party, jaded, lame and footsore, sought repose in open bivouac ; but on the morning of the 15th of September, after fording the Dease, the travellers arrived at Fort Confidence—the haven appointed to recruit their wasted energies, and to shelter them from the storms and tempests of the coming winter. The overland journey had occupied thirteen days.

Three days subsequently, Sir John Richardson, finding he could dispense with the services of eighteen persons, sent them on to the fishery location of Big Island on Great Slave Lake. Ten of the detached party were sappers, leaving only three of the corps with the chief, viz : lance-corporals James Mitchell and Robert Mackie, and private David Brodie. The two latter fitted up the establishment with tables and chairs, and such other social commodities as were considered to be requisite to give the fort a character of domestication, and to afford facilities of comfort to the adventurers. The fort was about three miles from the mouth of the Dease River and near to Fishery Island.

As far as the European contingent was concerned, the expedition was brought to a close ; and the search, prosecuted under very trying circumstances, and amid perils, hardships, and want, failed to discover any clue to the whereabouts of Sir John Franklin and his crews. The shores of Wollaston and Victoria could not be examined as had originally been intended, as Sir John Richardson had no means of carrying out the project, his craft having, unavoidably, been abandoned in September, 1848. With the only boat, however, taken up to Fort Confidence, Mr. Rae, with a party of natives, essayed unsuccessfully to pass to Wollaston land.

1848.

Augmentation to corps—Company removed from Portsmouth to Ireland—Chartist demonstration and services of the sappers in London—Road-making in Zetland—Company to the Mauritius—Major Sandham—Sergeant Anderson—Sergeant Ross—Sir Harry Smith's frontier tour at the Cape—Passage of the Mooi; corporal Pringle—Passage of the Konap; sergeant McLeod; also of the Orange River—Boem Plaatz—Spirited conduct of a party in removing an ammunition tumbril, which had upset in some burning grass—Peace—Inspection at Gibraltar by Sir Robert Wilson—Also at Hong-Kong by Major-General Staveley—Company at Corfu—Return of party to England from the Falkland Ial an —Sergeant Hearnden.

THE nineteenth company was formed on the 1st of April and appropriated for the duties of the survey. On the 1st of September, another company, numbered the 20th, was organized, which increased the establishment from 1,800 to 2,000 of all ranks. The detachment of one sergeant, one corporal and twelve privates, formed by royal warrant in July, 1839, for service in South Australia, merged into the establishment in December, by an order dated 15th of that month, and thus reduced the corps from 2,000 to 1,985 of all ranks. This measure was effected to simplify details and to make the detachment form part of a company, without removing it from the province. Its expense still continued to be borne by the colonial government.

The company at Portsmouth, ninety-eight strong, under Captain Robertson, R.E., was sent by rapid conveyances to Dublin, and arrived there on the 2nd of April, to assist in quelling the rebellion in Ireland. Late in July, Lieutenant Akers, R.E., with one sergeant and fifteen rank and file, accompanied the troops under the command of Major-General

Macdonald to Thurles, and encamped about a mile from the town, and returned to Dublin in September, without any necessity for their services arising. The meditated revolt was crushed, and Smith O'Brien with some other demagogues, condemned of traitorous designs, were expatriated. The company on being withdrawn from Ireland, removed to Woolwich, where it arrived on the 19th of February, 1849.

A rising of the Chartists being anticipated, measures were taken to thwart their designs. Troops were collected with rapidity from all quarters and appointed to various posts in London, to act if occasion required. Late in the evening of Saturday the 8th of April, a company of 100 strong with serjeant-major Bradford, under the command of Captain Tylee, R.E., was detached from Woolwich to the Tower of London. Each man took with him forty rounds of ammunition. The company slept in the Tower that night, but early next morning, two sergeants and thirty-two rank and file, under Lieutenant Sedley, R.E., were sent to the Ordnance Office, Pall Mall, to oppose any attempt at possession by the Chartists. Another party with serjeant-major Bradford under Lieutenant Wilkinson, R.E., was removed to the Bank of England. On the roof of this edifice were built platforms; and at certain places, massive timbers with loop-holes were run up as positions for defence. Several thousand sand-bags filled the upper tier of windows facing the Royal Exchange, and others as high as a man were piled upon the parapet of the roof, with apertures between them for musketry. Over the entrance of the building, a strong wooden machicouli, resting upon ponderous beams, projected into the street, which held a party of the corps ready to open a volley on the rabble, had an attempt been made to force an entrance. In the yard leading to the workshops, &c., the sappers also erected an enormous barricade of casks, hand-carts, &c.

The detachment at the Tower was no less zealous. At the Byward tower, the face—overlooking the entrance to the fortress from the Thames by the bridge—was loop-holed, as also a building to command the other entrance. About thirty yards inside—

from the gate of the Byward tower—a strong intrenched stockade was erected; and on the wharf near the Traitor's tower, two barricades were constructed of crates with bricks in them, iron coal boxes, &c., which were loop-holed for musketry. Along the Traitor's wall was an erection of sand-bags with openings for firing, and on the roof of the barracks, banquettes, to enable the troops to play on the mob in the rear near to the Mint, were formed of scaffolding and military forms. The old bricked-up embrasures facing Tower Hill were also rendered ready for the reception of guns by picking out the bricks and clearing away the debris, which for years had been accumulating there. Fortunately no outbreak occurred, and the company returned to Woolwich on the 14th of April.

In May, Captain Webb, R.E., with one sergeant and one private, both surveyors, proceeded to Zetland by an order from the Commissioners of the Treasury, and laid out and surveyed nearly ninety miles of road, upon which the poor of the islands were employed to afford them relief. In September, the party returned to Woolwich, where Captain Webb and the sergeant completed the plans of the work for the Home Office. The conduct and zeal of sergeant R. Forsyth were specially brought to the notice of the Treasury; and in a letter from Sir Charles Trevelyan to Captain Webb, dated 26th of December, 1848, it is stated, "that my lords have received with satisfaction your report of the zeal and intelligence displayed by sergeant Forsyth in assisting in this service; and that if his exertions shall continue to be equally useful, they will be prepared to grant him some moderate additional remuneration when these operations have been brought to a close."¹

A new station was opened for the corps this year, by detaching to the Mauritius a company of 100 strong, under the command of Captain J. Fenwick, R.E., which embarked at Gravesend on the 2nd of May, and landed from the 'Edmundsbury' on the 19th of August. A half company had previously

¹ He never received any additional remuneration at the close of the work, but his high rate of working-pay may have been considered a sufficient equivalent for his services.

been employed there, but on the completion of the citadel in 1840, it was removed to the Cape of Good Hope.

‘Captain John Walpole, R.E., was commissioned as brigademajor to the corps on the 1st of June, 1848, *vice* Major Sandham removed to the ordnance office as second inspector-general. With the sappers, Major Sandham had served for many years, and the great interest he took in their concerns is well known. Strict impartiality and a penetrating discrimination marked his whole conduct; and his attention to the discipline and drill, raised the character of the corps for military appearance and efficiency. The ready testimony of Lord Bloomfield, the commandant of Woolwich garrison, was frequently awarded to Major Sandham for his success in these particulars, and never was the corps present at a garrison parade, but his lordship called the attention of his staff to its correct marching and manœuvring. A sterling friend to the sappers, Major Sandham, with hearty goodwill, provided many non-commissioned officers and men with comfortable and lucrative situations in civil life, although in doing so, he laid himself under many and deep obligations to those from whom he obtained the patronage.’²

² Sergeant James Anderson was one of those who was thus favoured, on obtaining his discharge, with a pension of 1s. 10d. a-day, in August, 1845. He received an appointment in Worsley-yard, belonging to the estate of Lord Ellesmere, as superintendent and storekeeper of the yard, at a salary of 120l. a-year, with a residence. Since then, such has been his scrupulous character for honesty and careful supervision, that a very handsome addition has been made to his income, and the utmost confidence is reposed in him.

Another was colour-sergeant John Ross, a very ingenious mechanic, who, after his discharge, in April, 1848, was appointed engineer at Runcorn, to attend to a small steam fleet in the canal, under the Bridgewater Trust. He invented the drawbridge at the entrance of Fort Albert, Bermuda, the largest of its class in any military fortification, and which can be easily worked by two men, either in throwing it across the ditch, or pulling it in. Many years of his life had been spent in perfecting a new system of locomotion for ships. His great idea was the construction of a vessel which should ride above the control of the waves, resting upon an arrangement of large cylinders, to serve, like the piers of a bridge, as the natural supports of the ship, and within which should be placed his revolving paddle-wheels, to be moved by steam appliances. By a very ingenious contrivance he provided that the sea, which should come in contact with the paddles, should not only be deprived of its resistance, but

At the Cape of Good Hope, the companies were still dispersed to about fifteen stations on the eastern frontier and at Pieter Maritzburg. In February, corporal George Pringle, having under him twelve men of the 45th regiment, threw a raft of casks for the passage of his Excellency Sir Harry Smith, and his guard, over the rivers Umgani, Mooi, Bushman's, and the two Tugela's. Sir Harry was taking a peaceful tour of the colony from the frontier to Natal, and corporal George Pringle and party, under Lieutenant Gibb, R.E., went from Pieter Maritzburg to the foot of the Draakenberg Mountains, about 120 miles, to meet him. His Excellency noticed corporal Pringle for the activity and intelligence he displayed on this service. When crossing the Mooi, in consequence of the strain on the hawser which had been previously fastened to the opposite bank, the raft capsized, and threw the pontoon party and fifteen men of the Cape mounted rifles into the stream. Corporal Pringle and a man of the 45th regiment, alone clung to the raft; and as it swept along with the rapid current, whirling round and round with the eddy, the corporal dexterously seized the end of a breastline, jumped into the stream, and swimming to the shore, moored the raft to a clump of bush, by which it swung in safety. All the saddles and carbines, the waggon, and Sir Harry Smith's horse, which were on the pontoon at the time, were thrown into the river. The horse, however, was soon rescued, for by means of a lasso it was pulled in safety to the land; and the waggon, about five feet under water, was recovered by the coolness of the corporal, who swam to the spot, and lashing it to the boom, hauled it, with the assistance of his party, to the bank. All the soldiers were saved. The corporal

made to assist in the propulsion of the vessel. The speed he calculated to obtain by his system was almost incredible. Personal trials of an imperfect model, in the waters at Bermuda, convinced him of the practicability of his bold scheme. After quitting Runcorn, ambitious of higher employment, he emigrated to Canada, where he is pursuing the study and development of his novel notions of shipbuilding and locomotion. He received a gratuity and medal for his services in the corps, and might have been promoted to the rank of sergeant-major, but, restless and speculative, he preferred to try what his mechanical genius would yield him in civil life.

now adopted another method to take his Excellency and the guard across, and the passage of the Mooi, more than fifty yards wide, was eventually effected without accident to the troops or injury to the baggage.

Six privates, under sergeant Alexander M. M'Leod, left King William's Town on the 2nd August with a division commanded by Sir Harry Smith, to chastise the rebel Boers at Boem Plaatz. On nearing the Konap, the party was sent in advance to discover the ford. All night was spent in the tedious search, but by daylight next morning it was effectually traced and the march across the Konap commenced. The train, however, was soon stopped in its progress, as the leading waggon, unskilfully conducted by the vorlooper in charge of it, got off a ledge of rock upon which it was proceeding safely, and sinking into the water, the gunpowder it contained was destroyed. At the same time the vorlooper, young and weak, unable to stand against the current, was swept off his legs. In this emergency Colonel Buller directed the sergeant to assist the train in crossing. Standing in the centre of the stream, he controlled the refractory oxen and drove them to the opposite shore. There, however, fresh difficulties arose, for, as the soil was greasy and the bank steep, the oxen could not draw the waggons out of the river. Instantly the party of sappers reduced the bank, and throwing the excavated earth on the slippery beach, the waggons were at length dragged to the shore.

Arriving at the Great Fish River the troops, guns, and baggage were ferried across on the India-rubber raft taken with the sappers, while the empty waggons were drawn over by means of a hawser. On the 20th the Orange River was reached; next day four other sappers were added to the party, and on the 22nd, at day-light, the India-rubber float was launched for the passage of the division. The river was 250 yards wide and a very rapid tide was running, when, having stretched a sheer line across the stream fastened on either shore to a tree, the operation was successfully carried out. Forty men were ferried across at a time, and the expedient of the

guiding hawser considerably lessened the labours of the party. Three guns and several waggons were also taken over. The latter were simply rolled on the raft without disturbing their loads, and were deprived of any dangerous motion by blocking their wheels. Not a single accident occurred; and in compliment to the unfailing zeal and efficiency of the men, Sir Harry Smith took occasion, on a general parade at Graham's Town in October, 1848, to acknowledge that to the royal sappers and miners he was "greatly indebted for the means with which he had been enabled to make the passage of the Orange River, many of the men swimming in the river like dolphins in getting across the baggage and material."

Marching for Boem Plaatz the detachment was present in an engagement with the Boers, remaining for a time in the rear in charge of ten ammunition tumbrils and four engineer waggons, containing engineer tools and stores; but ordered to the front by the Governor's aide-de-camp, Captain Holdich, they pressed forward with four ammunition waggons, and did good service, during the remainder of the action, by serving out the cartridges to the troops.

It was not long before the Boers were beaten, and the column advanced, followed by the sappers and the train of waggons. The grass was on fire on either side of the road. Just at this time the fore-skean or linch-pin of the leading waggon broke, the near fore-wheel came off, and the tumbril upset. Another minute and the burning grass would have blown it up; but there were resolute spirits in the party, who, undaunted by the danger, rushed to the spot, raised the dismembered waggon from the fire, and replacing the wheel, fastened it by the drag-chain through the spokes to the tessel-boom. The expedient answered its purpose for twelve miles, when, by Sir Harry Smith's orders, the ammunition was removed to a commissariat waggon.

On the 30th August, at Bloem Fontein, the Sovereignty was proclaimed to be British territory. A few days afterwards, marching for Wynberg, the sappers cut a road up the steep and rugged banks of the river they crossed on the route, and repaired

a drift for the waggons at Wynberg. There a review was held by Sir Harry Smith. Moshes, the paramount chief of the Sovereignty, and his sons were present, attended by a cortege of 800 armed horsemen clothed in European garb, and 1,500 foot warriors in their war costume and accoutrements. When the display terminated, the Kaffirs formed a circle round Sir Harry Smith and the chief Moshes, and performed a frantic war-dance to serve as an additional proof of the re-establishment of peace. The sappers with the other troops witnessed this barbaric demonstration, and afterwards returned to Bloem Fontein.³

The companies at Gibraltar, brought to a strength of 197 men by the arrival of a reinforcement of 53 rank and file, were inspected by the Governor, Sir Robert Wilson, in May, and his report complimented them on their efficiency, zeal, and capacity. "Under arms," Sir Robert added, "their appearance is soldier-like, and their exercises were creditably performed." His Excellency, however, had to regret "that the vice of drunkenness should exist in a corps otherwise so respectable."

In October, Major-General Stavelly inspected the half company at Hong Kong, but while he commended the men for their "fine looks" and "being well dressed," he censured the irregularity which had recently marked their conduct. Intoxication, the greatest bane of the colony, was the chief predisposing cause of disease; and the sappers, who from the nature of their service were continually employed and often much exposed to the sun, carried the propensity to an extent which produced much sickness, and justly called for the Major-General's animadversion.

Very different, however, was the conduct of the seventh company at Corfu, which, having completed its tour of foreign duty, was relieved early in the year and returned to Woolwich. The Lieutenant-General spoke of their constant good conduct and exertions during the period they had been under his command, and commended them for the excellency of their ser-

³ 'Graham Town Journal,' October 14, 1848.

vices. In parting with the company he expressed his good wishes for their welfare, and a vast concourse of the inhabitants cheered them through the streets to the point of embarkation. Since 1824, the companies successively sent to Corfu were chiefly employed in the works of the citadel, and the defences of Vido. Fort Neuf and the church in the citadel, as well as Fort George, Lunette Wellington and the Maitland Tower at Vido, attest the skilful workmanship of the sappers. Individuals or small parties were at different times detached on particular duty to Santa Maura, Zante, Paxo, and Cephalonia. Of this special duty some idea may be formed, from the nature of the employment of a corporal, who being sent to Santa Maura in December, 1845, by order of the Lord High Commissioner, superintended the workmen engaged in opening a new channel into the port, to render the inner passage once more practicable for ships sailing either up or down the coast.

The detachment at the Falkland islands was removed from that settlement on the recall of Governor Captain Moody, and landed at Woolwich the 29th November, 1848. For more than six years the party had discharged all the duties of soldiers and artificers, assisted by about forty civilians chiefly labourers; and in that short period a considerable improvement had been made in the colony. Several buildings had been erected, including the Government-house and offices; also a school-house and barracks, and cottages for emigrants and workmen, with houses for boats and stores. Jetties were also constructed, sea-walls made, roads traced and formed, bridges thrown, weirs made for fishing, and kraals for cattle, with numerous ditches, drains, sod walls, and sod huts. To these must be added the performance of an endless variety of services, which the wants and contingencies of a new and inhospitable colony rendered indispensable. Four of the detachment were discharged in the settlement, and the remaining four, soon after reaching England, left the corps by purchase or on pension.⁴

⁴ Sergeant Hearnden, so frequently spoken of in these pages, purchased his discharge and emigrated with his savings, nearly a thousand pounds, to North America, where, from his enterprising spirit and commercial tact, he is realiz-

ing a fortune. Throughout his service of twelve years in the corps he was constantly employed on particular duty. In the practical instruction of the Cadets at Sandhurst and Woolwich, and in one of the early expeditions to the disputed territory in the state of Maine, he showed much talent and energy, and obtained great credit. For his services at the Falkland Islands no higher testimony could be afforded to a soldier than the repeated warm acknowledgments of Governor Moody. A word may also be given about his horse. Blanco was brought from South America; was perfectly white, and exhibited signs of good breeding. Hearnden purchased him at a rather high figure; but his subsequent usefulness and hardihood in a trying climate gave him ample reason to be satisfied with his bargain. On the 7th January, 1847, at the Falkland Island races, Blanco had the good fortune to win the Governor's cup, worth 50*l*. The cup, made of silver, by Hunt and Roskill, stood about eighteen inches high, and was richly ornamented and chased. On one side the sergeant was represented mounted, with sword, sabre-tache, and gauntlets. In another panel was the inscription. The cover was very massive, and both cover and cup were lined with silver gilt.

1849.

Breach in the sea-embankment at Foulness—Company to Portsmouth—Angmentation to corps—Homeward journey of the Arctic expedition—Private Brodie—Great Slave Lake party—Expedition arrives in England—South Australia—Sergeant R. Gardiner—Road-making in Zetland—Survey of Dover—Wreck of the 'Richard Dart'—Miserable condition of the survivors on Prince Edward's Island—Found, and taken to the Cape—Remeasurement of the base-line on Salisbury Plain—Shoeburyness—Eulogium by the Marquis of Anglesey—Fatal accident at Sandhurst College.

On the 10th January fifty-five men, under Captain Tylee, R.E., were sent by express conveyances from Chatham to Foulness Island, near the entrance of the river Burnham on the coast of Essex, to repair the sea embankment which for about 200 feet had been forced away by a heavy sea. The detachment took with it a quantity of intrenching tools, water-boots and stores, including 300 fascines and 3,000 sand-bags, which were made and filled in about three hours. In less than twelve hours from the commencement of the work, the breach was effectually mended by an ingenious placement of fascines and sand-bags, at an expence not exceeding 6*l.* 10*s.* The party worked in two divisions. The day was extremely wet, but the men laboured with the utmost zeal, and their conduct both on sea and land was exemplary.¹

A company was sent from Woolwich to Portsmouth in January to supply the place of the one removed from that garrison to Dublin in February, 1848. The return of a company to Portsmouth induced much opposition to its employment on the part of the civil workmen, and disparaging remarks, with respect both to its conduct and its mechanical abilities, appeared in the provincial journals of the time.

¹ The 'Times,' 12th January, 1849. 'Corps Papers,' i., p. 415.

One company, the twenty-first, was raised 1st February, and another, the twenty-second, on the 1st March, thereby increasing the establishment of the corps from 1,985 to 2,185 of all ranks. The royal warrant, authorizing the formation of the last eight companies, is dated 22nd August, 1849, and on its authority the companies were organized as follows :—

	Colour Sergeant.	Ser- geants.	Cor- porals.	2nd Corp.	Bugl.	Privates.	Total.	General Total.
17 Companies, Service, each.	1	4	5	5	2	83	100 =	1,700
1 Company, Corfu	1	2	3	3	2	51	62 =	62
3 Companies, Survey, each .	1	6	7	7	2	82	105 =	315
1 Company, Survey	1	4	5	5	2	83	100 =	100
								2,177
Staff—1 Brigade-Major, 1 Adjutant, 1 Quartermaster, 2 Sergeant-majors, } 2 Quartermaster-sergeants, and 1 Bugle-major. }								8
Total								2,185

When the summer fairly set in, the Arctic expedition under Sir John Richardson commenced its return. The van with corporal Mackie, started about a week before Sir John, who followed on the 7th May with Mitchell, Brodie, and three seamen. In five and a half days the journey over the ice was completed, and on the 12th they encamped at Cape Macdonald, clearing away for the purpose snow to the depth of five feet. They then moved on to Fort Franklin, where the advance division had arrived with a good supply of provisions for the voyage. Soon afterwards a detached party was commissioned to Fort Norman for a barge and stores, for which Sir John Richardson waited nearly a month, having with him Mitchell and Brodie and two fishermen, who, in the meantime, lived on trout, whitefish, herrings, and geese, and bivouacked under the shelter of a boat's sail as a substitute for a tent. In time they quitted the vicinity of the fishing hut, and moved to the banks of the Bear Lake river, where they encamped until the 9th June, when the descent of the river commenced. In the fishing coble brought from Fort Norman, Sir John Richardson with three of the party embarked, whilst Mitchell, Brodie, and a fisherman named Morrison, walked along the bank of the river, each of them carrying his own bedding and clothing. Narcisse,

another fisherman, was left behind in charge of some stores. Half an hour after setting out, the party in the coble put ashore, and in a short time Corporal Mitchell and Morrison joined them, but private Brodie, having struck into the woods to make a straight course, did not arrive in the hour that the chief waited for him; and expecting that he had gone past, the voyage was resumed with Mitchell and Morrison added to the party in the boat.²

Fourteen miles from the lake a *cache* was reached; and as Brodie had not arrived in the course of the day, it was evident he had lost himself, and therefore, corporal Mitchell and Morrison were sent back to the lake to acquaint Narcisse with what had happened, and to engage an Indian living at the fishery to go in quest of Brodie. In the meantime the party at intervals fired their fowling-pieces, and set fire to some trees, that the smoke might be seen by the strayed wayfarer at a distance.³

Next day the men came back from the lake. After placing written directions for Brodie in the *cache*, the expedition re-embarked, and in due time came to the influx of the Black River, then flooded. There another paper of instructions was left for Brodie, directing him to the *cache* for provisions, and to remain with Narcisse until the barge came for him. The fact of Brodie's straying gave Sir John Richardson much uneasiness, as he feared the wanderer would experience some suffering, though he did not apprehend he would lose his life, for he was a man of much personal activity and considerable intelligence. When he discovered he was walking in a wrong direction, he began to mend his pace, and to run, as is usual in such cases, but took an inland course, and at length came to the borders of an extensive swamp. Here the woods being more open he obtained a distant view of the "hill at the rapid," which he recognized, from having seen it on his former journey to the *cache*; and as he knew that the boat must pass it in descending the river, he resolved on walking straight for it, in the hope of arriving there before the others. After this he

² Sir John Richardson, ii., p. 138.

³ Ibid.

came to the Black River, a rapid, unfordable stream, scarcely passable by a raft ; but being a fearless swimmer, he swam across it carrying his clothes on his head. The stream, being very tortuous, came again in his way, when he crossed it a second and a third time in the same manner ; but on the last occasion, his bundle slipping off, floated away, and he regained the bank with difficulty in a state of perfect nudity. After a moment's reflection, he came to the conclusion that without clothes he must perish, and that he might as well be drowned in trying to recover them as to attempt proceeding naked. On which he plunged in again, and fortunately landed this time safely with his habiliments. He now refreshed himself with a part of a small piece of dried meat, which in his anxiety he had hitherto left untouched, and forthwith decided on finding the *cache* and returning from thence to the lake. On the third day (11th June) he found Sir John Richardson's note, together with some provisions which had been suspended to a pole for his use, but he had so husbanded his own small supply, that he had still a morsel of dried meat remaining. He had no difficulty afterwards in joining Narcisse, by keeping sight of the river the whole way, and in due course he joined the expedition at Fort Simpson, in a barge sent to receive him.⁴

At this fort also joined the ten sappers who had wintered on the Great Slave Lake, and on the 25th June Sir John started again on his homeward journey, encountering a succession of hardships, until he arrived at Norway House on the 13th August. The services of the mission were now wholly ended, and of the sappers, Sir John Richardson thus recorded his opinion : " During the time these men were under my command, not a single act of disobedience occurred. Crews better fitted for heavy portage work and for the ordinary duties of a winter's residence in the north, might doubtless have been selected *in the country*, but none that I could have depended upon with so much confidence in adverse circumstances."⁵

⁴ Sir John Richardson, ii., pp. 138—141.

⁵ *Ibid.*, ii., p. 144. The particulars relative to the expedition have, in the main, been abridged from Sir John Richardson's invaluable 'Journal.'

The arctic travellers arrived in England in November 1849, when three or four, in recognition of their usefulness, received gratuities of 15*l.* each, and the remainder 10*l.* each.

Captain Freeling, R.E., appointed surveyor-general in South Australia, with a party of five surveyors—sappers and miners—sailed for Port Adelaide on the 6th March, and landed there the 21st June. These men were forwarded to the colony to fill the vacancies occasioned by men discharged. Captain Frome, R.E., who had commanded the detachment in that province since 1839, was recalled to the corps in consequence of his period on the seconded list having expired.⁶

Early in March one sergeant and five rank and file, under the orders of Captain Webb, R.E., returned to Zetland to lay out and superintend the construction of the roads surveyed in the two previous years. Up to this time, there was nothing in the island that could be called a road, except from Lerwick to Scallaway, a distance of about six miles, which, though not finished, was passable for riders, &c. Captain Craigie, R.N., the commissioner for Zetland, accorded them high credit for their exertions in directing the work, and controlling the poor employed upon it; and in a report to the Edinburgh section of the Central Board, he thus wrote of their usefulness and merits: "I cannot close this report without bearing my humble testimony to the invaluable services of Captain Webb, R.E., sergeant Forsyth and the staff of royal sappers and miners, and recording the gratitude felt towards Government by the whole community, for their consideration in granting an officer so eminently fitted to conduct and carry out to completion, works of such public and permanent utility. But great and most important as these works unquestionably are, they fall into

⁶ Sergeant Robert Gardiner, the senior non-commissioned officer of the party, by great assiduity and application, so improved his attainments, that he was recommended for the appointment of clerk of works in the royal engineer department. His drawings of the Supreme Court of Adelaide gained him much credit, and his services were marked by skill, zeal, and usefulness up to the period of his discharge, in February, 1854. He now fills an advantageous appointment in the survey department of the colony of South Australia.

comparative insignificance as compared to the social regeneration now in progress, in the industrious habits of the people, and to which their efforts have mainly contributed. The patience, forbearance, the tact and temper with which Captain Webb and his staff have led the people on, step by step, to a knowledge of their physical powers; their indefatigable industry and disregard of difficulties of no ordinary kind in such a climate and country; but above all, their being looked up to as the organ and representatives of government in this remote region, have invested them with a moral influence among all classes which can scarcely be calculated."

In April eight rank and file from Chatham were employed under the direction of Lieutenant Stotherd, R.E., in completing the survey and contouring of Dover.

A detachment of one sergeant, one corporal, and twenty-six privates, with four women and nine children, embarked at Woolwich on the 3rd April, 1849, on board the brig 'Richard Dart,' for New Zealand, under the command of Lieutenant Liddell, R.E. The ship sailed from Gravesend on the 5th April, and made a pleasant voyage until the 15th June, when, to the southward of the Cape of Good Hope, foggy and rainy weather set in, which continuing till the 19th, the ship was carried to the north side of Prince Edward's Island and struck on the rocks. The waves at the time ran high, and within a few short minutes, the stern cabin-windows were stove in, the boats were filled and torn from the quarter, and while the vessel, beaten by a raging sea fell to pieces, wave after wave swept the decks and rigging and carried forty-seven of the crew and passengers into the deep. Of this number twenty-four men belonged to the detachment of sappers, who, with all their wives and children, and Lieutenant Liddell, perished.

Eleven souls only out of sixty-three were saved. Of these there were the captain of the ship, Samuel Potter, and four sappers. They took refuge in the mainmast rigging; and the wreck, having been driven broadside to the shore, the mainmast went by the board, falling fortunately upon the rock, and the survivors crawled along the spar to the shore. The rocks

being exceedingly steep and difficult of access, the men had to undergo much labour and fatigue in reaching the summit of the cliff, occasionally hanging on by fragile sea-weeds and every now and then throwing themselves into crevices to prevent the receding surge drawing them into the sea. Most of the party were barefoot and thinly clad. The night was intensely cold, and as there were frequent falls of snow, their sufferings were distressingly severe.

The island was a mass of black rocks, torn by volcanic violence, and wore an aspect of wild and sterile desolation. Selecting a small green spot where fresh water was found, they made it a temporary residence, and built with the wood they recovered from the wreck and some sods, a small hut, which sheltered them in a measure from the bitter wind and cold. A few sperm candles and some blankets, washed from the wreck, were all that could be found to reward their anxious exertions. No provisions of any kind could be picked up; but at length, when forced by hunger, they killed some young albatrosses, and fed sparingly on the raw flesh. The candles in this extremity were eaten with considerable relish; and as they were without fire, or the means of procuring any, they determined, on the seventh day of their deliverance, to explore the island.

Two of the men, from being frostbitten and cut in the feet, were unable to walk. The remaining nine, therefore, started off, leaving a stock of raw meat with the two sick sappers. Hourly their toils and miseries increased. After travelling all day, sometimes over high hills covered with sharp vitrified cinders, sometimes on marshy ground up to their hips in bog, they stopped for the night by the side of a rock. The rain poured in torrents; shelter could not be found; no expedient for kindling a flame succeeded; and in this deplorable condition they sat down on the charred ground, huddled together to preserve some little warmth among them, exposed throughout the night to the drenching storm, covered only by their blankets.

Next morning, resuming their travels, they gained a beach where four sea-elephants were lying basking in the sun, for the

day opened with a cheering summer's warmth. Two of the monsters they killed, but made no use of them. Here they waited for a few days to recruit their strength. The place was called "Double Beach," but no fissure or cavity could be found to hide them from the winds and rains; and so night after night, rolling themselves up in their blankets, they slept in the open air. After a few days, private Reid, with some others, returned to the first location to visit the invalids. Private Goldsmith was much worse; his frame was frightfully emaciated, and his toes were sloughing with gangrene; but private Devany was improving, though unable to walk. Three days they remained with their sick comrades, and on the 1st July again repaired to Double Beach, leaving with the sick the raw flesh of six birds, equal to a week's provisions.

A snow-storm now set in, which lasted all night and throughout the day of the 2nd. All were now so completely benumbed and weak from exposure to the frost and snow, that little could be done in the way of exploration. The night of the 2nd July was still more severe in its effects upon the spirits and constitutions of the party, and the rain poured on them incessantly. On the 3rd, private Inglis discovered a cave close to the shore, whither the party joyfully repaired; and as the day was fine, they dried their clothes and blankets, and killed eighteen birds. Next day, from the return of an intense frost, all power of feeling and motion left their feet and fingers, and confined them to the dreary cave for a full week.

Until the 26th July, the cave afforded them a partial retreat from the severe inclemencies of the weather. On that day, private Inglis, the most successful of the adventurers, discovered a small hut about three miles away, in which a number of men's names were carved. Under the last name was cut the words, "On a journey round the island, 27th May." It was now resolved that the captain, one seaman, and privates Reid and Inglis, should travel round the island until they regained the cave, to see whether any one was near to help them. Having started, they reached the hut early in the morning; but as, at

the time, it was blowing a heavy gale and snowing hard, they waited a day or two for the weather to moderate. During this interval they consulted together as to their future movements; and private Reid having volunteered to remain alone at the hut, the others commenced, on the 30th July, to make the special tour. Next day two of the party returned to the hut, so that on the 31st July the adventurers were thus dispersed—three on the search, three at the hut, two at the cave, and one of the two sailors in charge of the two sappers at the sick depôt. On the 1st August, after rambling about the island for no less than forty-two days, suffering acutely from hunger, pain, toil, and frost, they fell in with a party of explorers in the service of Mr. Geary, of Cape Town. The meeting was one in which mutual amazement and happiness were keenly felt; and for the following thirty-two days, no vessel having touched at the island, the Cape men generously shared with the sufferers their scanty stock of farina. Poor Goldsmith perished on the 24th August from the intensity of the cold and the want of proper nourishment, and his remains were interred on the spot where he ceased the mortal struggle.

The schooner "Courier," of Cape Town, at length brought up at the island with a supply of provisions; and the survivors of the wreck, after seventy-two days' sojourn in that bleak and desolate region, having embarked on board of her, landed at Table Bay on the 10th November, where they were well received and entertained by a party of the corps.⁷

A party of sixteen non-commissioned officers and men, afterwards increased to nineteen of all ranks, under sergeant James Steel, was detached on the 1st May with sufficient camp-houses, equipage, and stores, to carry out the remeasurement of the base line on Salisbury Plain, by means of the compensation bars invented by General Colby.⁸ No man or officer on the survey had ever seen the apparatus in position before; and sergeant Steel, therefore, has the credit of acquiring a full knowledge of the adaptation and uses of the various instruments belonging to the apparatus, unassisted by the teaching of any practician.

⁷ 'Cape Town Mail,' November 17, 1849.

⁸ General Mudge measured the line in 1794.

This he achieved by more than three months' unwearied study of some manuscript records on the subject, and by closely observing the results of a series of experiments which he conducted.

During the first fortnight, the line, six miles and three-quarters in length as the crow flies, was three times measured with the chain, marked off, cleared of wood, furze, and other obstacles, and again roughly surveyed. The little wooden encampment of the detachment was by this time in excellent order; and, after three days' tedious work in testing the apparatus by comparison with the standard bar, the first compensation bar in the remeasurement was laid at Beacon-hill. Owing to the steepness of the ground, and other causes, progress over the hill was both slow and wearisome; but having once mastered the descent, the operation throughout its length presented less difficulties than were at first encountered. From time to time the sergeant communicated to the ordnance map office at Southampton the obstacles, both physical and instrumental, he met with in his progress, and the contrivances he resorted to, to overcome them. The journal so sent was full of practical instruction, of a kind to be easily acquired on future reference and was replete with interesting information.

The distribution of the party gave ample employment to every man, and the division of labour was adapted to the attainments of the men and the necessities of the duty. Corporal William Jenkins assisted the sergeant at the bars and microscopes. The latter compared the microscopes with the standard on Sundays; and frequently, after a severe day's work, the same process was necessarily gone through, and other adjustments of the instruments effected. Corporal Edward Harkin constantly attended to the aligning instrument, while one man assisted him in preparing the stations, &c.; two privates levelled the triangles for the feet of the supporting stools for the bars; two attended to the adjustment of the stools on the triangles, levelled the camels on them, and moved forward the microscopes, &c.; two carried forward the bars and point-carriers, and levelled the former and fixed the latter; one registered the bars

and microscopes, and otherwise aided in moving them forward and adjusting them; one, a carpenter, made the pickets, and repaired the mallets, tents, &c; four attended to the shifting and placement of the tents; one was sentry over the bars at the dinner hour, and during the night, to prevent any disturbance in the apparatus; and two attended to the domestic and miscellaneous duties of the huts.

The camp occupied three different positions on the line. It was thus moved twice forward. On each occasion, for a few days, no progress was made in the remeasurement, and sergeant Steel with two privates, filled up the interval in comparing the bars and microscopes with the standards. In the meantime, the remainder of the detachment fitted up the portable huts in the position selected for them.

Great nicety and precision were required in the placement of the bars; and so rigidly did the sergeant enforce the strictest exactness in their alignment and contiguity, that he would not order the "move forward" until he satisfied himself that the possibility of an error in the operation was not likely to exceed the 10,000th part of an inch. In this way the work was continued till the 16th October, 1848, when the 3484th bar shot over the old Sarum terminus of the line. This was followed by a spontaneous cheer, hearty and sustained, from the assembled party who thus commemorated the successful accomplishment of the operation. By previous computations from the Lough Foyle base, the perfect accuracy of the remeasurement was proved; for, not only did the predetermined bar reach the gun, but the very inch of it entered the muzzle.

To ascertain by the usual computations whether any error in the omission in the registry of a bar or microscope could be detected, the line was divided into three parts, and each part was used as a base for a minor triangulation. Very great care was taken in executing this triangulation, but it failed to discover any inaccuracy in the measurement. Sergeant James Donelan and corporal William Jenkins, with the two 3-foot instruments, carried out this special service.

The results of the two measurements stand on record as under:—

By General Mudge with Ramsden's
steel-chains in 1794 36575·64 feet.
By sergeant Steel, with Colby's
compensation-bars in 1849 . . 36577·95 ,,
Computed from Lough Foyle base 36577·34 ,,

The precision of the two operations by such different instruments is strikingly close and beautiful, and not only illustrates the excellence of the instruments, but the perfection of the work.

On the completion of the service, corporal Jenkins was intrusted with one of the great theodolites, and removed with a camp party from the base detachment to a mountain station. The remainder were soon dispersed on the general duties of the survey, and sergeant Steel, after again comparing the bars and microscopes with the standard measures, returned with the compensation apparatus, &c., to Southampton.⁹

On the 7th June one sergeant and twenty-five rank and file were removed from Woolwich to Shoeburyness to erect temporary barracks, &c., for the royal artillery, and also to lay platforms, build batteries, and to execute the varied works which a new station might call for, both for the convenience of the ordnance troops, and the interests of the service. The party was increased to thirty of all ranks in July, but in October following was reduced to six non-commissioned officers and privates. Ever since this period, a small detachment has been retained at the station to carry on the current repairs and improvements, and its strength has fluctuated from time to time, in accordance with the prevailing emergencies.

⁹ While on Salisbury Plain he was visited by Lieutenant-General Sir Charles Pasley, frequently by Colonel Hall and Captain Yolland, and by about fifty other officers of the royal engineers; also by Professors Airy, Sheepshanks, and Cape. The last gentleman was very free in his inquiries. The mode of aligning the instrument did not, at first, satisfy him, but eventually, the process having been minutely explained by the sergeant, he went away convinced and gratified. Captain Gosset was present at the laying of the first bar and Captain Hawkins at the last.

The convicts had been working for a time in repairing the main-sewer in the royal arsenal at Woolwich, but in consequence of the unhealthiness of the duty, they were withdrawn from it. As the work was one of considerable importance to the locality in a sanitary point of view, volunteers to finish the drain were therefore demanded from the royal sappers and miners. One sergeant and eight privates at once undertook the work, continuing at it during a portion of the month of August, and its execution was effected without the slightest injury to any one engaged. This led the Marquis of Anglesey, then Master-General, on the 5th September to extol the labours of the party in these words: "I desire to mark my high approbation and admiration of the gallant conduct of the corps of royal sappers and miners, in volunteering an unpleasant and even dangerous service in the cause of humanity. Such self-devotion, wholly devoid as it is of the stimulus of public honour and of glory, far exceeds the renown gained in the battle-field. I offer my thanks to all the individuals concerned." In the reign of Tarquin I., 606 B.C., a force of Roman soldiers, ordered to construct common sewers, considered the employment an indignity, and destroyed themselves. The self-esteem of the Roman soldier which led to so fatal a result, had a different effect on the modern; for the pride of the latter, tempered by considerations of duty, urged him into the midst of danger, and for the sake of humanity to seek it. Reflecting too, that the service, though paramount, was too objectionable for even convicts to perform, the warm eulogy of the Marquis may not be regarded as undeserved by those on whom it was conferred.

On the 6th October an experiment was made at the Royal Military College at Sandhurst, to blow in the barrier-gate of the bastion-fort, which cost the lives of the sergeant and one of the privates employed. Sergeant John Cameron under Major Adams, had the conduct of the arrangements and the preparation of the fuse. Nine pounds of powder were placed in a sand-bag having a canvas tube joining into the middle of the powder. In this canvas tube was fixed a grenade fuse with a

piece of cotton in it, calculated to burn a sufficient time after the cotton burst into flame. The bag of powder placed against the barrier, was covered over with a curved iron shield with a hole in it to permit the fuse to come through, and then four sand-bags were lodged against the shield. The arrangements being completed, all the sappers retired except the sergeant and a private to ignite the fuse. Suddenly the explosion took place, and at once the sergeant was blown into the wet ditch, and the private knocked down on the berm. Both were mutilated in a frightful manner and in a few days expired. The accident is supposed to have arisen from some defect in the fuse which was made by the sergeant. Sergeant Cameron was a zealous and talented non-commissioned officer, had several seasons been employed with great advantage at the college, and presented the institution with some interesting military models. His widow was granted a pension of 10*l.* a year.

1850.

Party to the penal settlement at Swan River—Detachment to New Zealand—Draft to Hong-Kong—Mining operations at Seaford Bay—Determination of the latitudes of various trigonometrical stations—Sergeant James Steel—Professor Airy—Hardships of a party landed at Rona.

On the 15th February, five rank and file embarked at Deptford in the 'Scindian' convict-ship, under Captain E. Y. W. Henderson, R.E., for the Swan River settlement, and landed at Freemantle on the 11th June. The Captain had been appointed comptroller-general of prisons, and obtained the authority of Earl Grey, then Secretary of State for the colonies, to take with him this small detachment. The men were experienced as soldiers and tradesmen: one of their number was a competent draughtsman and architect, and another was acquainted with surveying, camp-duty, and the mode of blasting rock. On their arrival in the colony, they were appointed warders over the convicts, as well to keep them in discipline as to direct them in the execution of the various works that might be undertaken for the establishment of a penal settlement, and the development of the colony. The party was also intended to superintend the submarine operations required in the removal of the bar at the mouth of the harbour. The rates of working-pay granted to them, ranged between 1*s.* 3*d.* and 2*s.* a day. A full company has since been added to the command on the urgent recommendation of Captain Henderson, R.E.

Late in March one sergeant and twenty-six rank and file embarked for New Zealand, under Lieut. F. R. Chesney, R.E., and landed at Auckland on the 26th August, increasing the detachment there to a half-company of forty-one strong. The removal of this party from Woolwich was occasioned by the loss by shipwreck, near the Cape of Good Hope, of the detachment which sailed for that colony in April, 1849.

Fifteen rank and file embarked on the 15th May for China, and landed at Victoria on the 18th October. This was the fifth detachment sent to that country. Two men sent from Woolwich in April, to superintend the laying of asphalt on the government works, arrived at Hong Kong on the 17th June.

At Seaford Bay, on the coast of Sussex, the sea had made considerable encroachment, so as to jeopardise much of the adjacent property, and also the defences and martello-tower in its vicinity. Large sums of money had been expended in the construction of wood groins and clay embankments, with only partial success; and as an effectual remedy, it was proposed to throw down by mining a portion of the chalk rock itself, in the direction of the tidal current, and thus cause it to accumulate the shingle, and protect the land and contiguous property. With the view to efficiency and economy, the Master-General approved of the operations being carried out by a detachment of sappers and miners; and accordingly two sergeants and forty-four rank and file of the fourth company left Portsmouth at the end of July under Lieutenant E. W. Ward, R.E., who, on arriving at Seaford, lost no time in commencing the interesting undertaking. Late in August, the party was increased by ten rank and file under Captain Craigie, to assist in completing the final arrangements, and to take the military duty consequent upon the anticipated explosion.

The works were conducted under the direction of Colonel G. G. Lewis, R.E., with Captain E. C. Frome as his executive officer. In the face of the cliff, about thirty-five feet above high-water mark, a nearly horizontal gallery was cut into the chalk. The mouth of this gallery was approached by a ladder and platform, supported by scaffolding. At right angles from this gallery, extending fifty-two feet to the right and sixty-two to the left, were corresponding galleries, at the extremities of which were two chambers of seven feet cube, containing 12,000 lbs. of powder each. Two wires, respectively in connexion with two of Grove's batteries, completed the arrangements for exploding these charges simultaneously. The chambers of powder were about seventy feet from the face

of the cliff, and were intended to drive out its under portions and roll them towards the sea. Upon the surface of the rock, eighty-four feet from its edge, were sunk five vertical shafts, at the bottom of which other chambers were excavated, containing, in three of them, each 600 lbs. of powder, to be fired simultaneously with the two great charges. The two other chambers were not loaded, from the non-arrival of a sufficient quantity of powder. The shaft chambers were connected by wires to a Smee's battery, placed in a wooden shed erected about 180 feet from the edge of the cliff. The wires to convey the electric fluid to each chamber were covered with tape and varnished or tarred over. The galleries were tamped with sand and chalk, in bags, to within fifty feet of the mouth, both branches being tamped up, and twenty feet down the large gallery. The men worked in reliefs for the whole twenty-four hours. For the gallery three reliefs, of four men each, were appointed; and subsequently for the branches three reliefs of six men for the two. The relieving hours were 6 A.M., 6 P.M., and midnight, except at periods when the high spring tides prevented the relief passing a projecting part of the cliff at the proper hours, when arrangements were made to equalize the extra time the men were so employed. The work was hardly ever interrupted in its progress, for by compelling each relief to be in quarters six hours before its time for work, the men were invariably fresh at the commencement of their time; and as the best miners were always employed, the average amount of work performed by night equalled that accomplished by day.

All the necessary operations being completed, the great explosion, on a signal from the galvanic battery by sergeant Edward Wright, took place on the 19th September, under the immediate orders of Colonel Lewis. The effect of firing the two great chambers was to throw out the under portions of the rock, which, from the downward pressure of the superincumbent masses, rolled towards the sea, carrying with them the three smaller chambers unexploded, and causing deep fissures in the chalk as far back as the very foundation of the battery shed. The undertaking, so far as dislocating an immense mass of

chalk from the cliff was concerned, was thus perfectly successful ; but subsequent experience has thrown doubts upon its utility as a breakwater, for the chalk is gradually being washed away, and if some natural intervention does not take place to conglomerate the mass into a compact resisting body, time will remove the headland altogether, and expose as before the land and its defences to the gradual invasion of the sea.

The explosion was one of the largest that ever occurred, and it passed off without accident, delay, confusion, or inconvenience to any one of the detachment engaged, or to the thousands of spectators who witnessed the operation.¹ The quantity of chalk displaced was about 200,000 cubic yards, or about 380,000 tons. The distance the debris was hurled in front of the original line of cliff was more than 300 feet. The average breadth of the mound formed was about 360 feet, and its mean height about 50 feet.

Much of the expense of the service was paid by Mr. Catt, jun., a miller, to whom the surrounding property belonged, and who, as well for his own interest as for the welfare of Newhaven and its harbour, undertook a large share in the liability. The total cost of the work was 907*l.* 12*s.* 11½*d.* Of this sum only 92*l.* 3*s.* 1*d.* was spent on sapper labour, which included their services for levelling the ground, and other preliminary duties, excavating the galleries, shafts, and chambers, digging a trench above the cliff, loading and tamping the mines, making surveys and sections of the cliff and the works, preparing and laying wires, clearing away the debris, and various other miscellaneous duties, which the extensive and peculiar character of the operations rendered essential.

Lieutenant-General Sir John Burgoyne, the inspector-general

¹ The accidental destruction of the three smaller chambers was providential, for had they exploded, the battery-shed, with Captain Frome and his assistant, would inevitably have been carried away, and crushed among the falling masses: as it was, the electricity of the two Grove's batteries, on igniting the powder in the large chambers, caused an instantaneous disconnection of the Smee's battery from the smaller chambers, and, at the same time, the table on which they stood was jerked violently forward about three feet, upsetting the Smee's battery on the floor, and throwing out from the others also a quantity of the acids.

of fortifications, Lieutenant-General Sir Charles Pasley, and a number of officers of royal engineers, were present to witness the explosion. Later in the day the non-commissioned officers and privates commemorated the success of their exertions with an excellent dinner. "Night and day," wrote Colonel Lewis, "the detachment worked with great zeal and alacrity," exposed to colds from drafts and alternations of temperature, and to injury from falling masses. Nevertheless, no material accident occurred to any one, and all gained the praise of their officers, and the respect of the inhabitants of Seaford for their courteous behaviour and good conduct."²

The observations made with Airy's zenith sector for the determination of the latitudes of various trigonometrical stations used in the ordnance survey of the British Isles, which commenced in 1842, terminated in December 1850, and the results have become the subject of an important volume from the pen of Captain Yolland, R.E. The instrument at first was in charge of officers of the corps, but in course of time, from a paucity in their number, it devolved upon corporal, afterwards sergeant, James Steel. The first man of the sappers honoured with the use of the instrument was private Benjamin Keen Spencer,³ who was employed with the earliest parties in carrying on the observations; and it is not a little curious to add, that General Colby directed his own personal observations, the observations of his most able days, to be tested by sergeant Steel. This is a striking proof both of the greatness of his mind, and his freedom from those petty jealousies which sometimes mar the superiority of distinguished characters.⁴

² 'Professional Papers,' i., N. S., 69, 79. Colonel Lewis's Paper in 'Jones's Journal,' November, 1850.

³ Now a colour-sergeant. In his early career he was employed in the chronometrical determination of the longitude of Valentia, and for many years rendered very useful services in filling in the railways on the one-inch map. His talents and energy have singled him out at different times for the execution of particular duties. He was intrusted with the local superintendence of the survey, &c., of Her Majesty's domain at Osborne, in the Isle of Wight, and also had subordinate charge of the survey made for the military encampment at Chobham Common, near Windsor.

⁴ 'Professional Papers, R. E.,' iii., N. S., p. xxiii.

The following table shows in a condensed form the stations observed from, the period during which the observations were in progress, the officer of royal engineers, or non-commissioned officer of sappers in charge of the instrument, and the strength of the party; also the number of nights on which observations were made, and the number of observations registered at each station.⁵

STATIONS.	Observations in progress.		Officer or non-commissioned Officer in charge of the instrument.	Strength of the Sappers.	Number of Nights on which Observations were made.	Number of Single Observations.
	From	To				
South Barule, Isle of Man	11 Oct., 1842	12 Oct., 1842	{ Lieuts. Hornby and Gosset }	6	2	113
Blackdown, Dorset	26 Nov. ,,	1 Jan., 1843	Ditto	7	20	1087*
Frerelly Mountain, Wales	11 Apr., 1843	10 May ,,	{ Lieuts. Hornby and Layken }	5	17	674*
Forth Mountain, Wexford	29 May ,,	17 June ,,	Lieut. Hornby . .	7	12	659
Hungry Hill, Co. Cork	30 June ,,	31 July ,,	Ditto	7	9	293*
Feaghmann, Co. Kerry	14 Aug. ,,	26 Aug. ,,	Ditto	7	9	386*
Tawnymore, Co. Mayo	2 Oct. ,,	14 Oct. ,,	Ditto	2	7	294
S. End of L. Foyle Base	8 Nov. ,,	15 Nov. ,,	Ditto	2	6	335
Monach, Stornoway	16 June, 1844	3 July, 1844	Lieut. Gosset . .	5	10	180
Ben Hutich, Sutherlandshire	5 Nov. ,,	24 Nov. ,,	Ditto	6	10	480
Hensbarrow, Cornwall	9 June, 1845	14 June, 1845	Corporal Steel . .	4	6	290
South Barule, Isle of Man	27 July ,,	5 Aug. ,,	Ditto	3	2	114
Ben Lomond	2 Sept. ,,	4 Oct. ,,	Ditto	4	11	633
Ben Heynish, Isle of Tires	11 Nov. ,,	28 Dec. ,,	Ditto	4	10	267
Week Down, Isle of Wight	26 Apr., 1846	17 May, 1846	Ditto	4	11	536
Dunnose, ditto	24 May ,,	6 June ,,	Ditto	4	13	643
Boniface Down, ditto	13 June ,,	21 June ,,	Ditto	4	7	356
Port Valley, ditto	28 June ,,	14 July ,,	Ditto	4	10	411
Seavord, Unst, Shetland	3 Oct. ,,	26 Jan., 1847	Ditto	4	30	566
Gerth of Scaw, ditto	16 Feb., 1847	10 Apr. ,,	Ditto	4	21	581
Balta, in Shetland Isles	30 Apr. ,,	13 July ,,	Ditto	4	2	732†
Cowhythe, Banffshire	7 Aug. ,,	27 Sept. ,,	Ditto	4	18	641
Southampton	21 Oct. ,,	4 Sept., 1848 }	{ Sergt. Steel and Corp. W. Jenkins }	2	180	8730
St. Agnes, Seilly	13 May, 1850	1 June, 1850	Sergeant Steel . .	4	11	418
Goobilly Down, Cornwall	25 June ,,	28 July ,,	Ditto	4	9	442
North Rona, Co. of Ross	11 Sept. ,,	16 Sept. ,,	Ditto	4	5	428
Great Stirling, Aberdeenshire	14 Nov. ,,	6 Dec. ,,	Ditto	4	9	439

* Private E. K. Spencer took a few observations at these stations.

† A few observations were taken at this station by Corporal Jenkins.

⁵ Captain Yolland's 'Sector Volume,' p. xiii.

The list of stars selected for observation fell within the parallels of declination of $37^{\circ} 38'$ and $69^{\circ} 54'$. About two-thirds of this number were originally chosen, so as to admit of a continuous series of observations being made when the weather proved favourable throughout the night, and two observers were for some time employed with the instrument, who relieved each other after an interval of several hours' work. The observations were frequently carried on continuously for upwards of eight hours, but six hours' constant observing was reckoned a good night's work for one person, in consequence of the fatigue caused by his having to ascend twice to the table to make each complete or double observation. In the course of the service additional stars, not originally selected for observation, were occasionally observed, some of which were not found in the works of the best authorities. Two men, ready penmen, were also employed in booking, and in afterwards copying, the observations on the skeleton forms, for transmission to the map office at Southampton,⁶ where the necessary computations, in connection with the observations, were carried out and completed under the direction of Captain Yolland, R.E.

It would be out of place here to make any copious detail of the employment of the sappers on this special duty, belonging as it properly does to the history of the operation, and being so amply recorded in Captain Yolland's Sector Volume; but exception may fairly be taken to a few particulars in the personal services of the sergeant, which may prove interesting to the reader, and induce other non-commissioned officers in the corps to render themselves not only useful to their officers, but to deserve, in executing any important duty for which they may be selected, their confidence and approbation.

Sergeant Steel's first station was at Hensbarrow,⁷ from which

⁶ Captain Yolland's 'Sector Volume,' x. and xiv.

⁷ On journeying from Roach, in Cornwall, to Exeter, he sat by the side of the Astronomer Royal, who made various inquiries concerning the survey. At length, he asked, "What *instrument* have you been using?" "Professor Airy's zenith sector," was the reply. "Indeed! I am Professor Airy!" The surprise and pleasure of the sergeant, before unconscious of the presence of the eminent astronomer, may be left to the imagination of the reader to conceive.

The

he was removed to South Barule,⁸ and after completing his observations there, he was stationed for a time on the wild and romantic hill of Ben Lomond. There he witnessed a phenomenon which, perhaps, had never before been seen by any one. He had frequently been *above* the clouds, and at Hensbarrow, of a low altitude compared with Ben Lomond, he had observed the stars a whole night when the clouds *beneath him* were saturating with their vapour the little village of Roach below: but on Ben Lomond he saw extensive masses of cloud settle down into a level wide-spread stratum, the upper surface of which was at least 500 feet beneath the camp. This was after sunset, on the 10th of September, 1845, with a beautiful moon and a clear blue sky above, altogether presenting an impressive *coup d'œil*. Such was the depth and density of the mass, that it required the powerful influence of the sun's rays for the two following days to dispel it. The whiteness of snow was grey, contrasted with the silver hoar of the heavy cloud when the sun rose on the 11th, and it offered, said Steel, in his forcible language, "a strong temptation to a lover of nature's wildest grandeur, to treat himself to a celestial walk on its upper surface to the peak on the neighbouring hill." Some tourists ascended the mountain on the 11th and 12th of September in the true spirit of enthusiastic enterprise, wishing to connect their names in history with this startling, yet truly magnificent phenomenon, but their amazement was indeed great, when, after penetrating the cloud, they saw above them an encampment of soldiers carrying on the official services of the station, with all the activity

The incident is memorable, on account of the introduction, thus singularly obtained by sergeant Steel, and of the information he received from the Professor in the efficient use of the instrument, as well as in some salient points connected with astronomy.

⁸ At Hensbarrow he found the fixation of the sector an awkward process, the practice being to set it on four pickets, driven for the purpose into the ground. At Barule, however, he constructed a portable frame to meet the difficulty, which he used with success at all the subsequent stations where he was employed. He also effected an important improvement in the adjustment of the reflectors, by which means the light of the lamps was thrown with equal brightness on all the four microscopes.

and fearlessness of men accustomed to such extraordinary appearances.

At Ben Heynish, in Tiree, one of the westerly isles of Scotland, the sergeant had to struggle in watching and taking a few observations between the almost incessant storms. Next he was employed in the remeasurement of the latitude of Dunnose, the southern extremity of a British arc of meridian, to verify its result as determined with Ramsden's zenith sector in 1802, and also to test the value of Professor Airy's sector. The observations for this purpose were carried on both at Week Down and Dunnose. The near agreement in the results of the comparison proved very satisfactory as regards the work performed with both instruments; but to endeavour to trace the extent and amount of the disturbance that evidently affected the plumbline at Dunnose, the sergeant afterwards made observations both at Boniface Down and Port Valley, in the Isle of Wight, by which the difference in the geodetic and astronomical amplitudes between Greenwich and Port Valley were found to be almost insensible, and the comparison with Boniface Down and Week Down tolerably good. The discovery, however, of singular disagreements in the observations at one of the stations in the Isle of Wight, which had hitherto been looked on as the southern extremity of the longest of the British arcs of meridian, and where no sensible deviation could have been suspected, led to the re-examination of the northern extremity of the same arc, situated on Balta Island, by revisiting it, and by observing also from two other stations in the Shetland Islands contiguous to it.⁹ The disturbance alluded to—the effect of local attraction—caused the plumbline and level to be deflected or acted upon, as a loadstone would influence the needle of a mariner's compass, and thus, when the levels indicated that the instrument was pointed at zenith, it was in fact directed to a point nearly four seconds to the north of it.

To Unst, in Shetland, the northern extremity of the arc just mentioned, sergeant Steel now repaired, and ascertained the existence of a disturbance at Saxavord, but in the contrary

⁹ Captain Yolland's 'Sector Volume,' p. xi., xii.

direction. This was fully established by taking a similar series of observations at the Gerth of Scaw, near Lambaness, and on the small uninhabited island of Balta. The relative position of these stations he fixed astronomically as to latitude, and geodetically by triangulation and levelling from the mean level of the sea, which involved observations with regard to the ebb and flow of the tides. By the series of observations so far made, it was clearly proved, that the latitude of a place could not be measured with the degree of certainty formerly supposed, and that though astronomers may profess to give seconds, tenths, and even hundredths of a second of their latitude, yet the real truth is, that the record may often be *several whole seconds in error*. The discovery, now confirmed by sergeant Steel's inflexible accuracy, is likely to produce some interesting discussion in the scientific world, and has already been made the subject of an article in the 'Philosophical Journal of Science' for April, 1853, embraced in a review of Captain Yolland's Sector Volume.

After passing a station at Cowhythe Hill, in Banffshire, to verify the sector operations of 1813, and which object was satisfactorily attained, the sergeant fixed his observatory at Southampton, where, in carrying on the duty, he made various experiments to ascertain the cause of apparent errors. In taking the usual readings of the telescope micrometers, the value of the zenith point, derived from each double observation of a star, varied sensibly. To determine this more accurately, by ascertaining the true value of the divisions of the screw, and correcting the error involved in the reduction of the whole of the observation, he adopted the method of making two distinct observations of the same star without reversal of the revolving frame, in the manner described in the Sector Volume, page xxvii, and so excellent was this method considered, that the value of the screw thus obtained, was finally applied to all the observations.

In prosecuting the work, it was also evident, that the most northerly stars furnished the greatest, and the most southerly the least resulting latitudes. To arrive at the cause of this anomaly, sergeant Steel devoted much of his time to careful investigation, and his efforts and experiments were both inge-

nious and interesting. These embraced comparisons of the arc with Simms' dividing engine, by which the non-existence of any sensible error in the divisions of the limb that would account for the observed errors, was proved; but it was at the same time clearly ascertained, after a patient examination of the micrometer screws, the levels, the lenses, and the fullest consideration of the law of expansion by heat or contraction either by cold or pressure, that the immediate cause of the disparity arose from the compression of the divided limb by the downward pressure of the upper screw pivot, which, at each station, varied in proportion to the degree of pressure supplied. This was, ever afterwards, a special point of attention with the sergeant, and as, from the construction of the instrument, no absolutely permanent and uniform pressure could be insured at all times, he regulated its extent as well by his judgment as his recollection.

It was a rule with him, notwithstanding the apparent errors that might be the result, to register his observations with the strictest exactness. Experience had taught him to expect them as well from local as from indefinable causes. He considered, moreover, that the more perfectly an instrument was constructed, the more honestly would it report the discrepancies of both maker and observer, and that although the conclusions would seem to be a volume of errors, more credit and merit were due to the observer for ascertaining, instead of concealing or covering his errors. Influenced by this novel consideration, he threw an amount of earnestness, care, and faithfulness into his work, that rendered his observations of the highest class for accuracy, and deserving of the fullest confidence.

At Southampton he was assisted in the sector service for nearly twelve months by corporal William Jenkins: the one observed from sunset till midnight, and the other from midnight till sunrise. His final observations were at St. Agnes in Scilly, Goonhilly Down near the Lizard Point, North Rona, and Great Stirling—the north-east peak of Scotland. By this series of observations, the arc of meridian, which before terminated at Forth Mountain in the county of Wexford, and Monach in

Lewis, was extended to St. Agnes in the south, and to Rona in the north, a small, unknown, and stormy island, about 100 miles west of Orkney.

At Stirling, according to instructions, he examined the promontory to select for his observations a spot, which would be probably free from unequal attraction, and fix its position by triangulation. In this he was quite successful. The point was so far to the east as to be out of the direct meridional line of attraction of the hills lying south of Cowhythe, and by this series of observations it was ascertained, that the deflection which was found to exist at Cowhythe, is not general in those latitudes, and that the discrepancy between its observed and calculated latitude, is not due to an error in the figure used in computing the geodetic result, but to local attraction affecting the astronomical latitude.¹⁰ The fact of local attraction was now fully established; but from some peculiarities of its influence in particular districts, the inference derivable from it is, notwithstanding the skilful conclusions of scientific men, that the figure of the earth is *different* to the commonly-received opinion of its form.

In these later services he and his party were alike exposed to dangers at sea, and to trials and privations on land; and besides encountering many perils in difficult boat service, and in landing on almost inaccessible coasts and islets, they were on several occasions nearly shipwrecked.

A small party at Rona was subjected to severe hardships. Its number consisted of corporal Michael Hayes and ten civil labourers, who embarked with sergeant Steel's party on the 29th of August 1850 to survey the island. On the following day, by a desperate effort, the corporal and his labourers pushed into the boat, and taking with them a little provisions, scrambled amid the surf on shore; but as the weather was boisterous, and there was no harbour or anchorage in which the schooner could lie-to, she was compelled to return that evening to Stornoway with sergeant Steel and the sector party. Several days were now spent in intrepid attempts to regain the island, but such

¹⁰ Captain Yolland's 'Sector Volume,' p. xii.

was the roughness of the sea, and such the fury of the wind, that all efforts to do so proved fruitless; thereupon, the master of the vessel considering the undertaking to be impracticable threw up his contract, and it was not until the 7th of September, when another vessel had been engaged for the service, that Rona was approached, and a landing effected. All this time, seven days and eight nights, corporal Hayes and his party were pent up in Rona upon a very scanty allowance of food, and exposed without shelter of tent or hut, or even the comfort of warm clothing, to the cold and tempestuous storms of that dreary and desolate island.

1851.

Malta—Portsmouth—Swan River—Brown Down Batteries—Kaffir War—Strength of sappers at the Cape—Corporal Castledine—Attack on Fort Beaufort—Whittlesea, &c.—Skirmish near Graas Kop Tower—Also in Seyolo's Country—Patrol—Fight at Fort Brown—Patrol—Storming Fort Willshire—Patrols—Action at Committy's Hill—Gallantry of corporal James Wilson at Fort Cox—Patrols—Increase to the Cape by withdrawal of company from the Mauritius—Sir Harry Smith's opinion of the sappers—Eulogies concerning them by Lieutenant-Colonel Cole and Captain Stace, R. E.

THE fourth company under the command of Captain Craigie, R.E., was removed from Portsmouth on the 3rd January, and sailed from Southampton for Malta, where it landed on the 17th of that month. This was a new station for the corps, and its employment there was recommended on the ground that its services would be of great advantage in the erection of the proposed fortifications, and in providing an efficient force for the purpose of defence, in the event of the contingencies of the times rendering its co-operation desirable. Head-quarters were established at Valetta, and a large detachment was sent to St. Clement's to build new barracks. Much opposition was shown by the working people to the employment of the company for months after its landing, and even violence in some instances was resorted to. The press of the island also entered into the controversy, and the 'Mediterraneo' used its agency in strong editorial articles against the company to effect if possible its removal from the island; but the 'Malta Times' ably defended it, and successfully exposed the statements of its contemporary. Malignant as the 'Mediterraneo' was, it nevertheless concluded one of its articles thus:—"The sappers

and miners are, we admit, a most efficient and therefore highly useful body of men everywhere."

Immediately on the removal of the company to Malta another from Chatham succeeded it on the works of the royal engineer department in the Portsmouth district.

The small party of five men at Freemantle, Western Australia, was this year increased to a company by the arrival of ninety-five non-commissioned officers and men under Lieutenant Wray, R.E. The additional force was sent out to superintend the convicts in the erection and repair of the various public works and buildings, and to afford military protection to the colonists in the event of any demonstration of the convicts against authority or the settlers. The first detachment of sixty-five non-commissioned officers and privates embarked at Woolwich 10th September, 1851, under Lieutenant Wray, and anchored in Gage's Roads 17th December, 1851. The second, under Lieutenants Crossman and E. F. Du Cane, R.E., of two sergeants and twenty-eight rank and file, embarked as a convict guard 21st October, 1851, and landed 2nd February, 1852. The number of women and children that accompanied the parties were seventy-one of the former and ninety of the latter, and ten children were born on the voyage. Located for a time as a sanitary expedient on a slip of land running into the sea, called Woodman's Point, the company was removed as soon as the restriction was rescinded to Freemantle, where the projected works for the formation of the convict establishment at once commenced. Many of the men were appointed instructing-warders, with working pay at 2*s.* a-day each. The company was soon after distributed in small sections through the penal district, superintending the formation of labour depôts for ticket-of-leave men, or working at their trades at the different convict buildings, bridges, &c., and also in the making of roads. One man for many months assisted in the duty of exploring and surveying a portion of the colony under the Surveyor-General; and another—private John Cameron—did good service as a diver in recovering from the wrecks of vessels on the coast, treasure and valuable property.

An additional company was added to the Portsmouth district by the arrival at Gosport from Woolwich on the 10th December, of the second company under the command of Captain J. H. Freeth, R.E. The object of this reinforcement was to enable the commanding royal engineer to construct two large earthen batteries on the sea-shore at Brown Down, some two or three miles below Gosport. As soon as the works were completed, the company, early in April, 1852, was removed to Chatham for instruction in the field duties of the corps.

Hostile irruptions had occasionally been made on the frontiers of the Cape of Good Hope by the Kaffirs from the adjacent territories, and murders of peaceable subjects perpetrated, which rendered it essential to check by force of arms both their incursions and their crimes. With that intention the first movement of troops took place in December, 1850. The opposition of the enemy was determined and furious, and there was every appearance in the onslaught to induce the belief that the contest would be severe and protracted.

At the period of the outbreak the total of the sappers in the colony, scattered through fifteen posts and forts on the frontiers, was about 200 of all ranks, and notwithstanding that their services were much required in carrying on the temporary defences, they were, in this war, called upon for a more general co-operation than in any previous struggle in the colony.

From the unexpected firing of a field-piece from the tower of Fort Beaufort on the 20th January, 1851, it was feared that the enemy by some means had entered the place unobserved. Corporal Benjamin Castledine of the corps, without any delay, reported the circumstance to Colonel Sutton, Cape mounted rifles, and received his orders to assemble the troops under arms at their several posts. The order was promptly obeyed; but scarcely had it been effected when a reinforcement of the Graaf Reinet levy rode up, and the tumult was readily explained. The firing was given as a salute to the reinforcement by some imprudent civilians who had not communicated their intentions to the authorities. The people who had thus so alarmed the fort were arrested, so that the affair might be

fully sifted ; but while measures were being taken with this object by Captain Pennington and a detachment of the 91st regiment to secure the persons of the offenders, a concourse of people assembled at Colonel Sutton's quarters, where his lady was alone and unprotected, and there departed themselves with gross outrage, at the same time demanding an entrance. Corporal Castledine arrived at the moment, threw himself between the garden-gate and the excited people, and effectually prevented, by his firmness and military bearing, the ingress they so valorously sought. The party then made off, but all concerned were afterwards arrested to await the result of a full inquiry into their conduct. At this investigation, the explanations given being sufficiently satisfactory to exonerate them from the perpetration of intentional alarm or of complicity with the enemy, the Colonel at once released them from restraint. The "Graham's Town Journal" of the 8th February, contained some animadversions on the conduct of corporal Castledine in this matter, which led Colonel Sutton, in the impression of that journal for the 22nd February, to vindicate in every particular the corporal's conduct, and added, "Corporal Castledine is one of those well-educated, respectable, and efficient soldiers which are only at present occasionally met with. * * * During twenty-four years' service as a regimental officer I have never met corporal Castledine's superior in his position—seldom his equal."

In the attack on Fort Beaufort in which Hermanus was killed, corporal Castledine was posted with seven sappers in charge of a tower where the ammunition was kept, and commanded a 24-pounder howitzer mounted on it. The post of honour was given to this trustworthy non-commissioned officer in anticipation of an attack from Sandilli, who showed in force on the opposite side of the town. At the commencement of the action corporal Castledine was nominated to be garrison sergeant-major, and held the appointment until ill health compelled him to resign. This occurred in February, 1852, when Major-General Somerset, in a division order, acknowledged that "corporal Castledine had performed its arduous duties

with the highest credit." Colonel Sutton, for many months, was the only officer at Fort Beaufort, and on many occasions, when the nature of the service required his presence elsewhere, corporal Castledine commanded the garrison in his absence. Often he had to send escorts of provisions and ammunition to supply General Somerset's division, which service was always so satisfactorily performed that both the General and Colonel Sutton repeatedly commended him for his judgment, promptitude, and zeal.

Five rank and file attached to Captain Tylden, R.E., employed surveying in the territory of the chief Mapassa, being interrupted in the duty, were now necessarily occupied in adopting expedients for protection. Early in the year they assisted the inhabitants of Whittlesea in strengthening their houses against attack, and in converting the village into a strong defensible position. Afterwards they constructed a small musket-proof redoubt of dry stones, twelve feet square, with walls three feet thick and seven high, round their own camp, to protect the field guns, military stores, and equipment. The waggons were also brought into requisition, and stone walls were built up under them to render them defensible. By the evening of the second day everything was completed. Into this miserable post the Captain with his five sappers, one officer, a sergeant of police and his wife and four children, took refuge. The sappers worked so hard during the day that the Captain had to take his turn at sentry during the night.¹ Soon after these precautionary services, repeated actions took place between the garrison with the levied troops raised by Captain Tylden, and the neighbouring tribes, in every one of which, though attacked by an immensely-superior force, the little band beat off their assailants with severe loss, and gained for it the admiration and thanks of the General commanding-in-chief. The desperation and difficulties of their isolation, coupled with the paucity of their numbers, whetted their spirit of enterprise, and though their endurance and heroism might

¹ Letter of Captain Tylden in the 'Times,' April 23, 1851.

be equalled, they could never be excelled. In all the operations at Whittlesea, and in the actions with the tribes at adjacent places, as many of the few sappers as could be spared from the redoubt and the village were engaged, who participated with credit in the frequent desperate attacks, exceeding twenty in number, which it fell to the good fortune of Captain Tylden to repel, and to his stratagetical tact and prowess to win.

Sergeant John Poole accompanied a patrol of fifteen mounted men on the 18th February, under Ensign Gill of the Cape mounted rifles, in pursuit of Kaffirs. Near Grass Kop Tower the spoor of cattle was discovered and followed up to within sight of Double Drift, where some cattle were seen in charge of about twenty of the enemy. Taking at once to the bush, half the detachment advanced, unperceived, until within a few yards of the kraal, where the Kaffirs fought for a short time, and then fled to the river. In crossing the stream, sergeant Poole shot one of the rebel Kaffir police, and one of the two other Kaffirs who were killed on the occasion. In this gallant affair the patrol captured 106 head of cattle, 2 guns, 3 horses, &c., and received the approbation of Sir Harry Smith. Sergeant Poole was second in command of the party.

One sergeant and twenty rank and file were attached, on the 28th March, to a patrol of 900 men under Major Wilmot, R.A., and assisted in the devastation of Seyolo's country until the 31st March. With a detachment of the 6th regiment the sappers remained in charge of the pack-horses and ammunition, and when attacked, vigorously dispersed the enemy. Private George Wilson killed two Kaffirs in this skirmish, and private Charles Jarvis was wounded, the ball striking the fore-finger and thumb, and lodging in the stock of his carbine.

Two rank and file under Lieutenant Jesse, R.E., were present in the field with Major-General Somerset's division from the 27th March to 9th April. During this patrol the country was scoured near the old Tyumie Post, Hertzog, Eland's Post, and the adjacent highlands. The two men were found very useful in repairing the numerous bad drifts through which the

guns and waggons had to pass, and in the execution of various incidental services of a professional character.

Sergeant John Poole and one corporal of the corps were present in repulsing a midnight attack on Fort Brown on the 9th April. The enemy consisted of ninety-three Hottentots and fifteen Kaffirs. Robert Dunlop of the corps was the corporal of the guard that night. Hearing the dogs barking more than usual, he went out to see that the sentries were on the alert; but finding the Hottentot posted over the cattle, away from his post in a cloak, he was satisfied of the existence of some traitorous design, and discovered that the enemy was already in the kraal. Giving the alarm, the guard and the military in the fort were quickly assembled, and, under the command of Ensign Gill of the Cape mounted rifles, a sharp action for two hours was maintained, when the enemy was driven from the fort with great loss. The rebels attacked both the tower and the kraal; but from the latter they succeeded in carrying off about 200 head of cattle.²

From the 20th to the 24th April, four sergeants and seventy-six rank and file under Lieutenant Pasley, R.A., were despatched, with Major Wilmot's patrol, into the country of Stock and Seyolo. Near the Keiskama the sappers and artillery were placed in ambush to attack the flank and rear of the enemy, while the main body of the patrol engaged the Kaffirs in front. The country through which the division passed was very perilous, consisting of high kloofs and dense bush, broken by precipices. In this march the sappers assisted in destroying about 100 huts, several large gardens of the enemy, and capturing some large granaries of corn. In returning, the detachment, acting with the 6th regiment as skirmishers, kept the enemy at bay and desolated their crops.

On the 30th April, two sergeants and forty-eight rank and file, in burgher jackets, and laden with provisions and the usual war equipment, were engaged with the Kaffirs on the march from the Chumie junction to Fort Wiltshire, and shared in storming and driving them from the heights, where they had

² 'Parliamentary Papers,' Cape of Good Hope, June, 1851, p. 47.

occupied a strong position, under cover of the ruins of an old tower and a detached outwork. On the 1st May the party was again in action on the Keiskama; and after five days' patrolling through the territories of Seyolo, Stock, Sonto, Tola, and Botman, regained King William's Town on the 2nd May. The troops were reported to have conducted themselves admirably. As the sappers re-entered King William's Town, Sir Harry Smith welcomed them by saying, with characteristic cordiality, "Well done, my lads; you can both build works and storm them!"

Two sergeants and sixty-nine rank and file, from the 9th to the 13th May, were employed with Major Wilmot's patrol in the Amatola Mountains. In carrying out the service, the division penetrated difficult and precipitous fastnesses, surprised several of the enemy, and captured some cattle. The sappers were reported to have conducted themselves on this duty with willingness and zeal.

From the 17th to the 22nd May, one sergeant and twenty-one rank and file accompanied a patrol of 800 men under Major Wilmot to Seyolo's country as far as Fort Peddie, and returned with a convoy of waggons, cattle, &c. A similar patrol of two sergeants and forty-one men scoured the Amatola range, was once engaged with the enemy near Bailie's Grave, and returned to King William's Town, after a harassing march of seven days, on the 31st May. One sergeant and twenty men were out with another detachment under Major Wilmot as far as Fort Peddie. The march extended over ten days, and the patrol returned to King William's Town on the 14th June. Again from the 19th to 21st July two sergeants and forty-nine men were detached with Colonel Eyre's patrol, and assisted in clearing the rebels out of the Buffalo Poorts and Mount Kempt. The marching was very heavy, being for the most part, between eighty and ninety miles, through dense bush.

Under Captain Robertson, R.E., four sergeants and seventy-seven rank and file quitted King William's Town, with the force, about 400 strong, under Lieutenant-Colonel Burns of the 2nd Queen's on the 30th August. A body of Kaffirs and

Hottentots being at Committy's Hill, the troops marched on the 1st September from their bivouac at Fort Montgomery Williams by Breakfast Vley to the hill. One division of the sappers was extended as flankers on each side of the advancing column, and upon them a galling fire was soon opened from the bush. The sappers readily charged into it, and where the thicket could be penetrated drove the enemy back; but the denseness of the kloof in rear afforded the Kaffirs much security in retreating. Having ascended the summit of the hill the sappers faced right about, and made a rapid charge down the hill on the enemy, who were gradually collecting in the bush from which they had just been driven, and inflicted considerable loss upon them. The charge was made with cheering, yet not in a hurry; the men stopped at each kloof and fired volleys into it, and then dashed after the fugitives. "It is most gratifying," writes Captain Robertson, "to report the admirable and gallant conduct of the men under my command during this conflict which lasted nearly three hours, and of the readiness with which they advanced to carry off the wounded of their own and of other corps under a heavy fire." The officers of the 2nd Queen's spoke in terms of high commendation of the spirited manner in which the sappers acted, and of their cheerfulness in obeying their officers. Private James Murray behaved with great courage in exciting the men both of the 2nd and his own corps to follow him. Running forward like one whose life depended on the action of the moment, he was followed by several who lined the bush to which he drew them, and some fell in their gallant exertions. Among them were private James Fergus, whose arm was pierced by a ball which passed through the left breast and out near the spine below the heart. He died in camp soon after the action. Private Patrick Conroy, a cool and brave soldier, fired at a Kaffir more than 300 yards away and killed him. Private John Arthur came in contact with one in passing round a bush, and in a personal conflict laid him dead at his feet; and private Robert M'Intosh, whilst in the act of ramming home a cartridge, saw a Hottentot about to fire at him, but not having time to with-

draw the ramrod capped and fired, and the ramrod passed through his opponent's body. Lance-corporal Hosick Cowen and privates Charles Foot and Thomas Brooking were wounded; the last severely.

At Fort Cox, on the 28th September, second-corporal James Wilson behaved with intrepidity in repulsing a meditated attack on the cattle-guard. A body of Kaffirs intended to drive the cattle from the post unperceived, and then to massacre the guard. Two civilians and the corporal happened to go out at the time for recreation to an unfrequented spot, and were unconsciously directing their steps to the bush where the enemy were concealed in ambush. Fortunately one of the two in advance fired a random shot, and suddenly more than 200 Kaffirs made their appearance. The civilians were in front, and the corporal considerably in rear followed in support. A sharp fire now opened on the corporal, and the enemy made a disposition to surround him; but the corporal stealthily retired, and took up a favourable position, from which he kept up an unerring fire on his adversaries, who fortunately for him seemed more bent on capturing the cattle than spending their efforts in beating down a single opponent. Taking advantage of their predatory activity, the corporal shot down five of the Kaffirs before any assistance was rendered by the military cattle-guard. On being apprised of the approach of the enemy, the guard lost no time in collecting and driving off the cattle to a place of security, but in the attempt two soldiers of the 45th were shot dead. The Kaffirs at once stripped them, and placing their red jackets on their own bodies, danced frantically at their triumph. While this scene of exultation was going on, corporal Wilson, through the intricate windings of the bush, cautiously neared the group, and firing, one of the savages received the ball from his carbine and fell dead. On the troops advancing, the corporal at once joined them, and assisted in driving the enemy from the post.³

³ The incidents of this affair, for the most part, are taken from a Cape paper. One day this corporal was fishing in the Keiskama, armed with a loaded carbine, when he was approached from behind by a Kaffir. The latter fired, and

From the 14th to the 31st October, two sergeants and thirty-one rank and file served in the field operations with Major-General Somerset's division in the Water Kloof, Fuller's Hoek, Blinkwater, and Kat river. Again, from the 4th to the 7th November, two sergeants and forty rank and file were on patrol in Seyolo's country; and again, from the 1st December until the 18th January, nine rank and file were present in the long marches and difficult services of the division under Colonel Eyre. This party was intended to cut loop-holes in the missionary station at Butterworth. The Indian-rubber pontoon raft taken with the party, was used in the passage of the Kei. This service occupied two days, and the sappers worked with much ardour in its accomplishment.

With the exception of two or three patrols, in which the sappers were commanded by the officers already named, it was the good fortune of the corps in every instance during the campaign to be under the orders of Captain C. D. Robertson, R.E.

The cessation of the works at the Mauritius made the services of the company there available for duty at other stations. Accordingly, with the sanction of Earl Grey, the seventeenth company, under Captain Fenwick, R.E., quitted the island on the 25th October, and landed at the Cape of Good Hope on the 19th November. The force of sappers on the Eastern frontier now consisted of three companies, and counted 276 men of all ranks.

Speaking of the reinforcement Sir Harry Smith thus wrote to Earl Grey, under date the 4th October, "I assure your Lordship that I very much appreciate the value of this reinforcement. No officers and soldiers in Her Majesty's army do their duty in a more gallant and exemplary manner."⁴ On the

corporal Wilson, who was untouched, fell as if killed. Warily the Kaffir neared the spot; but the corporal, watching his opportunity, jumped up and shot his opponent. The wound was not fatal, but a blow from the butt end of his carbine sealed the Kaffir's fate, and the corporal took home his head as a trophy.

⁴ 'Parliamentary Papers,' Cape of Good Hope, presented February 3rd, 1852, p. 164.

same date, Sir Harry thus wrote to Sir John Burgoyne, the inspector-general of fortifications, "I have 120 sappers here now, under as gallant a fellow as ever lived—Captain Robertson. These men are the finest soldiers I almost ever saw, and have taken their tour of most arduous patrol duty heart and soul."

"From being employed on the works," wrote Lieutenant-Colonel Cole, the commanding royal engineer, "and their usual industrious habits, the men were generally found to endure long marches and fatigues better than the line, particularly in the commencement of the war." "Besides," said Captain W. C. Stace, R. E., "the performance of garrison, patrols, and escort duties in the field at most of the posts on the frontier, the works provided for in the annual estimates, and several special and numerous incidental services, many of them contingent on the war, were executed by the sappers and miners, and their important and valuable services have been duly acknowledged to me verbally by different officers. The want of such a body of men would have been seriously felt on many urgent occasions during the war, in consequence of the difficulty at all times, and sometimes impracticability, to obtain artificers when required."

1851.

GREAT EXHIBITION.

Sappers attached to it—Opening—Distribution of the force employed—Duties; general superintendence—Clerks and draughtsmen—Charge of stationery—Robert Marshall—Testing iron work of building—Workshops—Marking building—Receiving and removing goods—Custom-house examination—Fire arrangements—Ventilation—Classmen—Private R. Dunlop—Clearing arrangements—Miscellaneous services—Bribery—Working pay—Close of the Exhibition—Encomium by Colonel Reid—Also by Prince Albert and the Royal Commissioners—Honours and rewards—Their distribution—Statistical particulars—Lance-corporal Noon—Removing the goods—Return of companies to Woolwich—Contributors to the Exhibition—The Ordnance survey—And Mr. Forbes, late sergeant-major.

It was the good fortune of the royal sappers and miners this year to be associated with the Great Exhibition of the Industry of all Nations, by which its name and character, its acquirements and usefulness, became more extensively known, appreciated, and commended. For this honour, the corps is indebted to Lieutenant-Colonel Reid, the chairman of the Executive Committee. Receiving the cordial concurrence of his civil colleagues, he represented to Prince Albert and the Royal Commissioners, the desirableness of military co-operation for carrying out the subordinate details of the work. The measure—at once approved of—was ordered to be carried into effect, and accordingly, three lance-corporals—Richard Rice Lindsay, Thomas Baker, and Charles Fear—were attached on the 11th September, 1850, to the executive committee. The two former were clerks and draughtsmen, and the latter an ingenious mechanic and modeller. Their first duty was to execute a plan and model of the proposed arrangements for the Exhibition. By the end of the year, fifteen rank and file, clerks and draughtsmen, including a founder and an engineer, were added to the

party, who for a time were quartered in Kensington cavalry barracks. By degrees the force continued to augment, and at last by the arrival of the fifth and twenty-second companies, under Captains Owen and Gibb, R.E., and a strong detachment under Lieutenant Stopford, R.E., who was appointed acting-adjutant, the corps, on the 21st April, 1851, counted 200 non-commissioned officers and men. This was the greatest number of the sappers ever employed at the Exhibition. The enlarged force was furnished on the ground that as the corps was composed of artizans, its services would be especially useful, particularly in the mechanical part of the arrangements. As soon as the small cavalry barrack was full, the subsequent arrivals at the Exhibition were quartered in the royal palace at Kensington, and ultimately the detachment in the former barrack was also removed to the palace.

Just prior to the opening of the Exhibition on the 1st May, parties of the corps placed barriers across the various entrances into the building and also at some of the naves leading into the transept. At each outer barrier a small section of men was posted to prevent its removal, or the ingress of persons not authorized to view or take part in the state ceremonial. Within the area of the transept a strong detachment was stationed near Her Majesty, to attend to any orders which Prince Albert or the Royal Commissioners might see necessary to enforce. As the crowd kept flowing in, the barriers to protect the space round the throne were in part swept away by the excusable impetuosity of the throng, and the entire space of the nave seemed to be permanently in possession of the spectators. In this emergency Colonel Reid called out a party of sappers who soon restored order, "and thus," wrote 'The Times,' "added one additional service to the many others which they had contributed for months within the walls of the Exhibition." With temper and management the confusion soon subsided, and by ten o'clock order was established, and proper facility afforded for the royal progress round the nave of the building.¹ Immediately the Queen proclaimed the Exhibition

¹ 'Times,' May 2, 1851.

opened, the sappers removed the barriers, and the avenues of the building were at once rendered free for the unrestrained passage of the people. For the temperate, quiet, and efficient conduct of the sappers on the occasion, they received the thanks of Colonel Reid, Sir George Grey, the Home Secretary, and Sir Richard Mayne, the Chief Commissioner of Police.²

The subjoined table shows the strength of the corps at the Exhibition at the beginning of each month from October, 1850, to December, 1851, and also illustrates the divisions of labour in which the several parties were occupied.³

RANKS—DISTRIBUTION.	1850.				1851.											
	30th Sept.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Strength:—																
Colour-Sergeants	.	.	.	.	.	.	2	2	2	2	2	2	2	2	2	2
Sergeants	.	.	.	.	.	.	4	4	6	4	6	5	6	4	3	2
Corporals	.	.	.	.	.	1	7	10	7	10	6	10	10	9	9	2
Second Corporals	1	1	2	2	3	10	13	8	14	10	13	10	9	8	3	3
Privates	6	5	5	9	11	31	142	158	160	155	137	144	142	132	154	17
Buglers	.	.	.	.	.	.	2	4	4	4	4	4	4	4	4	1
Total Strength	7	6	7	11	13	37	167	193	186	191	164	179	172	159	179	24
Distribution:—																
General superintendence	.	.	.	.	.	.	2	2	2	2	2	2	2	2	2	2
Clerks, draughtsmen, autographic press, &c.	4	3	4	8	9	15	13	25	17	17	17	22	22	17	7	7
Charge of stationery, &c.	.	.	.	.	.	.	2	2	2	2	2	2	2	2	2	2
Testing iron-work	2	2	2	2	2	2	2	.	.	.	.	.	.	.	.	.
Modellers—workshops	1	1	1	1	1	1	1	2	10	10	10	10	8	7	2	1
Lettering and laying out passages	.	.	.	.	.	18	18	10	.	.	.	.	.	.	.	.
Receiving, arranging, unpacking, and removing goods	.	.	.	.	.	.	44	46	23	28	.	12	3	5	12	4
Custom-house examinations	.	.	.	.	.	.	24	24	6	6	4	4	2	2	10	2
Charge of gates	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.
Charge of fire-engines, &c.	.	.	.	.	.	.	14	9	20	20	20	22	20	12	3	3
Ventilation	.	.	.	.	.	.	.	2	2	2	2	1	1	.	.	.
Class superintendents	.	.	.	.	.	.	21	48	46	46	49	50	41	42	3	.
Cleaning British side of building	.	.	.	.	.	.	.	.	38	38	38	38	37	39	.	.
Collecting and arranging specimens	.	.	.	.	.	.	.	.	.	.	.	.	13	4	4	4
On guard	.	.	.	.	.	.	4	4	4	4	5	5	5	5	5	5
Cooks and cooks' mates	.	.	.	1	1	1	10	8	9	9	6	6	8	8	10	1
Sick	.	.	.	.	.	.	7	9	3	5	3	2	1	1	2	.
Absent from various causes ^b	.	.	.	.	.	.	1	3	1	2	.	.	4	3	3	.
Tailors	.	.	.	.	.	.	3	1	.	1	2	2	3	8	4	.
On command ^c	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.
Total	7	6	7	11	13	37	167	193	186	191	164	179	172	159	179	24

^a Part of day only.

^b Duty, furlough, pass, &c.

^c Clerk, Royal Engineers' Department, Glasgow.

² First Report Royal Commissioners, Exhibition, App. xxv., p. 128.

³ Ibid., App. vi. p. 50.

A brief but more extended exposition of their duties than the above detail adduces, is here given to show the general nature of the connection of the sappers with the Exhibition, and the availability of the men to discharge onerous duty and varied occupation.⁴

One of the colour-sergeants during the arrangements superintended the sappers on the British side, and the other on the foreign side. After the opening of the Exhibition, colour-sergeant Thomas Harding acted as sergeant-major; and colour-sergeant Noah Deary as foreman of works, in the repair of damages which accidents and the pressure of the crowd were continually causing to the railings, counters, &c. On two or three occasions when there was a press for money-takers, colour-sergeant Deary and sergeant Thomas P. Cook and William Jamieson did duty as collectors.

The clerks were employed under the various officers, military and civil, of the Executive Committee; the draughtsmen, partly under Sir W. Cubitt and Mr. M. Digby Wyatt, when they found such assistance necessary in the superintendence and record of the progress of the building; but principally under the Executive Committee, in making the numerous plans which were necessary during the preliminary arrangements. It was from their surveys and drawings that the plans in the Commissioners' First Report were made. The men employed as clerks and draughtsmen varied at different times from three to forty in number. One of the men, lance-corporal John Pendered, was also employed in working an autographic press, which was useful when a few circulars were required at a short notice. The facility with which he acquired a knowledge of the apparatus was creditable to his aptitude, and the simple method he adopted to throw off the copies with rapidity and clearness proved him to be intelligent and skilful. The most distinguished of the draughtsmen were lance-corporals James Mack, Thomas Baker, and Nicholas Clabby, corporal Archibald Gardner, and lance-corporals Richard R. Lindsay and John

⁴ Chiefly from the First Report, Royal Commissioners, Exhibition 1851, App. vi., p. 48.

Venner. The large plans, both of the ground and galleries, made for the convenience of the visitors, to enable them to find their way more easily to the parts likely most to engage their curiosity, and which were displayed at the south side of the transept during the later months of the Exhibition, were prepared by corporals Mack, Baker, Gardner, and Clabby. Both were considered to be highly-creditable specimens of drawing, combining boldness and skill with perspicuity. A daily journal, after noticing one of the drawings, made some flattering allusions to the proficiency of the sappers employed on the national surveys.⁵ The plans were each twenty-one feet long by six feet wide. Similar drawings on a very reduced scale, from which the plans in the first report were engraved, were executed by corporals Gardner, Mack, Clabby, Venner, and Lindsay, but the principal and most effective part of the work devolved on corporal Mack. The ground plan was drawn by the three first-named non-commissioned officers, and the galleries by corporals Mack and Venner. The interesting coloured diagram to show the fluctuations in the number of visitors, and other characteristic details, was wholly drawn by corporal Mack. The plan of the exhibition building to illustrate the water-supply, and measures for security against fire, was drawn by corporal Lindsay. These four drawings comprised the plans in the First Report.

The chart exhibited in the transept on the 6th October, to show by diagrams the fluctuations in the number of visitors to the building, was prepared by corporals Gardner and Mack, under the direction of Captain Owen. 'The Times,'⁶ said it was a production of great merit and of much public interest, and resembled those scales of mountain elevations usually prefixed to atlases. The shilling days were the Himalayas and Andes of the chart, while the half-crown and five-shilling days were represented by heights of much lower altitude. With the permission of the Executive Committee, these two non-commissioned officers compiled, on the same principle, a similar diagram with more copious general information, for the pro-

⁵ The 'Times,' July 2, 1851.

⁶ October 7, 1851.

prietors of the 'Weekly Dispatch,' from which an engraving was made, and copies in immense numbers were thrown off and issued on two stated occasions to the purchasers of that newspaper. Referring to the great chart shown in the Exhibition, the 'Weekly Dispatch' thus wrote: "This chart, which is beautifully executed, and is altogether a production of very great merit, reflects the utmost credit upon the authors—corporals Gardner and Mack of the royal sappers and miners, a corps which has rendered most intelligent and valuable service to the Exhibition."⁷

Corporal Baker, under Mr. Henry Cole, had the honour of preparing a coloured plan of the arrangements for Her Majesty, another for Prince Albert, one for the Duchess of Kent, and several for the members of the Royal Commission. He also surveyed the whole of the arrangements on the ground floor. In an instructive article in 'Chambers' Journal,' on the 'Crystal Palace,' allusion is popularly made to this portion of the sappers' duty, and it is justly added, that "the men were found very useful."⁸

During the latter months of the Exhibition, corporal Clabby recorded hourly the number of visitors who had entered the building up to the time of making the registry. This he did on a large sheet of paper fixed in the transept, at a sufficient elevation for the public to consult it. The rush at the moment of making the record was always great, and the interest with which the corporal was greeted and questioned by the curious, was accompanied by many honourable indications of kindness and good will.⁹

Two men were in permanent charge of the receipt and issue of printed forms, and all articles of stationery to the various officers. Second-corporal John Vercoe was in chief charge. He also assisted as a clerk, and was pay-sergeant for Lieutenant Stopford's detachment. From the 2nd October, 1850,

⁷ October 12, 1851.

⁸ March 1, 1851, p. 130.

⁹ Apprehensive of accidents, the *public* registry of the numbers was, a few days before the closing of the Exhibition, abandoned at the instigation of the police authorities.

to 23rd January, 1851, he had the charge of the party then at the Exhibition, and for his courteous deportment and address, was well spoken of by those with whom he was brought in contact.¹⁰

Two men were employed during the erection of the building in testing the cast-iron girders and columns with an hydraulic press, &c., and in ascertaining that all the bolts were sufficiently screwed up; also in keeping a record of the ironwork fixed each day. This duty was intrusted to lance-corporals Robert Fleming and Joseph Barrow; the former tested the girders, and the latter the proper adjustment of the fitments and bolts. In cases of dispute about the practicable application of some defective columns and girders, the opinion of corporal Fleming was, on three or four occasions, sought for; and he gave it in so clear and manly a manner, that his views were readily followed by the contractors. It is not a little remarkable that this non-commissioned officer was the only sapper recommended by Sir William Reid for promotion, during the period that the Colonel commanded the corps at the Exhibition. Corporal Barrow, when not employed in examining the fitments, took his place in the drawing-room, and notwithstanding the rough occupation he had been accustomed to, was found efficient. For the successful stability of the building, some little credit is at least due to these two humble officials. Their exertions were very great, and their vigilance in the important work intrusted to them was fully equal to the responsibility.

¹⁰ Robert Marshall, formerly a private in the corps, was also attached to the stationery department. From this he was promoted to be collector from the money-takers. After the Exhibition closed, he received a gratifying testimonial from Earl Granville, and a gratuity of one month's pay from the Royal Commissioners as a recognition of his services. In consequence of his industry and honesty, he was one of two or three retained for employment under the Commissioners, from whom he was transferred to the Department of Practical Art, to assist in superintending the reception and classified organization of the Trade Museum of specimens presented to it from all countries. In this duty his disciplined habits of order and arrangement made his services of great utility and value. He now holds a lucrative appointment as superintendent to a boarding establishment in London, under the Electric Telegraph Company, obtained for him, in consequence of his creditable conduct at the Exhibition, by Major-General Wyld.

Soon after the building was constructed, and before the goods began to be deposited, it was considered desirable to ascertain the effect of regular oscillation in the galleries. Experiments of different kinds were tried, but to carry out that which was regarded as the most trying, a strong detachment of the corps in close columns, keeping military time and step, was marched several times up and down, and round, and finally were made to mark time. With the result of this last test the eminent scientific men present expressed themselves highly gratified, and the incident was considered to be sufficiently interesting to become the subject of illustration in a popular journal.¹¹

Lance-corporal Charles W. Fear made, in the early part of the arrangements, a model of a portion of the building for the information of the Royal Commissioners, and afterwards was employed in making small models of counters of various parts of the building and other things of the kind required during the progress of the work. After the opening of the Exhibition a party was employed in repairing damages caused to the railings, counters, &c., and in copying, in model, some of the simplest and most instructive mechanical inventions and appliances for provincial institutions. The better to carry out the new style of constructing models, four of the party attended lectures on the subject delivered by Professor Cowper at King's College, Somerset House.

A party, varying from five to twenty-five men, all painters, was employed during the arrangements in numbering and lettering the columns, and laying down on the floor of the building the plan of the proposed passages and counters. Lance-corporal John Venner, who also worked as a clerk and draughtsman, was conspicuous in this division of duty. Corporal Archibald Gardner, also a draughtsman, was in great request for printing. The facility with which he lettered notices, labels, &c., required in *an instant*, brought him greatly into favour with the officials. The amount of work he had to execute rendered it indispensable that some more convenient substance than Indian ink, which

¹¹ 'Illustrated London News,' March 1, 1851.

took an immense time to grind, should be found. This he effectually provided, and thereby caused a considerable saving of expense. Gas-stoves were used in the Exhibition offices, in which he observed a very available description of soot to accumulate; and carefully collecting the material and mixing it with common ink and a little glue, he manufactured an abundance of a fine jet black preparation, which was always ready for emergencies.

The number available for unloading the goods when they were coming in varied from twenty to fifty men, and was not sufficient without the assistance of considerable numbers of porters from the docks. As the waggons containing the packages arrived within the building, they were driven to the centre of the transept and there unloaded and marked by a Custom-house officer. From the transept relays of sappers conveyed the packages in trucks to the compartment of the foreign country from which they had been consigned, where another band of Custom-house officers was ready to receive them. There was always a fresh supply of sappers with chisels and other implements to break open lids or other coverings, and who, with military determination, swept everything before them until the goods were revealed. This was the usual course of the reception arrangements.¹² "We have here," writes a London journal, "to commend the aptitude and intelligence with which the force of sappers execute the duties intrusted to them. So quietly and precisely do they obey instructions, that their assistance is properly considered of material consequence to the punctual fulfilment of the arrangements in which they are concerned."¹³ Another thus writes, "The sappers and miners form prominent objects in the animated scene. Their work is principally to facilitate the reception of goods, and they get through all they have to do with great energy, and with a certain observance of military precision which is not without its interest to the looker on."¹⁴

¹² The 'Times,' February 19, 1851.

¹³ 'Illustrated London News,' February 22, 1851.

¹⁴ The 'Times,' February 26, 1851.

From ten to twenty men were employed during the receipt of goods in opening the cases, and in assisting the Custom-house examination. Both in this duty and in removing the goods the greatest care was taken ; so much so indeed, that only two or three accidents by breakage occurred to the exhibitors' property.

As early as January, 1851, while the building was still under the control of the contractors, a party of four men of the royal sappers and miners patrolled the building and its workshops every evening after work, remaining until they had seen every fire and light properly extinguished except those in the offices, where the great press of work rendered it necessary to allow fires and lights to be kept up during the night. With the addition of a party of the London fire brigade, this arrangement remained in force until the opening of the building, when a picquet of twenty-four men of the corps was mounted in the building at eight P.M. ; this party on arriving at the Exhibition was marched round it to all the stations where the different fire-engines, fire-cocks, tanks, buckets, &c., were placed ; thus every individual ascertained that all the stores were correct and ready for use. The whole of the men of the corps at the Exhibition had been drilled to the fire-engines, and made acquainted with all the arrangements undertaken to provide for the immediate extinction of any fire. The twenty-four men slept in the building every night, one man remained on sentry to be in readiness to rouse the men in case of alarm, and a non-commissioned officer and two men patrolled the building every two hours. The picquet came off duty at six A.M., when another party of the sappers relieved them for the usual daily duty. This arrangement continued until the 4th November, 1851. The number was then reduced to twelve, and on the 11th November to two men, who remained all night in the building until it was again given over to the control of the contractors, Messrs. Fox and Henderson, in December, 1851.

By day two non-commissioned officers were selected, one for each side of the building, foreign and British, whose sole duty it was to take charge of the men who belonged to the fire party,

and in conjunction with the men of the London fire brigade on duty at the building, they were held responsible for all the stores connected with the fire department, that everything was in its proper place and ready for immediate use, and also that the water was on, and the pressure not less than sixty feet. When the body of sappers was marched to work in the building each day, a party of twelve or fifteen men was allotted for each side of the Exhibition, and placed under these two non-commissioned officers, who distributed them to the various fire stations, and visited them during the day to see that they were at their posts, and alert.¹⁵ The promptitude with which this service was attended to was exemplified on an occasion when a fire, in the southern part of the Colonial collection, raised an alarm. The flue attached to a stove in one of the offices of the contractors having become heated, ignited a piece of wood with bunting attached to it. A piece of the burning cloth fell into an open cask of Indian corn, but the drapery of the counter concealed for a time what had happened. Eventually the smoke began to break forth, and as soon as the existence of fire was ascertained, it was extinguished before it had time to do more than slightly char one plank of wood. The stores in charge of the non-commissioned officers were 8 engines complete, 40 cisterns, 16 hydrants, 410 spare buckets, 16 spare hose, 16 axes, 18 hand-pumps, and 15 fire annihilators.

Opening and closing the louvre-boards for ventilation, and keeping a register of the temperature in the building, were attended to by a few of the men. The register was kept from 19th May to the 11th October, and the indications of fourteen thermometers were taken three times a-day.¹⁶ Corporal Thomas Noon was the chief at this duty, and was found very intelligent and attentive.

There were one or more men, termed classmen, attached to each class on the British side, who carried out the orders of the class and district superintendents during the arrangements, and also during the time of the Exhibition. The number of classmen appointed to the thirty divisions of the arrangements

¹⁵ First Report, App. xxvi. p. 130.

¹⁶ *Ibid.*, App. x., p. 67.

during the progress of the building, &c., were fifty-seven; and the number included in the organization for assisting in the classes during the exhibition, was sixty-one of all ranks. Five or six men also assisted on the foreign side, of whom two were attached to the Chinese court. The classmen afforded material help to the exhibitors and their assistants in displaying their property to advantage, and in protecting it.¹⁷ They likewise were often found very useful in giving information to the public, and in conducting individuals through the masses, to those parts of the building which they were the most anxious to visit. Their courteous demeanour and intelligence were rewarded with repeated expressions of thanks and satisfaction, and the exhibitors were desirous to mark, in a substantial form, their appreciation of the services of the classmen, but it was

¹⁷ One man, private Alexander Dunlop, in the machinery department, was made the operator in an interesting experiment with an article of manufacture in which both England and France were concerned. The incident was related by Mr. Overend, at a public dinner, given at the Cutlers'-hall, Sheffield, to the Great Exhibition Local Commissioners for that town. Among the jurors there was a French gentleman, who very properly showed great zeal in protecting the interests of his countrymen. He admitted that Sheffield had made the best files, but he maintained that there was a house in France that could make them incontestably superior. He challenged Sheffield to the trial, and selecting the house with which he would make the test, it happened to be that of the Mayor of Sheffield, Mr. Turton, who accepted it. From France files were brought over for the purpose, and a French engineer was despatched across the Channel to use them. Messrs. Turton did not send to Sheffield to have files made specially for the occasion, but merely went to a London customer, whom they supplied with files, and took a few, indiscriminately, from his stock. Private Dunlop was chosen to use their file against the French engineer and the French files made for the occasion. Two pieces of steel being selected upon which to try the files, they were fixed in two vices. The Frenchman was stripped to his work, with sleeves turned up, and all encumbrances likely to affect his strength and freedom of action, were removed. Dunlop was very differently garbed; his coat was buttoned up to the throat, and he was, in all respects going, as it were, to parade. Both now, by a signal, began to work simultaneously, but Dunlop, a very powerful blacksmith, had filed the steel down to the vice before the French engineer had got one-third through. When the files were examined, that of Messrs. Turton was found to be as good as ever, while the French one was nearly worn out. The French juror then said no doubt he was beaten in that trial; but Messrs. Turton's file must have been made to cut steel only, whereas the French file was better adapted for iron. A new trial then took place upon the iron, and the result was still more in favour of the English file.

declined on military considerations. Private tokens of respect, however, were frequently presented by some of the superintendents and class assistants to their military subordinates.

A party of about forty men came early in the morning during the Exhibition, and superintended a force of boys in sweeping the British side of the building. The arrangement was systematic, simple, and effective. Six hours—from four o'clock in the morning until ten—were dedicated to this purpose. Had it not been for the peculiarity of the structure, the duty of sweeping would have been insurmountable, but fortunately both floors and roof assisted very greatly to carry off much of the dust and dirt.¹⁸ After finishing the service each morning, the detachment was either kept as a reserve, or returned to the barracks.

In addition to the above they on several occasions assisted the police in their duties, especially on the opening and closing days; occasionally a few trustworthy non-commissioned officers issued tickets during the arrangements,¹⁹ and some of the privates rung the bells at the time the building closed each day. In assisting the police, corporal George Pearson detected an official personage, holding a lucrative situation at the Exhibition, taking money from the place in which it was deposited. The corporal for a long time watched his proceedings, and making known the case to the superintendent of police, the delinquency of the official was fully proved, and his dismissal from employment forthwith ordered.

During the preliminary arrangements the non-commissioned officers who issued tickets, and took charge of the gates and private entrances, were frequently besought by bribes to permit individuals the privilege of entering the building, &c., but no

¹⁸ 'Fraser's Magazine.'

¹⁹ This gave offence to one London periodical—the 'Builder' (April 5, 1851, p. 212). Its antagonism, however, is consistent, for it has always advocated that the services of the sappers should be confined purely to military duties, and that the national surveys, &c., should be wholly controlled and regulated by civil energy and operation. Still, with all its opposition, it spoke of the sappers at the Exhibition, in a qualified sense, as intelligent and efficient.

man of the corps was so wanting in a right sense of his duty as in this way to break the trust reposed in him. An instance of another kind was brought to the notice of Colonel Reid by sergeant Thomas P. Cook, who had a party under him employed removing goods from the hoarding to their destination in the building. Many of the exhibitors, wishing to insure a priority of attention in the removal of their property, offered considerations to effect it, but they were justly exposed, and the Colonel made it the occasion of complimenting the sergeant for his integrity.

The working-pay of the non-commissioned officers and men was 1s. 3d. a-day each; but from twenty-five to thirty of the most useful draughtsmen and others received 2s. a-day.

The Exhibition was closed on the 15th October, on which occasion small parties of sappers were posted at the barriers, and in the various passages leading to the transept, to assist the police in preventing the rush of the crowd. They were also placed around three sides of the dais from which the ceremony took place, and from which Prince Albert took leave of all those who had given their assistance towards conducting the Exhibition to its prosperous issue.²⁰ The sappers were engaged the whole of the previous night in removing obstacles likely to interfere with the arrangements for the ceremonial. They also constructed the platform, or dais; and while attending, on the morning of the ceremonial, to the preliminary arrangements for the temporary accommodation of the Prince and the Commissioners, a sustained cheer was given by the visitors for the sappers, as a parting token of thanks and satisfaction for their past services.

Colonel Reid, now Sir William, on being appointed Governor of Malta, resigned on the 27th October, 1851, his charge in London, and the command of the corps at the Exhibition consequently devolved on Captain H. C. Owen, R.E. "I have," said Sir William on leaving, "the most perfect confidence that they will continue to the end of this service, to perform their duties with the same zeal which they have hitherto invariably shown, and with the same considerate and

²⁰ 'First Report,' p. xxxvii.

forbearing conduct towards all with whom they have been connected in this arduous undertaking."

The crowning testimony to the useful services of the corps was graciously given by Prince Albert and the Royal Commissioners in a letter to the Marquis of Anglesey, the Master-General of the Ordnance. In promulgating the letter,²¹ a copy of which follows, his Lordship expressed his confidence that this high testimonial in approbation of the valuable services of those immediately concerned, would be received with feelings of pride and gratitude by the whole corps of ordnance.

"MY LORD,

"WINDSOR CASTLE, Oct. 29th.

I HAVE the honour, as President of the Royal Commission for the Exhibition of 1851, to convey to your Lordship, both in my own name, and in that of the Commission, our thanks for the cordial aid you lent us in allowing several of the corps of royal engineers, and two companies of royal sappers and miners to assist the executive committee in the arrangement and management of the Exhibition.

"Her Majesty's Commissioners consider it due to the officers of royal engineers, and to the non-commissioned officers and privates of the royal sappers and miners, who have been thus employed, to express to your Lordship, in strong terms, the sense which they entertain of the admirable conduct of the whole body while engaged in this novel, delicate, and responsible duty.

"The officers of engineers have, in the able assistance rendered by them, afforded another instance of the useful manner in which a military body may be employed in civil services during a time of peace.

"The Royal Commissioners, being desirous of marking their sense of the share which the different persons employed in connexion with the Exhibition have had in bringing it to a successful issue, have requested the various civilians so employed to accept a certain sum of money in recognition of their services. We have ascertained from Colonel Reid, that such a course

²¹ 'First Report,' App., vi., p. 49.

would not be agreeable to the feelings of the engineer-officers who have similarly given their assistance, and to whom we could have wished to offer a similar token.

“With regard to the non-commissioned officers and privates, it gives me much pleasure to state, that at the period of the preliminary arrangements, when the labour required was sometimes excessive, their exertions were always cheerfully made. During the course of the Exhibition, they practically demonstrated the great value of their schools of instruction by the many useful plans which they drew; and by carefully acting always in subordination to the civil police force, they established for themselves a character for good conduct and attention to the exhibitors and visitors, greatly to the credit of the corps to which they belong.

“The Royal Commissioners have therefore thought fit to award a sum of 600*l.*, to be laid out either in drawing or mathematical instruments, or in other suitable lasting memorial of their connexion with the Exhibition, for the non-commissioned officers and privates of the royal sappers and miners, to be distributed by the officers in such manner as your Lordship and the Inspector-General of Fortifications may approve; and we trust that you will give your sanction to the acceptance of these testimonials of their good conduct.

“I have, &c.,

“ALBERT, President Royal Commission.

“*Field Marshal the Marquis of Anglesey,*

“*Master-General of the Ordnance.*”

In the first report of the Commissioners to the Right Honourable the Home Secretary, the corps of sappers and miners was thus alluded to: “In many parts of these arrangements, both before and after the opening of the Exhibition, the Commissioners derived the most important benefit from the co-operation and assistance of the corps of royal engineers and royal sappers and miners, who had been placed at their disposal.”²²

²² ‘First Report,’ p. xxi. It may be worth remarking, that Mr. Cobden, the persevering enemy of naval and military establishments, was so satisfied with the conduct and services of the corps, that he was heard to say, he would never, in his advocacy for military retrenchment, seek to reduce the numbers of the sappers.

To carry out the intentions of the Commissioners with respect to the disposal of the 600*l.* according to individual merit, a board of officers of royal engineers—Captains Owen and Gibb, and Lieutenant Stopford—laid down rules to guide them in the distribution. The cardinal grounds for exclusion were, that none should participate in the rewards who had been less than a month at the Exhibition, or who had been sent to head-quarters in consequence of irregularity, or who had been notoriously idle and useless. Of this character it is satisfactory to add, that among the whole body employed, from the very beginning to the close, only two privates had earned the unenviable distinction.

The distribution of the grant was arranged into sums considered to be equivalent to the criteria of five specific classes of qualification and utility. On this principle, therefore, the first class comprised men only, who in situations of considerable responsibility, drew public attention for their steadiness and general ability.

The second and third classes embraced men who in various degrees called for favourable mention, and who displayed considerable aptitude and zeal.

The fourth class contained men, who not having the same opportunities of distinguishing themselves as the men in the previous classes, gained the commendation of their officers and others for attention to duty, and cheerfulness and exertion in its execution.

The fifth class comprised men who had only been a short time at the Exhibition, but who, nevertheless, rendered themselves, by their conduct and zeal, deserving of a slight memento of their services.

According to this classification, the prizes distributed were in value and number as follows:—

Class.	Value.	Number.
1st. .	each £10 . .	13
2nd. .	„ £5 . .	41
3rd. .	„ £3 . .	41
4th. .	„ £1 . .	97
5th. .	„ 10 <i>s.</i> . .	14
	Total	<hr/> 206

The prizes embraced a selection of gold and silver watches, cases of instruments, portable writing-cases, and such other articles as would tend to increase the professional efficiency of the men, and at the same time form a suitable and handsome memorial of their services. Every article was suitably inscribed with the owner's name, and the source from whence it was obtained.

In addition to these rewards, each non-commissioned officer and soldier, to the extent of the above number, received a bronze medal inscribed with his name, in a morocco case, to be kept as a token of useful services rendered, and also a large pictorial certificate signed by Prince Albert.

The number of men sent to the Exhibition from September 1850 to December 1851, reached a total of 274 of all ranks. Sixty-eight of the number reaped no advantage from the grant. Of these, twenty-four had been removed to head-quarters for slight irregularity, two deserted, two did not participate on account of indolence, thirty-three were only three weeks at the Exhibition before it closed, and the remainder, seven men, were removed after short periods of employment, in consequence of illness.

Only one casualty occurred in the companies during their service under the Royal Commissioners. Lance-corporal Thomas W. Noon had obtained leave to visit his friends at Oxford, and was killed by a railway accident at the Bicester station on the 6th September. Liberally educated, and brought up to the profession of an architect and builder, he promised to be very useful both as a non-commissioned officer and foreman. In several situations of responsibility, he proved the superiority of his attainments, and was consequently one of the first men selected for duty in London. Mr. Wiltshire, under whom he was employed at the Exhibition, bore testimony to the value of his services. Much esteemed by his comrades, his melancholy end was deeply deplored, and his remains, interred in the cemetery of St. Sepulchre, at Oxford, were followed to the grave by a large concourse of mourners, among whom were seven non-commissioned officers of the corps from the Exhibition. In a

funeral sermon, preached by the Rev. W. Mitchell, M.A., in Hornton Street Chapel, Kensington, was given a review of the history and character of the deceased, which awakened interesting sympathies in the crowded congregation.

The removal of the goods commenced immediately after the closing of the Exhibition, and all the available sappers were for some weeks employed in assisting the exhibitors and their assistants to pack their property, and remove it from the building. Soon these duties, from the rapidity with which the clearance was carried on, permitted a large force of the corps to be withdrawn, and accordingly, the 22nd company quitted for Woolwich on the 4th November, and the 5th company with the greater part of Lieutenant Stopford's detachment on the 11th November. Of the number left, a few were employed in collecting and arranging specimens presented to the Commissioners for the formation of a trade museum, and gradually the numbers were reduced to twenty-four, and by the end of the year to nine men only.

Among the contributors to the Exhibition were the Ordnance Survey, and Mr. Forbes, late sergeant-major of the corps. The Survey sent a number of artistic specimens of maps, one of which, Lancashire, was fifty feet in height and twenty-seven feet in width. A plan of the city of Dublin, on a scale of sixty inches to the mile, was the finest specimen of map engraving ever produced in the United Kingdom.²³ With this plan was associated the name of colour-sergeant John West, late of the corps, whose services have already received honourable mention in these pages. Among the other maps exhibited, which especially attracted attention, was one of the borough of Southampton, on a scale of six inches to a mile. For finished beauty of execution and truthful delineation of the various features of the ground, it was regarded as unrivalled. This specimen was executed by Charles Holland, formerly second-corporal in the corps, and who is still the leading draughtsman at the Ordnance Map office, Southampton. As already noticed in these pages, he received a case of instruments from Prince Albert for his talent

²³ 'Hampshire Advocate,' May 10, 1851.

in drawing a similar plan of Windsor. Six or seven specimens of electrotype, to illustrate the different stages of the process of engraving the copper-plates, were also exhibited. Sergeant Donald Geddes assisted in mounting the maps, which, from the colossal dimensions of one of them, was found very difficult; and he also arranged the various specimens in the space assigned to them at the end of the western gallery. "The Council gold medal was granted to the Ordnance Department who exhibited the maps, as a just and honourable tribute to the meritorious and scientific officers of that department who prepared them."²⁴ "For the copper-plate etchings, and for the use of the electrotype process in reproducing the plates, our eulogium," say the Jurors, "is justly due to the establishment at Southampton, where they are executed."²⁵ Sergeant Geddes had from the first the charge of the electrotype branch at Southampton, under the executive officers of royal engineers, Captain Yolland, and afterwards Captain W. D. Gosset; and by his skill and acquaintance with chemical science, attained that perfection in the art which, but a few years past, it would have been thought chimerical to expect

Mr. Forbes exhibited a beautiful model of his spherangular pontoon in raft, with all its stores complete, and waggon for carriage. He also contributed the model of an apparatus for the ventilation of mines. Both objects were inventions of his own, and the former, though not adopted in the service, gained for him the present of one hundred guineas from the Board of Ordnance. Mr. Forbes was very late in submitting the articles, and they have therefore not been included in the official catalogues.

²⁴ 'Juries Reports,' Exhibition, 1851, p. 222.

²⁵ Ibid.

1851.

SHETLAND ISLANDS.

Observations—Road from Lerwick to Mossbank—To the western districts—And southwards—Between Olnafirth and Doura Voe—Voe to Hillswick; corporal Andrew Ramsay—Island of Yell; sergeant John F. Read—Intrepid bearing of corporal Ramsay—Conduct and usefulness of the party employed on the roads.

For nearly four years one sergeant and five men of the corps had been employed in Zetland constructing some trunk lines of roads, with the view of relieving the wants of the poor of the islands, who, from the failure of their fisheries and other dreadful visitations, were threatened with starvation. Captain T. Webb, R.E., directed the operations of the party for three years, but throughout the fourth year, sergeant Robert Forsyth was alone responsible for its discipline and conduct. With respect, however, to the execution of the works he received instructions from Captain Craigie, R.N.

The roads constructed under the superintendence of the sappers were, considering the character of the country, its frequent storms, heavy rains, and bleak winds, and the utter inexperience of the peasantry in land labour and the use of implements, very extensive and difficult.

In 1849 there was scarcely a practicable road in Zetland, except a few isolated portions in bad condition. But on the removal of the party in January, 1852, more than 100 miles of excellent road, including the island of Yell, had been made practicable both for pedestrians and wheel vehicles.

From Lerwick to Mossbank, twenty-five and a half miles of good road were cut through a mountainous country intersected with large plots of deep bog. It was fifteen feet wide clear of

the water-tables. All through the line it was properly drained and gravelled to a depth of between fourteen and eighteen inches. The undulations of the country and the occurrence of streams called for considerable engineering skill. At different parts of this road were built two stone bridges, the first of fifteen feet span and twenty feet high, and the second of ten feet span. Both were of the best rubble masonry. In different parts of the line there were twenty-four large culverts built of dry masonry as substitutes for bridges. A number of cross drains were also laid and properly paved. About eight miles of the road ran along the side of a high hill, and here an embankment and wall were raised on the lower side, and a cutting made on the upper.

The road from Lerwick to the western districts was constructed over the steep and rugged heights of Wormiedale, for one mile of which a cutting was made from the upper side, which assisted in forming an embankment of five feet average on the lower. From thence to the head of Weesdale Voe the road ran comparatively easy. A large stone causeway, however, had to be built over the point of a sheet of water which communicated with the sea. In this causeway were six openings of two and a half feet by four feet for the free passage of the tide. From the head of Weesdale Voe to the Scord of Tresta, one mile, a cutting was made on the upper side, and a retaining wall built on the lower side of the road. To Gruting Voe, six miles, the road was easily prepared. On this line two bridges were erected: one at Bixter with piers of rubble masonry and the superstructure of stout oak, with a span of ten feet; the other at Tumlin of dry masonry with three openings. At the head of Gruting Voe, a causeway of stones, six feet high by thirteen feet broad, with seven openings of two and a half feet wide each, was constructed, crossing a part of the Voe for 120 yards, and thereby shortening the distance to Walls by three quarters of a mile.

From Lerwick, southwards, a road of twenty-three miles was formed to Dunrossness, and portions of the Test road were

also improved. Four stone bridges and a wooden one were constructed on this line over heavy and sometimes impassable streams.

From the bridge at Fitch, four miles from Lerwick, a road of one and a half mile long was made, which joined the Scal-loway road and the trunk line together.

From the main line at the Olnafirth branch another road was cut for three and a quarter miles, connecting Olnafirth and Doura Voe, whence there is an easy access by boat to Lerwick. One stone bridge of twelve feet span and nine feet high was erected on this line.

From Voe to Hillswick fifteen miles of bridle road was made, and two substantial stone bridges were thrown over deep and rapid burns. The ground was very difficult, and in many places the red granite was so hard that blasting the rock was necessarily resorted to. This road passed through part of the parish of Delting, connecting it with North Mavine by a narrow isthmus about sixty yards wide from sea to sea. On the south of this the hills rose to a height of about 700 feet above the level of the sea, and terminated on the shore in very high precipitous cliffs. To surmount such a barrier with anything like tolerable gradients, it would have been necessary to make a detour of at least one mile and three-quarters over uneven and rough ground. To obviate this, a road was cut along the base of the bold cliffs of Cliva for 590 yards, which, considering the description of the labour employed, was an undertaking of no ordinary kind. The method adopted was to blast the face of the cliff, in which only 250 lbs. of powder were expended, and this removed more than 10,000 tons of rock. With the dislodged fragments a retaining wall was built, which formed a rampart of thirteen feet broad and twelve feet average height. Some of the stones used in the wall were two tons weight.¹ Corporal Andrew Ramsay was intrusted with the execution of the work, and the fact that 1,700 blasts had been fired by him among a

¹ The particulars, taken from sergeant Forsyth's statements in 'Report of Committee of Manage. High. Dest., 1852,' pp. 15—18, 35—37.

people unused to these operations, and without a single accident occurring, affords sufficient proof of his caution, discretion, and attention.²

In the island of Yell a road of twenty miles, nine feet wide, was cut between the two principal harbours—Cullivoe and Burraoec. The line was through a rugged country, with peat morasses, rapid streams, and mica and silicious rocks. In some places deep excavations were made before gravel could be obtained to form the surface of the road; and from the swampy nature of the ground much draining was required to render the foundation solid and the line durable. The danger of sinking in boggy ground for gravel was often felt. Once in particular when the party had dug to the depth of fourteen feet in a broken morass, the sergeant (Read) observed the whole mass of moss in motion. Instantly he ordered the workmen to leave the pit. Scarcely had they done so when the sides began to close in, and, as a rush of water at the same time came from beneath, the bog was quickly dislocated, and toppling over, filled the pit.³ Owing to the inequalities of the surface it was difficult to carry on the line with easy gradients, and from Bastavoe and Mid Yell Voe, running far inland, its course was therefore circuitous. A bridge was constructed over the burn of Dalsetter in North Yell, ten feet span and nine feet high, with piers of strong masonry, while the cross beams, planking, and handrail were of substantial oak. A similar bridge was erected over Laxo burn, Mid Yell, and five large culverts, locally termed sivals, with heavy embankments, between that and Burraoec in South Yell. To accommodate South Yell, and to remove a serious obstruction to the conveyance of the mail and the passage of travellers in the winter season, bridges of ten feet span and seven feet high were erected over the dangerous streams of Hamnavoe and Arrisdale. In building that over Arrisdale a middle pier was erected, the span of the arch being otherwise too great to make it a sound work.⁴ Sergeant John F. Read was intrusted with the construction of

² 'Report of Committee of Manage. High. Dest., 1852,' p. 41.

³ *Ibid.*, p. 19.

⁴ *Ibid.*, pp. 18—21.

this road. His conduct throughout his service in Shetland was correct and soldierlike.⁵ His report on the character of his operations in Yell, detailing the difficulties he surmounted and the improvements effected in the industrial habits of the people, is highly creditable to his ability.⁶

On one occasion while assisting the making of the Yell road, the conduct of corporal Ramsay, under peculiar and trying circumstances, elicited the praise of his officers.⁷ An outbreak occurred in his party, and being unarmed he was placed in a critical position. He was, however, cool and determined, and resisted in a manly but forbearing manner the demands of his labourers. By persuasion and command the angry feelings of the labourers were eventually allayed, and they were induced to resume with a more contented spirit the employment they so unsparingly abused.

In accordance with arrangements made by the Secretary of State for the Home Department, the connection of the party with the Highland Destitution Board closed early this year, and the men arrived at Woolwich on the 27th January. In parting with the detachment Captain Craigie, R.N., spoke highly of its efficient and creditable services and its excellent conduct. Privates Alexander Smith and David Muir executed all the masonry work on the roads. Sergeant Forsyth, in his character of superintendent, evinced considerable ability, zeal, and intelligence in the discharge of his duties, and was unremitting in his efforts to render Captain Webb's absence as little felt as possible.⁸

⁵ 'Report of Committee of Manage. High. Dest., 1852,' p. 41.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.

1852.

Party attached to the Commissioners for the Great Exhibition—Mount Alexander—Corporal John McLaren—Spike Island—Brown Down—Hurst Castle—Holmfirth Reservoir—Alderney—Tidal observations, river Dee—Van Diemen's Land—Channel Islands—Kaffir war—Passage of the Kei—Patrols—Party benighted in the bush—Action at the Konap Pass—Patrol—Fort White—Patrols—Passage of the Orange river—Conduct of the sappers during the campaign.

THE detachment in London under Captain Owen was throughout the year, attached to the Commissioners for the Exhibition of 1851. Four of the party were generally in the office performing the duty of clerks and draughtsmen. Among the services executed by them was the organization and classification, for historic and scientific purposes, of the voluminous correspondence, documents, and tabulated forms and returns of the department, previous to their deposit in the royal archives. To this was added the duty of preparing the various certificates with the signature of Prince Albert, and forwarding them, with the exhibitors' and jurors' medals, and juries' reports, to the different local and foreign committees throughout the world. To corporal Gardner was intrusted the office of stamping the Prince's signature. Before he commenced the task he made some experiments to ascertain the best mode of transferring the royal name from the block to the paper. His object was to make the impression a perfect resemblance of the original, to accomplish which the use of common ink was a desideratum. Observation and ingenuity soon led him to adopt an expedient that proved to be very successful. About 20,000 of these certificates he prepared, and many of the transfer were such faithful fac-similes of the original, that the minutest ex-

amination of their details failed to discover the slightest deviation from the character of the royal autograph. For two or three months when the men were not employed on more pressing services, they were advantageously occupied in collecting and arranging specimens received from the exhibitors, now composing the trade collection at Kensington Palace. They also examined and took charge of the Exhibition photographs, executed in Paris, 18,000 in number, after their return by Messrs. De la Rue and Co. who mounted them. In the evening after the day's labour had ended, five of the party attended for four months the Government school of design at Somerset House, and received instruction in free-hand drawing. The privilege thus conceded was not only unprecedented but greatly enhanced by an instant departure from the rule of the institution, which required candidates to avail themselves of its benefits in their turn. By the end of the year the sappers with Captain Owen were reduced to four non-commissioned officers.

In January and February two non-commissioned officers with six civilians as labourers, under Mr. John M'Laren,¹ the de-

¹ Was formerly in the sappers, from which he was discharged a corporal in January, 1838, on a pension of 1*s.* 7*d.* a-day, after a service of twenty-three years. Most of his military career was spent on the survey of Ireland, in which he was found a zealous and correct surveyor. Soon after quitting the corps he emigrated to South Australia, and was hired by the Commissioners for the colony as a draughtsman in the Land Office. He was one of the first race of surveyors in the settlement, and his duties, carried on through an unexplored intricate wilderness, were extremely toilsome and trying. At one time the survey department was thrown into great difficulty by the resignation of the original survey staff, which was the more embarrassing as emigrants were pouring into the colony by thousands, and land was rapidly purchased. In this extremity corporal McLaren, to meet the great and pressing wants of the colonists, exerted himself with untiring energy. The Governor, Colonel Gawler, in writing of his services ('Times,' November 7, 1846), said, "Corporal McLaren was a fine fellow, who would have answered all my purposes if I could have cut him up into ten or twenty living portions, but who, unhappily for me, was not thus divisible." He was afterwards attached to the department of the surveyor-general, and ultimately, by his commendable labours, his experience, and valuable co-operation, received the appointment of deputy surveyor-general which he now fills. His income is about 700*l.* a-year. A report by him ('Times,' September 20, 1852), on the overland route from Adelaide to Mount Alexander, is a fair specimen of his literary attainments and business-like habits.

puty surveyor-general of South Australia, were employed in establishing an overland route from Adelaide to Mount Alexander. They laid out a line of road between these points through the wilderness, removed all striking obstructions, and formed at every practicable locality convenient wells of water for the use of travellers. The object of laying down this line of communication was principally to assist the transit of the "gold diggers" of the Mount and the contiguous country into Adelaide.

Twelve rank and file were sent from Woolwich in April to Spike Island, to superintend the convict mechanical skill and labour placed at the disposal of the Ordnance, in carrying on the defences of the island and other posts in Cork harbour. This measure was strongly urged by Colonel Oldfield, the commanding royal engineer in Ireland, on the score both of utility and economy; and the services of the party in directing the convicts in the quarries, the excavations, and at their trades, have been followed by results of indisputable advantage to the public.

The seventh company, employed first at Portsmouth and then at Gosport, in conjunction with the second company, in constructing the batteries at Brown Down, was removed in June from Fort Monckton to Hurst Castle, to repair its defences and construct new batteries. The men not quartered in the castle were provided with accommodation in a detached shed, which was converted into a barrack for the purpose.

Early in the year, under orders from the Home Government, four men of the corps made surveys and plans of the Holmfirth reservoir and the country in its neighbourhood, to assist Captain R. C. Moody, R.E., in his inquiries to ascertain the cause of the bursting of its embankment and the consequent destruction of life and property. On the completion of the work the men were much commended for the active and able manner in which it had been executed, and received a liberal allowance for their services.

A new station was opened for the corps this year at Alderney, one of the Channel Islands, whither the eleventh company,

under the command of Captain W. F. D. Jervis, R.E., repaired from Woolwich, and arrived at the island on the 30th June. Some four weeks afterwards the men commenced the construction of the permanent works considered necessary in these precarious days, to enable the garrison to resist any attempt at invasion by the enemy. There being but little accommodation in the island for troops, unused as it had been to have soldiers quartered on it, the company was necessarily divided into two portions, and domiciled more than a mile apart, at Longy and Corblets. The "Nunnery" was constituted an hospital for the sick.

Sergeant John Berry and one private, both surveyors, were employed under Captain Vetch, late R.E., from June to August, in conducting a series of tidal observations in the river Dee at Chester, for the harbour department of the Admiralty, and in order to carry out the provisions of the "Dee Standard Restoration Act." The observations were to extend over a period of twelve months, but the service was concluded in a fourth of the time. The duty was very carefully attended to, and the registrations were always accurately made by the sergeant and his assistant.

One sergeant and fourteen rank and file embarked for Van Diemen's Land on the 19th July on board the 'Lady Montagu,' as a guard over convicts, in conjunction with a detachment of the line under the command of Captain J. S. Hawkins, R.E., and landed at Hobart Town on the 11th December. The Lieutenant-Governor of the colony applied for the assistance of the sappers to constitute, in the first instance, the nucleus of an efficient survey body, and to carry on, both in the city and the distant bush, the trigonometrical and detail survey of the settlement. The men, eleven of whom were married and had families, were selected from the survey companies, and were all competent for the duty both as surveyors and draughtsmen.

A party of six men from Chatham was employed under Captain G. Bent, R.E., from 24th September to 13th December, in surveying and levelling the ground in the neighbourhood of St. Helier's, Jersey, to the extent of about ten square

miles ; and afterwards the same party was removed to Alderney, where, under Lieutenant Martin and Captain Jervois, it completed for military purposes a special survey of the island, in May, 1853.

Hostilities at the Cape were this year continued in the same desultory manner as in the previous year. The attempts for a fair open fight were quite unsuccessful, and the patrols that were undertaken to drive the enemy into action were equally as harassing and arduous as in any former war. In these operations the sappers participated to the extent of their numerical means, not without, in one particular instance, suffering greatly both in loss of life and property. The following detail embraces the active services of the corps on the Cape frontier this year.

A party of two sergeants and sixty-five rank and file, under Captain H. C. B. Moody, R.E., returned to King William's Town on the 1st January, 1852, after three days' march in escorting supplies to Forts White and Cox.

One sergeant and thirty rank and file accompanied a patrol of nearly 500 troops from King William's Town, under the command of Lieutenant-Colonel Skipwith, 43rd regiment, on the 3rd January. Captain Moody with Lieutenant Fowler, R.E., commanded the sappers. The American pontoon was carried with the party. The division crossed the Kei on foot, at a drift, on the 7th and 8th. On the 14th Colonel Eyre's division appeared in sight, but as the Kei had then risen considerably, the pontoon was used with effect to cross the stream. About one mile and a half above the drift, at a point where the water was smooth though the current was strong, the raft was employed. The river was about 100 yards wide, with a muddy bottom ; the bank was easily accessible by infantry, but not by cavalry or artillery. To form the communication a strong hawser was passed over to the opposite bank, and the pontoon, attached to it by two short lines with running loops, was passed from shore to shore, carrying forty men at each trip. On the first day, seven companies of the 73rd and 60th regiments were in this manner ferried across, as also about 100 Fingoe women

and children. During the day the tide again rapidly fell, and the waggons, &c., crossed the stream at the main drift. Captain Moody, in reporting upon the conduct of his detachment, said, "Nothing could exceed the energy and willingness with which they all worked."

From the 31st January to 2nd February one sergeant and forty rank and file, under Lieutenant Fowler, R.E., accompanied the patrol under the command of Captain Campbell, Cape mounted rifles, and, supplied with sickles, assisted in devastating the crops of the enemy in the neighbourhood of Perie and cutting off their supplies. On the Mangoka river a like razzia was effected, and after a night's bivouac on the Gwokkobi, several huts were burnt and fifty acres of corn cut down. Further destruction was carried on up the Gwokkobi and Umnaza rivers to the Perie station, to the extent of eighty acres. After a slight skirmish with about 200 Kaffirs in the Perie bush, the patrol returned to King William's Town, laying waste in its route the gardens in the vicinity of Fort Beresford, and down the Umtabini to the point of its junction with the Buffalo river, comprising another area of about eighty acres of thriving corn.

Captain Fenwick, R.E., with twenty rank and file, formed the European part of an escort of 100 strong, which conveyed supplies in five bullock waggons, in addition to seventy head of cattle, to Major Kyle's column in the Tomacha—a distance of seventeen miles from King William's Town; to which place the detachment returned on the 5th February after two days' patrolling.

From 27th January to 28th February ten rank and file, under second-corporal William Roberts, were attached to Lieutenant-Colonel Eyre's column, and during the operations on the march to the Keiskama, and beyond it, were employed in making drifts practicable for waggons, throwing temporary bridges for the passage of the troops, and assisting in the destruction of the enemy's crops.

A similar party during the same period, under corporal George Grubb, accompanied Major Kyle's division in Seyolo's

country, and, in addition to the ordinary duties of the camp, assisted in devastating the crops of the Kaffirs, and improved the drifts for the passage of the waggons and the fording of the troops. This detachment also formed part of the waggon escort which brought provisions to the column from Fort White.

On the 22nd and 23rd February one sergeant and sixty rank and file were on patrol to Fort White, with supplies for the columns of Colonel Mitchell and Major Kyle. Ten waggons were in charge of the party, five of which were delivered to an escort from Major Kyle's patrol, and the remainder were unloaded at the Fort. The party then returned to King William's Town, capturing on their road two Kaffirs and six horses.

From 5th to 27th March nine rank and file under Captain Robertson, were present in the operations of the force under his Excellency the Commander-in-Chief, in driving the enemy from the Waterkloof and adjacent fastnesses, and finally from the Amatola mountains. The sappers, commanded by Captain Fenwick, R.E., were most useful in rendering the drifts injured by heavy rains practicable for the passage of waggons. On this service four men of each regiment accompanied the head-quarters as the Commander-in-Chief's escort. The party of sappers also shared in the honour, by being permitted to add five men to his Excellency's body guard. One corporal was also attached to the division under Colonel Eyre, and was present in all its operations from 5th March to 27th April. To this patrol were added seven rank and file on the 20th April, who assisted in the concluding services of the division.

Sixty sappers formed part of a patrol of 150 men, under the command of Captain Moody, R.E., sent out on the 27th March to co-operate with Colonel Eyre's division, and also to intercept fugitives, cattle, &c., flying from him in the direction of the Isili range. That day Captain Moody formed a junction with Colonel Eyre's force under Murray's Kraantz, and in working up by Kaffir tracks to the high ground burnt several of the enemy's huts. The service required that the party should descend again: this was done in a different direction

over shelving rocks and through dense underwood. It then crossed one of the sources of the Buffalo, scoured the country in its vicinage, and returned again through the bush under the Buffalo range towards Colonel Eyre's camp. The paths were most intricate and rocky, and the detachment consequently marched in Indian file. While in the heart of the bush night came on. The darkness was so intense that the men were obliged to trail on by feeling and calling to each other. It was with the greatest difficulty that the path was kept, but at last it was lost altogether, and halting near a stream, the men lay down on the wet ground, without fires, and passed the night in a comfortless bivouac. At grey light next morning the patrol was in motion, and the sappers emerged from the bush after about four hours' exertion. One man missed his way in the jungle, and spent eighteen hours in endeavouring to gain the detachment. He had nearly exhausted his energies in extricating himself from the steep and broken rocks that lay in his track, when luckily he was rescued by some of his comrades who were sent in quest of him. After renewed efforts to clear the bush of prowling Kaffirs, and driving them and their cattle in the direction of Colonel Eyre's division, the detachment on the 29th March returned to King William's Town, laying waste on the route three Kaffir gardens. "As usual," wrote Captain Moody, "the sappers behaved in an excellent manner." Their conduct also met with the approval of Colonel Eyre.

With a patrol of about 240 troops, commanded by Captain Robertson, R.E., was sent a party of one sergeant and forty rank and file, under Lieutenant Siborne, R.E. The patrol left King William's Town on the 30th March. The sappers, broken up into small sections, aided in scouring the Isili Berg. On the 1st April the patrol quitted the bivouac at the source of the Yellow Wood river, destroyed a few huts and several fields of corn, and reached head-quarters on the 2nd April.

A patrol of 300 men, under Captain Moody, R.E., conveyed supplies of cattle and provisions to Fort Cox for the divisions working in the Amatolas, and returned with the empty waggons without opposition from the enemy. The escort was out three

days, from 5th to 7th April, and 100 sergeants and rank and file of the corps, under Lieutenant Siborne, R.E., formed a part of the force.

Sergeant John Mealey and ten rank and file accompanied, on the 7th April, a small escort under Lieutenant Broke, 60th rifles, with provisions in waggons to the Green river for Colonel Percival's division, and returned the next day to King William's Town.

Soon after this, a detachment of thirty-one men, under Lieutenant Siborne, R.E., built a defensible tower in the Keiskama Hoek, for the purpose of making a demonstration of a fixed purpose permanently to eject the Gaika tribe from that territory and to occupy the Amatolas.

The head-quarters of the ninth company was removed from King William's Town on the 28th May by Graham's Town and Fort Brown to Beaufort, at which fort it arrived on the 19th June. Previously to its arrival it was overtaken in the Konap Pass on the 13th June by a body of 200 rebel Hottentots, under Ian Cornelis and Damon Kuhn, and at noon was suddenly brought into action. The small force under Captain H. C. B. Moody, R.E., consisted of two sergeants, thirty-one rank and file, and one bugler, in charge of five waggons containing baggage, arms, engineer stores, and 30,000 rounds of musket-ball ammunition, with four women and ten children. The Pass—a long and dangerous one—has a serpentine direction, accommodating itself to the tortuous ravine through which it ascends. On the left, the whole way is a rocky precipice some forty feet high, either scarped by manual labour to form a road or by descending torrents in bygone ages; the summit of which is covered with bush. On the right rises a steep hill, inaccessible, and thickly wooded to the brim; a better position adapted to a lurking foe could not well be imagined, affording the means of enfilade fire at every turn of the road.² Acquainted by spies with the movements of the convoy, the rebel Hottentots had before its approach concealed themselves in an impenetrable ambuscade, and as

² 'Naval and Military Gazette,' 21st August, 1852.

the sappers ascended the hill, the advanced guard was met with a volley which killed three of the mules in the leading waggon and stopped the progress of the train, the road being too narrow to turn it. So sudden and fierce a beginning did not appal the detachment, for instantly, without disorder, they joined issue with the enemy though so superior in force and almost unassailable in position. Some of the party soon tried to push into the bush above them, but the rebels already occupied it close to the edge of the road ; and as the thicket was too dense to work in, the men were compelled to retire. At this moment one of the leading drivers showed unmistakable symptoms of treachery and fraternization with the rebels, and he was instantly shot down by a sapper.³ In a few seconds the firing was general for more than 150 yards on both sides of the Pass, but the detachment, careful of its ammunition, only fired when the enemy could be seen and picked off. At length the advance men fell back and took cover under the bank, and between it and the leading waggon, where they received a reinforcement of a few men from the rear. Each waggon was now defended with great determination and intrepidity, and each man fought his way through fearful straits. The firing was chiefly within five yards and less of their antagonists. Sometimes in venturing from their shelter to fire upon the rebels in the kloof, they were opposed by a deadly fire from behind, which always lessened the number that returned. At the head of the road a force of the enemy occupied a position which enfiladed the detachment, but the rebels there were held in check by the steady firing of a few men who kept a vigilant look out for them. Without diminishing his fire in the parts he already occupied, the enemy rapidly increased the extent of his flanks and was trying to surround the little band, but to prevent this, and as the men were fast falling, Captain Moody gave the reluctant order for the women and children to leave the waggons, and all to commence a retreat. Not a move was made to the rear until the order was given, and, with as many of the wounded as could assist themselves, and all the women and children—except one

³ 'Naval and Military Gazette,' September 18, 1852.

who was then killed—the retreat towards the Old Konap post was conducted with steadiness and without precipitation under a spirited fire from the rebels. On clearing the gorge, a section of the men was extended into the bush to keep the advancing enemy in check, and under its cover the detachment gained an abandoned inn, which was soon converted into a post of defence by barricades and loopholes. Here a final stand was to be made, but the Hottentots, although they were aware of the weakness of the party, dared not renew the attack. The action lasted an hour, three-fourths of which was spent in defending the waggons. The casualties were—

Killed 7—Lance-corporal John Hitchings; bugler David Brotherton; privates John Crilly, John Gillies, James Marr, Edward Phillips, and William Sanderson. Also the wife of private Thomas Hayward.

Died of wounds . 2—Privates William Forgie and John Arthur.

Wounded severely 5—Second-corporal William Marshall, and privates Henry Scott, John Cloggie, Philip Gould, and James Reynolds.

Wounded slightly 2—Corporal Edward Wilmore and private Thomas Seaman.

Total . . . 16

The spare arms, ammunition, oxen, baggage, and equipments were captured by the rebels, but the waggons, engineer stores, and some minor articles were recovered.⁴ Captain Moody's conduct throughout commanded the confidence of his men. Of their coolness and courage he reported in the highest terms. Colour-sergeant Alexander Spalding who commanded

⁴ After this disaster, arms or ammunition were forbidden to be conveyed from one post to another, except by the express orders of the Major-Generals or officers commanding divisions, who were held responsible that sufficient escorts were provided to defend the convoys.

the rear-guard, and sergeant William King, who had charge of the advance, were favourably noticed in the Captain's despatch. Sergeant John Davis of the 12th regiment, was also highly spoken of, as well for his coolness and courage, as for his offer to proceed with four volunteer sappers to Fort Brown for assistance. While Captain Moody was assisting the men in their charges, one of the rebels took a steady aim at him by resting his gun on the branch of a tree, but his piece snapped, and before he could re-cap he was shot down by private John Murphy.⁵ Three times sergeant King collected his men, and bravely headed them in their fruitless charges on the rebels.⁶ Private Thomas Hayward volunteered to go to Fort Brown alone, in disguise, after dusk for assistance, but the firing having been heard at that fort, a detachment of the 12th regiment soon appeared, and rendered the hazardous enterprise of the private unnecessary. "The little band of sappers," wrote a London journal, "were noble fellows, who often before, under another of their officers, had fought bravely in a fairer field."⁷ In the Government notice of the Commander-in-Chief, dated June 16th, 1852, the conduct of the men "in defending the waggons to the last," and their "steady and good order in retreat after inflicting a severe loss on the enemy," were much lauded. The notice then added, that "the greatest credit is due to Captain Moody and his small party of sappers for their soldier-like and gallant bearing on the occasion."

The remnant of the party, taking with it the killed and

⁵ Said to be young Webb, a driver (in 'Naval and Military Gazette,' August 21, 1852); but Captain Moody has recorded, that the service was performed by private Murphy.

⁶ The praise due to him was unjustly given both in the colonial and metropolitan press to sergeant Davis, of the 12th regiment: but it was claimed for sergeant King, in a very soldier-like manner, by corporal Wilmore of the party, who was present and wounded in the action. Without attempting to disparage the conduct of the sergeant of the 12th, the corporal explained that at the period the charges took place, sergeant Davis was in the rear at the Old Post, with four volunteer sappers, awaiting orders to proceed to Fort Brown for a military reinforcement.—'Graham's Town Journal,' October 23, 1852.

⁷ 'Naval and Military Gazette,' August 21, 1852.

wounded, and the women and children, reached Fort Brown at dusk on the 14th June. There the brave men who lost their lives were interred. A subscription was forthwith made among the officers, non-commissioned officers, and men of the royal artillery and 12th regiment to meet the urgent wants of the party, and the necessities of the motherless children of private Hayward. A further sum of 100*l.* was collected among the benevolent citizens of Graham's Town for the same purpose, and the amount was distributed to the sufferers in proportion to their losses and wants.

Captain Moody, having under him thirteen rank and file, was out on patrol with the force under General the Honourable George Cathcart, from the 6th to 15th July. The sappers kept with the guns. They carried with them a proportion of tools to improve the roads, and assisted in some of the operations for driving the enemy from the Kroome range and the Waterkloof.

On the 25th July sergeant John Mealey and nine men of the corps at Fort White were present with about 100 men of the 12th Lancers, 2nd Queen's, and Cape corps in repulsing an attack on the cattle guard. The Hottentots, about 200 in number, under Uithaalter were on the plain in front of the fort in good skirmishing order. After crossing a drift they stood for a time, and kept up a smart fire on the garrison. They then retreated with the loss of six men to Slambie Kop, to the foot of which they were pursued. The British casualties only counted two slightly wounded. The sappers turned out with great promptitude, not waiting to cover themselves with their jackets, and conducted themselves as good soldiers. Captain Robertson, R.E., was also present, and two of the sappers were near to him in the hottest of the fire. The rebels had a bugler among them who was proficient in his duty. The bugle on which he sounded had been captured by the Hottentots in the Konap Pass a month before from bugler Brotherton, who was killed in the action.

Again Captain Moody, in command of twenty-eight rank and file of the corps, was attached to the troops under his Excel-

lency, which operated from the 29th July to the 29th August across the Kei, by Aland's Post and Whittlesea. On the 6th August the party was increased by the arrival of nine men at Brome Neck, with the patrol from King William's Town under Lieutenant-Colonel Mitchell. This party brought up the India-rubber pontoons, but the low state of the tides rendered their use unnecessary. The detachment more immediately with Captain Moody was employed on the journey in repairing the defective drifts, and establishing a defensible kraal on the Kei, at the standing camp. The conduct of the sappers was well spoken of by the Captain, and his Excellency expressed his satisfaction with all that had been done by them.

A detachment of twenty-seven non-commissioned officers and men landed at the Cape from England on the 11th September, which increased the corps in the colony from 268 to 285 of all ranks.

Eight rank and file left Fort Beaufort, under Captain Moody, on the 11th September, and were attached to the division under his Excellency, to make a demonstration in the Waterkloof. At Nelle's Farm, under the direction of Captain Jesse, R.E., they constructed an intrenched camp, assisted by the rifle brigade, and formed a similar one in the valley of the Waterkloof, near Brown's Farm. These services were rapidly and creditably executed.

Four rank and file were present in the field services of the column, under Colonel Eyre, from 30th September to 30th October. Four also served in the various operations with Major-General York's division from the 12th to 28th October; and one sergeant and thirteen privates, under Lieutenant Siborne, attached on the 7th November to the force under his Excellency's command, did good service with the American pontoon. This party ferried the troops under Colonels Eyre and Napier across the Caledon and Lieuw rivers for the battle of Berea. Owing to floods and other circumstances, the operation was attended with great difficulty. The sappers were not present in the action, being left in the rear on the banks of a river with the pontoons. The detachment returned

to King William's Town on the 29th January, 1853, having again passed the troops and waggons over the streams that intercepted the march, including the Orange river, the passage of which was most tedious ; and on the following muster parade, a letter from his Excellency the Commander-in-Chief was read, commending the officers and men for their zealous and active services in removing the troops across the rivers. Corporal Edward A. Henderson was present in the fight at Berea, being at the time attached as an assistant to the Ordnance surgeon.

Lieutenant-Colonel Cole, the commanding royal engineer, in his final report, dated 1st March, 1853, to Brigade-Major Walpole, communicating the termination of the war, thus wrote of the services and conduct of the corps :—" I cannot conclude what is probably my last report to you, without conveying the gratification I have experienced throughout by the value which has been attached to the services of the non-commissioned officers and men of the royal sappers and miners, not only in public despatches, but from the opinion expressed to me by the late commander of the forces especially, and the officers under whose command they have served, and who have in many instances shown their confidence practically.

" I am enabled to add that from the reports I have received and my own observation, the non-commissioned officers and men have in all instances throughout this arduous struggle shown a zeal and determination to further the service in which they were engaged, and have displayed their usual gallantry and discipline whenever they have been in the presence of the enemy."

1853.

Expedition to Central Africa—Private E. Swenny—Journey to Beni-Olid—Hospitality of the natives at Sokna—Black Mountains—Privations and exertions—Private John Maguire—Gatrone—Sufferings of the slaves in their march across the desert—Evidences of the number that perish—Trials of the expedition; halts at Kouka—Party with the Department of Practical Art—Sanitary survey of Woolwich—Detachment for survey of Van Dieman's Land—Additional commissions to the corps—Company at Alderney—Corporal James S. Taylor at New York—Company recalled from the Cape—Company to the Mauritius—Party to Melbourne—Epidemic at Bermuda—Detachment for the Mint at Sydney—Greatcoats.

CORPORAL JAMES F. CHURCH and private Edward Swenny, energetic and intelligent men, were appointed on the 19th February to join the expedition to Central Africa under Dr. Barth. The former was a carpenter, and the latter a surveyor and draughtsman acquainted with the management of philosophical instruments, and had, previously to his enlistment, travelled in Belgium, France, Algiers, and Milan. From political considerations they quitted in the character of civilians, but were armed each with a Colt's revolver, a rifle, a double-barrel fowling-piece, a bowie knife, and an axe.

On the 20th February they embarked at Southampton, under Dr. Vogel, a young German astronomer attached to the expedition, and after a short stay on shore at Malta, proceeded to Tripoli, where they tarried for some months, devoting their leisure to learning the Arabic dialect, and familiarizing themselves with the mode of riding on camel back. Corporal Church also mastered the use of the sextant, mountain barometer, azimuth compass, &c., so as to make ready observations with them.

From a dangerous illness private Swenny could not go on with the expedition, and was sent to England with high testimonials for zeal and ability from Dr. Vogel and Colonel Herman, the Tripoline consul. The ill chance which deprived the enterprize of his valuable services was much regretted by Lord Clarendon, who granted the invalid in addition to his salary a gratuity of 15*l*. His place was supplied by private John Maguire, a fine soldier and skilful mechanic, who was selected from among thirty-six volunteers of the company of the corps at Malta.

The caravan under Dr. Vogel was a large one of thirty-seven camels, carrying upwards of four tons of baggage and presents for the sultan of Bornou and other chiefs. The organization of the force, with the packing and distribution of the baggage, was chiefly confided to corporal Church, who in consequence of the temporary indisposition of Dr. Vogel set out in charge of the expedition on the 19th June, in company with Mr. F. Warrington, a gentleman well known in Tripoli, to Beni-olid, where he arrived on the 26th. There Dr. Vogel joined on the 2nd July, and a day or two afterwards the caravan was again in motion.

At Sokna, midway between Tripoli and Moorzuk, a number of the natives approached them with greeting, and conducted them to an ample residence already prepared for their accommodation. A supply of provisions, consisting of melons, green figs, dates, two sheep, two large dishes of bazeen, and three dishes of some other compound, owning a name more curious than intelligible, were placed at their disposal. In the evening a similar presentation was made to them, and the like extravagant proofs of generosity were continued to the travellers for four days more. Presents were made in return to compensate for this hospitality; but the natives would only accept a few specimens of English cutlery in the shape of knives and razors. On quitting Sokna the governor and the people accompanied the caravan a short distance on the road, and took their leave of the adventurers with unequivocal demonstrations of sympathy and good will.

Next day the expedition entered the pass of Gible Asswaa, or Black Mountains, a region of dreariness and desolation. In every direction masses of basalt seemed to have been upheaved by some convulsion of nature, whilst in some places the rock had all the semblance of iron suddenly cooled after leaving the furnace. Much of the road was of the worst character for travelling, for it was not only hard and broken, but ridged with knife-like edges, which gashed the camels' feet and lamed them. This sterile region extended for more than fifty miles without even a shrub or an insect to invite observation. To add to their trials, the travellers were four days and a-half without water save that carried by the camels, which from being constantly acted upon by the sun was always more than tepid and lost much of its relish. In these mountains the heat was excessive. When exposed to the full blaze of the sun the mercury in the thermometer rushed up speedily to 150° ; and afterwards, when corporal Church withdrew the instrument from the sand in which he had buried it about six inches deep, the indication was 130° . After passing the Black Mountains, the corporal counted in one day nine skeletons of camels which had fallen in the waste from exhaustion.

The expedition now traversed a far-spreading plain, and being short of water, pushed on night and day by long marches for the well called Omhul-obid, or the Mother of Slaves. Before gaining it, they were wearied with sixty-six hours' exertion in the saddle out of eighty, and the camel which Church had ridden from Tripoli, fell dead at Erfad from fatigue.

In a few days afterwards—5th August, 1853—the expedition reached Moorzuk, where private Maguire joined it on the 31st of the same month. This soldier, cool and confident, journeyed from Tripoli with three or four Arabs who were unable to speak a word of English. He was equally unable to exchange with them a word of Arabic. Gesture and grimace, therefore, were the means employed by him to communicate his orders and to express his feelings of satisfaction or discontent; but notwithstanding this impediment, he gallantly drove on,

and in thirty-four days accomplished the journey under a fierce sun, without casualty and with credit.

On the 16th October the adventurers left Moorzuk, and had a toilsome journey as far as Gatrone, where they arrived on the 24th of the same month. Seven days Dr. Vogel and his sappers remained at this place to await the arrival of the rest of the lagging camels and stores. In that time they were joined by a caravan of merchants with about fourteen Arabs from Egypt, going to Bornou to purchase slaves.

While at Gatrone a batch of more than 700 slaves, nearly all women and children, passed through the place. The grown-up men in the drove did not seem to exceed twenty in number. All were in a miserably withered state, and many were panting and dying from fatigue and want. Already they had been driven across a desert between 600 and 700 miles, and had yet to go to Tripoli, nearly 700 miles more. Every step of the journey was to be tramped, and most of them had burdens to bear on their heads, of from fifteen to twenty pounds or more in weight, according to their strength. The slave-masters were very cruel to the wretched creatures, for, if they showed signs of lassitude or fell exhausted on the sand, the whip was applied with unmeasured severity to their naked bodies; and if the horrid scourging failed to move them on, they were abandoned to their fate, perhaps three days from the next well, to perish from raging thirst.

The expedition reached Teghery on the 3rd November, and resting for a few days, after collecting dates for the use of the camels, moved on the 7th into the Great Desert. In the first three days no less than 250 skeletons of slaves were passed, and fragments of bones were scattered about in such vast numbers on the route, that one could traverse the wilderness unguided, without much chance of missing the track. At the wells of Meshroo, about two days' journey from Teghery, the ground had the appearance of an excavated cemetery, or the site of a well-contested battle, and to be free from these sickening relics of mortality the doctor and his sappers pitched their tents for the night at a distance.

The travelling was carried on at the rate of twelve or thirteen hours a-day, without halting, which was equal to a journey of from twenty-five to thirty miles. This was reckoned to be very fair work, as camels usually only go over two miles and a half of ground in an hour. The average heat of the sun ranged from 125° to 130° , and beamed upon the wayfarers with so oppressive an intensity that their substance and their strength were wasted in excessive perspiration. In the evening they halted, spread canvas, and lay down for the night. The two sappers posted themselves in turn as sentries over the caravan, to protect it from injury or surprise. During the night, owing to the state of the atmosphere falling from its fiery day heat to a temperature sometimes as low as 45° , the men suffered from a feeling of extreme cold.

In this way the expedition journeyed for sixteen days without seeing a single native. For ten marches of the period they looked in vain for the slightest trace of herbage, but at a Waddy called Ekaba, a not very luxuriant oasis, they found a little coarse grass that afforded an acceptable change to the camels after feeding for ten days upon dry dates. On the 27th November the expedition was at Ashanumra, in the country of the tribes of Tibboo; and it is since understood that the party has reached Kouka on the lake Tchad.

The small party under Captain Owen, R.E. at Marlborough House, was increased in February to five rank and file. On the completion of the referential arrangement of the correspondence and documents connected with the Great Exhibition, they were attached in May to the department of practical science and art, under the superintendence of Mr. Henry Cole. Since the transfer they have been engaged in services of a very miscellaneous character, embracing the distribution to national and public schools of examples and models for teaching elementary knowledge, form, and colour, mounting and tinting examples and prints, preparing models, &c., and officiating as clerks and draughtsmen in the offices at Marlborough House. Corporal Mack, in addition to his ordinary duties, produced two or three plans of an interesting character. In arranging

some dietary tables Dr. Lyon Playfair engaged the assistance of the corporal. The ingredients used as food, extending to twenty-three substances, having been subjected by the professor to analysis, required to be classified into a simple and consistent arrangement. This the corporal effected by means of an ingenious diagram in colours. Dr. Playfair was well pleased with the illustration, and when at a meeting of the Royal Society, to which the corporal had the honour of being invited, the professor announced his intention of publishing it for the use of schools, the promise was received with applause. True to his intention, Professor Playfair afterwards produced the plan in colours on a very large scale, and gave it a distribution as wide as the United Kingdom. On the 8th June, 1853, the diagram was exhibited at the Mansion-house, and attracted much attention. A reduced plan of the illustration was also made for the Dean of Hereford, which forms the frontispiece to the sixth edition of his work on 'Secular Education.' Corporal Mack constructed another elementary diagram, commencing with the diet of an agricultural labourer and *ascending* to that of a convict. Singular to add, by this scale it appears that good diet is increased in the same ratio as crime; and the industrious husbandman fares worse than the felon!

Corporal Gardner, with an assistant sapper, had charge of the decorative furniture of cabinetry, silk tapestry, and drawing, exhibited at Gore House. He received the various specimens, assisted to arrange them, and was intrusted with the responsible duty of securing their safety. On his removal to the royal mint, to receive instructions in the process of coining, he was succeeded by second-corporal John Pendered, who retained the charge of the cabinetry until the close of the exhibition in September, 1853. He also had the care of Gore House estate and the adjoining grounds, purchased by the Royal Commissioners. Second-corporal Frederick Key, the foreman of carpenters at Marlborough and Gore Houses, superintended the construction of the fitments for the exhibition of cabinetry, and the necessary repairs to the interior of Gore House. The working pay of the party, in addition to their regimental allow-

ances, was 2*s.* each a-day, but corporal Pendered was allowed 3*s.* a-day, in consideration of the extra charge confided to him in the care of Gore House estate.

On the 15th February was commenced the sanitary survey of Woolwich for the Local Board of Health by corporal James Macdonald, having under him a small variable party of sappers and civil assistants. The survey comprised that part of Woolwich lying south of the river Thames, and was finished in October, the work having been delayed for a few months by the withdrawal of the party for the military survey of Chobham. Corporal Macdonald was provided with outline tracings from the 5-foot initial plan of the metropolitan survey, enlarged to ten feet to a mile. These he carefully corrected, and filled in the details, embodying such other minutiae as were necessary to assist the local authorities in effecting improvements in the drainage, &c. The whole work, so creditable to corporal Macdonald, mapped on sheets, was done at the expense of the Woolwich Board of Health for 450*l.*

Under the authority of a royal warrant dated 24th February, a detachment of one sergeant, two corporals, and twelve privates was raised for the survey of Van Dieman's Land. In anticipation of this sanction, the party had been organized and sent to Hobart Town in 1852.

On the 1st April two Quartermasters were added to the corps by the Master-General—Lord Raglan. One was attached to the royal engineer establishment at Chatham, and the other to the companies employed on the ordnance survey. Major Walpole originated the former, Lieutenant-Colonel Hall the latter, and Sir John Burgoyne, the inspector-general of fortifications, ably supported the suggestions by his recommendation. These commissions were bestowed to reward merit, and to place the corps on an equal footing of advantage with the royal artillery, which regiment, taking its published force at the time as a datum, gave one commission from the ranks for every 700 men.

The eleventh company was removed from Alderney to Woolwich on the 2nd June, owing to the diminished strength

of the corps there and at Chatham, rendering the withdrawal expedient. For twelve months it had been stationed on the island, and during that period its services were confined principally to the construction of the Longy lines and to scarping the rock in front of them, with the view of making the place less accessible to invasion. The masons always had full employment, but the greater part of the company, failing work at their own trades, took service in the quarries, and furnished the stones for the fortifications. Private Simon Williams was noticed as the best and most successful cutter and builder. On the removal of the company, a small party was left for special duties as foremen and clerks.

An incident occurred in July which from its novelty is deserving of record. Private William Calder committed forgery and theft, and deserted from the corps. His movements being traced and his assumed name discovered, second-corporal James S. Taylor, fully acquainted with his delinquencies, was sent to the United States, provided with a warrant from the Foreign Secretary, to demand, under the Convention, the apprehension and extradition of the culprit. He had embarked at a Scottish port on board the 'Dirigo,' and as she was sailing up to New York, corporal Taylor, who had arrived in a steamer before her, boarded the trader, captured the thief, and found in his possession all the property he had stolen from his comrades and the Ordnance. The case was taken before Judge Edmonds—notable for his eccentric decisions—and, contrary to the clearest evidence, he discharged the offender, and insinuated, from some extraordinary reasoning he employed, that the corporal himself had committed the forgery. Protesting against the inference, with soldier-like forbearance and respect, he induced the judge to make a promise to cancel his unjust remarks, but his Honour, regardless of his word, afterwards published them without modification. The unmerited accusation, however, did not discourage the corporal from following up his duty; and he made two other attempts to secure the person of the deserter, by asking a remand until direct evidence could be adduced from England, but the partisan judge, proof against proof, ordered

the unconditional dismissal of the thief, and thus afforded an asylum to a fugitive, whose character is a reflection on the verdict that shielded him from justice. The exemplary conduct of second-corporal Taylor, eulogized by Sir John Burgoyne and Lord Raglan, gained for him promotion to the rank of corporal. 'The Albion,' a New York paper, of 3rd September, 1853, gave a spirited leader in vindication of the "soldierly honour" of the corporal; and added, that he "gave his testimony with an air and tone manly, direct, and irreproachable." On the other hand, the forensic turpitude of Judge Edmonds was strongly condemned, for treating the prisoner as the victim of a government persecution instead of a renegade charged with heinous and multiplied crime. The prompt measures taken in the case were intended not merely to punish the offender but to deter others of the corps intrusted with responsibility, money, and property, from the commission of a similar offence; and though it failed to secure the delinquent, it opened up for future guidance a sure line of proceeding, which it is hoped there may never be occasion to resort to.

Soon after the close of the Kaffir war the ninth company was withdrawn from the Cape, and landed at Woolwich the 19th September. During its service in the colony, its casualties in action were ten men killed and eleven wounded.

On the representation of Lieutenant-Colonel Waters, commanding royal engineer at the Mauritius, a company was detached from head-quarters in May, which disembarked there on the 25th September. On landing, the fine appearance of the men, their size and soldierlike bearing, attracted the attention of the staff officers and officers of the garrison. In the afternoon they were entertained with a substantial repast, furnished by the spontaneous generosity of the company of royal artillery there. On the following day they were inspected by Major-General Sutherland, who complimented Colonel Waters by observing, "that they were the finest company of soldiers he had for a long time seen." A testimony like this from the Major-General, who is known not to be satisfied with even mediocrity, was certainly flattering.

A party of three men embarked under Captain A. P. G. Ross, R.E. for the colony of Victoria, landed at Melbourne on the 14th October. Selected as they were with reference to their qualifications as mechanics and general intelligence, they have been appointed to oversee the skill and labour employed in the construction of works for the defence of the harbour, and the rapidly-increasing towns in its vicinity.

The yellow fever, so frequently the scourge of the Bermuda islands was prevalent at St. George's from August to November, and carried off its victims in greater numbers than in the fatal epidemics of 1819 and 1843. It commenced among the convicts in the 'Thames' hulk, and spread with frightful rapidity, first to the military and civil establishments, and then to the residences of the native population. The first soldier who died was a sapper, and before the sickness had ceased, no less than twenty-five men of the corps, out of a detachment of forty-seven of all ranks, became its victims. Three women and one child of the party also died. Colonel Phillpotts, the commanding royal engineer, and Lieutenant Greatorex, R.E., were among the dead, as also the wife of Lieutenant Whitmore, R.E. All the men of the detachment except three were attacked with the fever, and many suffered relapses. To relieve them as much as possible from the influence of the infection, they were early removed from their quarters to an encampment on the north side of the island, near the naval tanks, and finally to Prospect Hill and Port's Island. "Those who were able," reports Captain White, R.E., "showed themselves to great advantage by the cheerful way in which they attended to the sick. Their exertions were above all praise." Several opinions have been ventured relative to the exciting cause of the epidemic, but the general belief was that from some disturbance in the position of the hulk by the pressure of strong winds and agitated tides, the atmosphere became impregnated with mephitic gases emitted from the accumulation of impurities around her bottom. Ireland Island, where a half company of sappers was stationed, was not visited by the calamity.

A warrant dated 15th of August, sanctioned the formation of a detachment of one sergeant, one corporal, three second corporals and eleven privates, for service in the mint at New South Wales, which increased the corps to a total of 2,218 of all ranks. To fit them for the duty, they were quartered for several months within the royal mint, near the Tower, where the departments of the establishment were thrown open for their instruction. From a desire to monopolize the craft of the mintage to themselves and their families, the moneyers viewed the employment of the sappers in this confidential work with jealousy and opposition, and just imparted to their military pupils as much knowledge of the art as they cared to divulge. The party, however, made up by attention and observation for what was withheld from them, and promptly acquired full information with respect to the working of the machinery, and the various processes used in coining. Two or three of the smiths were also initiated in the method of adjusting weights and scales, and in the construction of balances and patent locks and safes. Instruction in these mechanical expedients was given them by Mr. Hobbs, celebrated for his exploits in picking locks before considered invulnerable. The first instalment of the detachment, consisting of sergeant Archibald Gardner and nine rank and file, embarked at the London Docks on board the 'Maid of Judah,' on the 3rd of December, 1853, and landed at Sydney in March, 1854.

The grey greatcoat, which for nearly half a century had been worn by the corps without improvement, was in November of this year superseded by a blue cloth greatcoat of the same cut and fashion as its predecessor, except that the cuffs for all ranks were abolished, the capes diminished, and the sergeants collars were of scarlet, instead of blue cloth.

1853.

CHOBHAM CAMP.

Nature of the ground—Position of the sappers—Their strength—Quarters and cantonments—Equipment—Duties and services—The survey—Marking out the encampment—Forming tanks—Wells—Lakes—Construction of stables—Camp-kitchen—Oven—Incidental employments; Royal pavilion; Queen's road—Sentry-boxes—Post office and postal statistics—Intrenchments—Submarine mining—Passage of Virginia Water—Her Majesty's gracious acknowledgments of the conduct of the sappers in the operation—The second passage of the lake—Also of the Thames at Runnymede—Field-days—Inspections by the Queen—Breaking up the camp—Satisfaction of Colonel Vicars and Lord Seaton.

IN common with the army, the royal sappers and miners furnished detachments for the camp at Chobham about four miles from Chertsey. The common where the encampment was formed was an extensive tract of waste, varied with hill and dale. The amplitude of the district, its freedom from enclosures, from wood or bush, or from barriers or hedges to mark the boundaries of individual or corporate properties, and its succession of swelling heights, well adapted it for the purposes of an instructional encampment, and for the campaigning evolutions of a concentrated force, assembled less for military parade and display than to realize in a degree some of the chequered difficulties and vicissitudes which fill up the hard and comfortless career of an army engaged in the active operations of war.

The camp was established on the concave edge of the ridge. Each end was advanced, while the centre with a sweep receded, giving to the position a curved line approaching the segment of a circle. The detachment of sappers was tented south of the 'Magnet,' the name given to the hill where the head-quarters were established, and next to the left of the Coldstream guards, close to the road leading across the common to Bagshot. The

line regiments which succeeded, fell back from the detachment. To be regimentally correct, the sappers should have been on the right of the Grenadier guards, but the position was chosen for the corps because it was central, prominent, and easily accessible to the troops requiring the use of entrenching tools and field implements. The division, consisting of a due proportion of cavalry, artillery and infantry, was under the orders of Lieutenant-General Lord Seaton, G.C.B. The sappers were among the first troops on the ground. As soon as it was determined to form the camp, the party at Sandhurst—one sergeant and twelve rank and file—was directed to suspend its services at the college, and remove to the encamping district. It commenced work on the 21st of April and ceased on the 7th of May, when it returned to the royal military college to carry out the concluding operations of the term. Lieut. Drake, R.E., commanded this party.

To make a hurried survey of the ground one sergeant and eighteen rank and file were detached from Southampton between the 27th of April and the 1st of May, who, as the service permitted, returned in sections to the ordnance survey. A small party detained at Windlesham for special purposes, in connexion with the military survey, did not quit the district till late in July. Lieutenant Stotherd, R.E., directed the detachment.

Colour-sergeant Henry Brown and twenty rank and file from Chatham, reached the encamping ground on the 9th of May. On the 13th following, this detachment was increased to a company (numbered the 2nd) of three sergeants and eighty-seven rank and file from the royal engineer establishment, under the command of Captain Lovell, R.E. Lieutenant and Adjutant Somerset from Woolwich, joined the company on the 14th of June. The whole were under the orders of Lieutenant-Colonel Vicars, R.E.

To diversify the operations, a pontoon train was ordered to be attached to the division; and on the 20th of June, the sappers appointed for this duty commenced to move in detachments. The force consisted of drafts from the first, fifth, and

eleventh companies detached from Chatham, and reached a total of

1	quartermaster, George Allan,
1	sergeant-major, William Read,
12	sergeants,
16	corporals,
3	buglers, and
156	privates,
<hr style="width: 10%; margin-left: 0;"/>	
189	total,

under the command of Colonel Harry D. Jones, assisted by Captains H. St. George Ord, G. Ross and W. M. Inglis, and ten subalterns of the royal engineers. The great bulk of the men arrived at Wellington camp on the 22nd of June, on which date the totals of the combined force of sappers counted 297 of all ranks.

A day or two after the pontoon operations at Virginia Water were concluded, the first company, with a detachment of the eleventh, quitted Wellington camp, and returned to Chatham the same day.

The second company at Chobham camp was relieved on the 22nd of July by the fifth company, with the greater part of the eleventh from the Wellington camp, and repaired that day to Chatham. The company was played from the ground by the band of the 79th Highlanders, who from good feeling volunteered to confer the honour; and as it passed the tents of the 79th three cheers from the assembled regiment testified its esteem for the departing company. The total force then left for the field duties of the camp, exclusive of the surveyors, numbered 100 men of all ranks.

As some further pontoon operations were ordered to be executed, and the force at the camp was considered to be numerically inadequate for the duty, sixty-five non-commissioned officers and men were sent to the field from Chatham on the 25th of July, and after the completion of the work, they returned on the 28th to their destination.

The party from Sandhurst and colour-sergeant Brown's de-

tachment were billeted at Sunning-hill and Sunning-dale. On Captain Lovell arriving with his company at Sbrub's-hill, finding no billets or tents he stayed for three days in a barn at Bagshot Park House. On the 16th of May the company was for the first time tented on the skirts of Colonel Challoner's wood, then on Sheep's-hill, and lastly on the Oystershell-hill near the "Magnet." The division under Lord Seaton reached the encampment on the 14th of June, when in allusion to the appearance and exertions of the troops as they took up their ground, a leading journal of the day observed, "that the sappers and miners, probably the most intelligent and best-educated men in our army, make the least external show." The pontoon train was encamped about one and a half miles from Virginia Water, near the Wellington Bridge, from which the camp took its name. The detachment of sixty-five men furnished to assist in the formation of the bridge across the Thames at Runnymede, was billeted during its short stay at Egham.

The camp equipment for the Chobham company embraced five marquees, fourteen circular tents, one hospital tent for officers' mess, one for orderly room, one guard tent, and one store and ammunition tent, besides fourteen Flanders' kettles. For the pontoon train there were four marquees, thirty-four circular tents, two hospital tents for workshops and stores, one laboratory tent, and twenty-five camp kettles. Each man was supplied with a wooden canteen, havresack and blanket, but no bedding. Straw was afforded in abundance to sleep on. The men were distributed in parties of nine and ten to each tent, which permitted the senior non-commissioned officers to be provided with ample canvas accommodation, and some spare tents to be used for various incidental military purposes.

A detail of the duties and services performed by the sappers and miners in connexion with the encampment follows. In some of them they were assisted by small levies from the guards and the line. The senior non-commissioned officers were colour-sergeants Henry Brown, Noah Deary, and Timothy Sillifant, who throughout the service were indefatigable in their exertions, and their skill and contrivance were on many occasions

found very useful.¹ In the early stage of the preparations, Viscount Hardinge inspected the camp on Sheep-hill, and expressed in a few pointed sentences his satisfaction of the appearance of the field, and the steps taken to render the accommodation of the troops as comfortable as the resources of the district would admit.

It was deemed indispensable that a map should be provided of the country for several miles round the encampment, to guide the Generals in the choice of positions, manœuvres, marches, &c. The district had been surveyed sixty years before, in common with the general survey of the south of England, and was drawn on a scale of two inches to a mile. The better to meet the present requirement, the plans were enlarged and drawn to a scale of four inches to a mile. All the improvements which had arisen within the last half century, were also supplied, and the original work corrected where necessary. This was done by taking magnetic bearings with a prismatic compass and pacing the ground. The distance examined and corrected, included an area of about 220 square miles, the cardinal angles of which were Chertsey, Wokingham, Farnham, and Guildford. All was carried out and completed between the 1st May and 14th June. The principal part of the hills were sketched by Lieutenant Stotherd, assisted by four non-commissioned officers of the corps, who, although heretofore wholly employed in the operations of a civil survey, were without any previous practice in the art made to turn their talents to account in military sketching. The survey—

¹ Sergeant Brown has served twice in Gibraltar and also a campaign in Syria. He was present at the capture of Tyre, Sidon, and Beirout, and the defensive occupation of D'Junie and Jaffa. Has since gained credit for his services at the capture and destruction of Bomarsund, and is now serving with the army in the Crimea.

Sergeant Deary served at Natal, Cape of Good Hope. He was present in an attack on the Boers at Congella; in the repulse of one by the Boers on the British camp, and the subsequent siege of it, which lasted a month, in May and June, 1842.

Sergeant Sillifant distinguished himself at Gibraltar as a first-class artificer and foreman of works. Is now colour-sergeant of the company at Bermuda.

comprised on four large sheets—was compiled, lithographed, and coloured under the direction of Captain W. D. Gosset, R.E. Corporal Sinnett drew the 12-inch plan of the encampment furnished for the use of Colonel Vicars. A special survey of the ground at Aldershot Heath was also made and plotted on a scale of six inches to a mile, by sergeant Spencer and corporal Macdonald. The soldiers most conspicuous for their usefulness in the Chobham survey were—

Sergeant Benj. Keen Spencer ; for surveying, levelling, and hill sketching.

Corporal William Jenkins ; trigonometrical observations, levelling, and traversing.

Second-corporal James Macdonald ; traversing and surveying.

Lance-corporals Michael Daveran and Valentine Sinnett ; hill sketching, surveying, &c. Sinnett was the best sketcher in the party.

Marking out the encampment was done by the sappers under Colonel Torrens, assistant quartermaster-general, by driving pickets into the ground in the places selected to mark the salient points of the boundaries, to be occupied by the several regiments.

The springs and watercourses were sought for and collected into small reservoirs or basins, at sites as convenient for access as practicable. In some places small trenches were excavated, to afford easy channels for conveying the water to the terraces. These tanks were for domestic uses. Attached to them were larger ones for washing purposes, which were filled by the surplus water from the drinking reservoirs through the agency of small troughs, fixed near the top of the partitioned embankments.

From the dipping and trawling of so many utensils of different kinds into the tanks, and the constant washing of the water against the sides of the embankments, it became very dirty and disagreeable. To obviate this, pumps were fixed in the tanks, large wooden troughs were added to them to convey

the water to the recipients, and sentries were posted over the reservoirs to compel all parties to take the water from the approved contrivances instead of resorting to the objectionable mode which had been attended with so much discomfort.

Where springs could not be found in sufficient number, wells were sunk to afford water for the troops. Some of these answered excellently, and yielded a good supply. In several instances the men were interrupted in the service by the presence of moving quicksand, which prevented them digging to the depth they otherwise would have done. These wells, nevertheless, were ultimately made available for use. To keep the ground from being undermined by the sand, rough sap rollers were at first constructed and sunk, but as these were found inadequate to meet the difficulty, on account of the sand oozing through the interstices of the brushwood, some barrels were securely fixed at the bottom, which at once offered an effectual resistance to any encroachment, and secured a serviceable quantity of good clean water. Into several of the wells two or three bushels of pebbles and shells were thrown to purify the water in its infiltration. Wells cased or lined with fir poles—an expedient first resorted to—were found not to answer, as the water collected in them tasted disagreeably of an impregnation of turpentine. Many failures in seeking for water occurred. Three or four in elevated parts of the field were sunk through a stratum of sand and clay to the depth of thirty-five feet without success. Two artesian wells were also bored late in July, one to a depth of sixty feet and the other to thirty-five feet, without any beneficial result.

Tradition or experience was of little avail in selecting places to sink the wells with anything like certainty of finding water. Several ingenious suggestions were made and acted on with no better result. All depended upon chance, and to make up for the deficiency from this source, greater attention was paid to gathering the nests of springs, and opening up courses and channels for their unfettered issue into reservoirs. Commonly, depths beyond thirty feet were obtained without the use of the windlass, or the application of materials to support the sides.

Many of the men in these experiments turned out expert well-diggers, and executed the heavy duty with energy and coolness.

The formation of lakes was effected by damming up some small brooks and rivulets, in the valleys which emptied themselves into Virginia Water. The dams were raised on piles formed from the ends of fir poles, which, to make a firm foundation, were driven into the ground about ten or fifteen feet wider at the base than the road was at the top. The sides were built with good sods, and filled in with the best soil that could be gathered on the spot. Where the bog was unstable, it was replaced by stiff clay, which was puddled. In this way two or three fine expansive sheets of water were formed, which were extremely useful for the cavalry horses; and a safe and ready passage was also afforded for the troops across some valleys and morasses over the roadway of the dam. One sheet was behind the cavalry stabling on Egham Common, and the others, named "The Great Arm" and "The Little Arm," were at the base of Black-hill and of Sheep-hill.

The stables were constructed of a uniform width, but the length varied according to circumstances. For a stable of six horses, the dimensions were twenty-seven feet by thirteen feet six inches. The uprights or stanchions were nine feet long, three feet of which were driven into the ground and well rammed. A wall-plate was then fixed to the stanchions at the height of six feet from the ground. The rafters were made of rough poles, secured by a collar-beam four feet from the top, and then nailed firmly down on the wall-plates, every alternate one being strapped with hoop-iron. The centre was supported by a king-post rammed three feet into the ground, and besides being nailed to the collar-beam, was tied for steadiness and stability at the top with rope-yarn. Poles were also fixed and secured on either side and at the ends, which, with the doors, were thatched or wickered with fir branches, compactly intertwined. The whole was roofed with canvas, and stayed by guy-ropes. The canvas was made under contract, in pieces to cover a stable for six horses, but after a few days' rain, the pieces

shrunk about sixteen inches, and caused throughout the period of the camp much inconvenience to the horses. The stabling was made to accommodate 1,800 horses at an expense of nearly 1,000*l.* An experimental stable of the above form was run up in two hours and a quarter by twelve men, under sergeant George Pringle, directed by Lieutenant Drake, in the presence of the Commander-in-Chief—Viscount Hardinge—who expressed his satisfaction both with the exertions of the men and the suitability of the construction.

The camp-kitchen for the sappers was built six feet wide and ten feet long, and was approached by a ramp. The flues were ten feet long and one foot wide, with a space intervening through the entire length of twenty inches, which was six inches deep in front and lessened to nothing as it neared the neck of the chimney, for the purpose of facilitating the action of the air and producing a rapid draught. Its sides were built up with sods to the height of fourteen inches, and the top was covered over with the blades of broken shovels. Intervals of nine inches were left to receive the camp-kettles. A trench was dug round the kitchen from which at one end rose, to the height of above six feet, a mud stack containing two distinct chimneys shaped into ornamental pots. At the other end, the two fires were lighted. The flues were kept independently of each other, and, with the chimney-stack, were plastered both inside and out with clay. This expedient gave to the kitchen a neat appearance, and sufficient durability to stand the wear and tear of constant use. Sometimes it was converted into an oven by removing the kettles, and temporarily closing the open spaces with sods. The kitchen cooked for 100 men. Though somewhat troublesome to inexperienced men to construct, compared with the old Peninsular *range* adopted by some regiments in camp, it was a decided improvement both in form and utility, inasmuch as it economised fuel, received with readiness the few appliances used in military cooking, and enabled the culinary art to be carried on with more alacrity and on a larger scale.

An oven was also constructed after the model of the kitchen

with one flue and chimney only. It was built with bricks made on the spot, from clay in the vicinity of the camp. Amid so much rusticity and so many rude campaigning inventions, this oven, from its neatness and success, was much admired. Sergeant Timothy Sillifant, an ingenious mechanic, designed both the kitchen and the oven, and superintended their construction.

Some incidental services executed by the sappers were of a character which it may not be considered inappropriate to notice. So various were their duties and so frequent the calls for their assistance, that the encomiums passed upon them after a full test of their usefulness were not extravagant when it was said "that in all their capacities, from the driving of a nail to the marking out of a fortification, they seemed to be equally as *au fait* as if each service was their special and sole vocation." They repaired and adapted the poor-house at Burrow Hill for a general hospital, erected a flag-staff for displaying the royal standard, enclosed a large area of ground with a canvas wall seven feet high, within which were pitched marquees and different tented conveniences for the use of the Queen and Her Majesty's Consort and guests, and watched and managed the tent-ropes of the royal pavilion, &c., within the compound. Here likewise they erected a cookhouse of brick, after the form of their own kitchen, and cut a road about two miles long, from Colonel Challoner's plantation to the "Magnet," as a carriage drive for Her Majesty. The road led across one of the artificial sheets of water, and at either side of this causeway was fixed a temporary railing, which gave it an appearance of strength and completeness. Contrivances were also adopted for permitting the water to run freely through the embankment so as to insure the stream rising to the same level at both sides of the bridge. The road was, moreover, a useful one, for in manœuvring the troops it was sometimes employed to accelerate their movements, and the passage across it formed a grand feature in the reviews. It was called the "Queen's Road," and the dam across the sheet of water was dignified with the name of the "Queen's Bridge." The sappers also attended to the pitching and adjusting of the marquees of some

of the staff officers, drained the camp ground, taught soldiers of the line the readiest methods of effecting these duties, and built several sentry-boxes. One was erected under the superintendence of a French captain, of rough poles driven into the ground in a circle, after the manner of the initial gabion. In front, one stake was omitted for the entrance. The box was built to the usual height, was covered in with a conical top, and the whole was thatched with straw in courses, which gave it in the distance when the sun was shining upon it, the semblance of a richly-flounced dress. Another box of this kind revolved on a pivot at pleasure, to screen the sentry from wind or rain; and after the camp was broken up, it was given a place in the grounds of Colonel Challoner. A third was run up by private James Queen, which, from its mechanical pretensions, was applauded as a work of taste, but could never be successfully imitated unless by talented workmen accustomed to build with neatness and exactness. The structure was of a mural character and defensible, having loopholes in its sides and rear. An heroic bust, made of clay by the private, who had shown some aptitude as a sculptor, was to have surmounted the box, but it was unfortunately destroyed by some of his comrades, during an excited criticism upon its merits.

“Much as we admired,” wrote a London daily journal, “the universal utility of the corps, we thought we had seen the extent of their capacities, but when looking a little more into the variety of their employment we found them in a new sphere, and discovered that corporal Richard J. Letton had been, under Mr. Smith, discharging the details connected with the Post-office with the usual off-hand success which seems to pertain to the corps.” The receiving-office at the “Magnet” was a sub one to the post at Chertsey. The number of letters sent to and from the camp, as detailed below, from the first day of opening the office to the day of closing it on the removal of the troops, shows that it transacted a fair amount of business.

First division—from 13th June to 13th July.

Inwards . . .	33,783
Outwards . . .	29,614
	————— 63,397

Second division—

July 14th to 20th August.

Inwards . . .	42,105
Outwards . . .	37,500
	————— 79,605

Total . . .	143,002
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Of these the number of registered letters were 257, and the postage-stamps sold realized the sum of 123*l.* 17*s.* 3*d.* The number of letters to the camp showed but little variation through the course of the month, but those despatched *from* it were much affected by the field days, and on one occasion they fell from 1,526 to 601. The management of the postal arrangements was highly satisfactory, and reflected great credit upon Mr. Smith and the corporal. The latter, in a testimonial from his chief, was eulogized for having performed his duty with the greatest zeal, integrity, and attention.

To give an additional warlike feature to the evolutions of the division, some temporary field-works were thrown up. These consisted of three redoubts, two irregular, with faces of very unequal length, on Oystershell and Catton hills, and one regular, on Sheep-hill. The one on Oystershell-hill was revetted on one of its faces with brushwood and fir-branches woven upon pickets, while its remaining sides were cased with sods. The other redoubts were revetted wholly with sods. Sheep-hill redoubt was a square work, with two platforms for one fieldpiece each, and its sides in the interior were each sixty feet long. Four shafts of six feet deep were sunk under its right face, and the charges, in boxes containing each 100 lbs. of gunpowder, were laid and tamped ready for explosion on the 6th August. The Queen was present on that day and witnessed the manœuvres, which were closed by blowing up the

redoubt. At the appointed time, the wires were applied to the battery, but from some mismanagement, supposed from the communication becoming disconnected, the mines did not go off. Two sappers immediately repaired to the spot where the charges were chambered, and after removing the earth which covered them, and affixing in the ordinary way the powder-hose to form the train, Captain Inglis fired it with portfire, and a successful explosion was the result. The whole face was blown up. The field-works were completed early in August, and were only on three or four occasions used in the general operations. Contingents of men from the guards and the line threw them up. Some of the sappers acted as overseers, and others took part in the trenches. The shafts for the mines were dug and the powder placed in them in the night-time.

A series of seven or eight sub-aqueous mines, fired by voltaic electricity, were made in Virginia Water, to show the effect of such expedients if the service rendered recourse to them desirable. The largest charge fired was 35 lbs. of powder. The charges were fixed in tin cans of sizes to suit the bulk of the powder, and fired from the shore. Sergeant Entwistle and one private had the preparation of the charges, &c., and Captain Inglis, R.E., invariably fired them. One on the 12th July was exploded in the presence of the Prince of Wales, and was successful, a column of water being thrown into the air to a considerable height.

As soon as the pontoon train and equipment arrived, the corps commenced and continued for several days to carry out such instructional practice as was considered essential to render the contemplated bridging perfect. The train consisted of—

- 30 cylindrical pontoons,
- 4 india-rubber ditto,
- 1 demi india-rubber ditto,
- 6 carriages,

and the requisite stores, forge, &c., and all were packed on the margin of Virginia Water on the 25th June, 1853.

In accordance with appointed arrangements, a military dis-

play took place on the 5th July, in the presence of Prince Albert and Her Majesty. Early in the morning about 8,000 troops were marched to the Water, on the north side of which an enemy was supposed to have established himself, represented by the second company of sappers and detachments of the Grenadier guards and 23rd fusileers. While a sharp and prolonged attack was being made upon the brigade of Sir De Lacy Evans at Blacknest Bridge, a body of sappers 125 strong, directed by a captain and five subalterns of royal engineers, began to form the pontoon bridge, and to carry out other subsidiary means for effecting the passage of the lake. The six carriages of the train, packed with twelve pontoons and their superstructure, were horsed by the royal artillery, and moved down to the water's edge, where they were unloaded. The remaining pontoons, eighteen in number, had already been stored on the margin of the lake in readiness for the service. The moment the order was given, the sappers in fatigue-dress launched the pontoons, and with the greatest silence, precision, and diligence, formed in forty-five minutes a bridge of thirty cylinders with two bays across an arm of the lake 324 feet broad. The pontoons were lashed in intermediate intervals of eight feet apart, which is considered to be the proper adjustment of buoyancy for the transport of the varied weights of artillery. While the bridge was booming out, Her Majesty and His Royal Highness Prince Albert, with their illustrious guests, embarked in a royally-decorated barge, drew near the bridge and watched with evident interest the movements and exertions of the men.

During the operation a party of twenty-one non-commissioned officers and men, under three subalterns of the royal engineers, formed two rafts and one demi-raft of the india-rubber pontoons, and rapidly ferried across the lake four companies of the rifle brigade, who took shelter in the woods close to the edge of the water. This service was executed in exactly the same time that was occupied in forming the bridge.

About noon, the cannonade on the left at Blacknest Bridge ceased, and the supposed enemy, having discovered Lord

Seaton's real intention, advanced to dispute his passage over the pontoons. Not a moment was now lost on either side. One wing of the rifles was thrown across, and forming line on the opposite bank, opened a spirited fire on their opponents. The batteries also boomed from the south side of the water, and under cover of the cannonade—for the whole woodland for some minutes was shrouded in the smoke it occasioned—a battalion of the Grenadier guards defiled over the bridge. Scarcely had they concealed themselves in the embowering woods when the sappers, who had left the pontoons for an interstitial duty, suddenly returned with bundles of fern and brake, which they strewed over the superstructure to render the passage as secure as practicable for the batteries and the cavalry. Now followed two 6-pounder batteries and a 9-pounder battery of six guns each, the 6th Dragoon guards, and a battalion of the Coldstream guards and of the 42nd Highlanders, with all the staff.

The remainder of Major-General Fane's brigade of cavalry proceeded by the iron gate to the high ground on the north side of the lake, whilst the brigade of Sir De Lacy Evans, now unopposed by the enemy, marched by Blacknest Bridge to Smith's lawn, where the troops were reviewed by Her Majesty. The second company only of the corps was present at the review; the other companies being necessarily detained with the pontoons.

To provide as much as possible for the safety of the horses in crossing, the sappers, with an oar extended from man to man, lined the bridge at each side, by which a kind of railing or balustrade was formed from one end of the bridge to the other. The plan had unquestionable advantages in encouraging the horses and retaining them in their places, but it was somewhat dangerous to the men. As the second battery approached the middle of the stream, the floating motion of the bridge caused some of the horses to become restive, and in the efforts made to control their progress, five of the sappers were thrown into the lake. No casualty, however, happened, and the men, after a little swimming, resumed their stations on the bridge.

In testimony of the services of the corps on this occasion, Lord Seaton published the following order from Her Majesty :—

“ Horse Guards, 5th July, 1853.

“ GENERAL VISCOUNT HARDINGE has received the Queen’s commands to express Her Majesty’s satisfaction in having witnessed this day the laying down of the cylindrical pontoon bridge, which was completed in less than one hour, for the passage of the artillery, cavalry, and infantry.

“ Her Majesty did not fail to remark the order, the silence, and the perfect acquaintance with every detail, which prevailed throughout all ranks of the sappers and miners.

“ Her Majesty highly appreciates the service of this portion of her army.

“ From the date of its original formation this corps has been remarkable in the annals of the British army for the scientific attainments of its officers and the practical knowledge of its men, and has justly acquired the confidence and esteem of the army by its skilful arrangements, and by being at all times foremost in the perilous duties of war. In peace upholding its high reputation by the useful labours which it so cheerfully performs.

“ Viscount Hardinge requests Lord Seaton will convey to Colonel Jones, of the Royal Engineers, who directed the pontoon train, and to Colonel Vicars, in charge of the engineer duties in the camp, and to the officers and men of all ranks of the Royal Sappers and Miners, the Queen’s approbation of their state of discipline and conduct.

“ By command of General Viscount Hardinge.

“ (Signed) G. BROWN, A. G.”

The 11th July was another day of field manœuvring appointed expressly to experimentalize with the pontoons. Before the arrival of the troops at the lake, a bridge was quickly formed with twenty-four pontoons, on the same site as that occupied on the 5th instant, and by the same detachment. At eleven o’clock a part of the division under Major-General His

Royal Highness the Duke of Cambridge passed over it in the order of movement detailed below :—

- 4 companies of the 93rd Highlanders.
- 13th Light dragoons.
- 6 companies of the 93rd.
- 38th regiment.
- 17th Lancers.
- 1st Life guards.
- 1 troop of Royal horse artillery—six guns.
- 2 nine-pounder guns ; and
- 4 small ammunition-waggons.

The time occupied in the passage of the troops was fifty minutes, and on its completion, the bridge was speedily broken up into rafts. These, with the assistance of the india-rubber rafts, manned by the same detachment as on the 5th July, were afterwards employed in ferrying back the 38th and 93rd regiments at a spot 150 yards wide, below where the bridge had been constructed. This duty was also completed in fifty minutes. In all the operations, there appears to have been a remarkable coincidence of duration, which, had the facts not been carefully ascertained and recorded, would seem to be the errors of carelessness or inexperience.

In crossing the bridge, many of the horses of the Life guards became unmanageable. Not a few of them got into a gallop and started off, sometimes as many as three abreast. Several of the artillery horses also were restive. Among so much violence and disorder, the sappers, who lined the bridge as before, had to bear their full share of accident and danger, and before the passage was effected, as many as twenty-five sergeants and rank and file were thrust overboard. All fortunately could swim, and soon made good their places on their respective rafts.

This day's bridging closed the operations on Virginia Water. With the exception of seven rafts and the six carriages, the remainder of the pontoons and stores were packed up and removed to their original stations at Woolwich and Chatham.

The seven rafts, &c., were soon afterwards conveyed to Staines, in readiness for ulterior service over the Thames.

On the 27th July another pontoon bridge was thrown, this time across the Thames, at Runnymede, celebrated alike for its historic claims and attractions, and for the beauty of the surrounding landscape. The point chosen was an angle of the river about a mile from the town of Egham, opposite Ankerwycke House. The operation bore some resemblance to that which took place on Virginia Lake on the 5th July. The sappers commenced their march at eight o'clock in the morning, and, proceeding with the pontoons along the Windsor and Staines roads, halted on the banks of the river at Runnymede at a quarter to eleven. At once the men set to work, and under the more natural circumstances of steep banks and a strong tidal current, unfelt at Virginia Water, threw in thirty-five minutes a bridge consisting of six rafts of twelve cylindrical pontoons in open order, twelve feet apart, and two half bays. To allow the operation to be conducted without interruption, a mimic battle was fiercely carried on some distance higher up the river, and to afford protection to the bridge as it approached the Ankerwycke shore, parties of the 79th Highlanders were rapidly rowed across in punts, which at the time were lying unemployed and captured for the occasion. Soon the combat was removed to the pontoons, and a heavy fusillade was for a long time kept up. Under cover of the guns of the horse artillery, fired from a commanding position, the troops poured over the bridge in a continuous stream, and followed the retreating enemy, with all the impetuosity of enthusiastic pursuit into Magna Charta Island. There the fight was hotly maintained, and ultimately won by the little band of mixed troops under the command of Lieutenant-Colonel Vicars.

The troops that crossed the bridge were a battalion of the Guards, 4th Light dragoons, the other battalion of Guards, 79th Highlanders, the Horse guards blue, and some batteries of horse and foot artillery.

An accident took place just as the last battery was crossing the bridge. The vertical motion of the rafts was such as to

startle the horses, and some from the dull reverberating noise produced by their tramp coupled with the booming roll of the heavy wheels on the superstructure, became ungovernable, and six horses tumbled into the stream dragging with them a gun with its carriage and limber. As usual, the sappers lined the bridge with extended oars, and in the struggling of the horses, four of the men were swept into the current. Three of them were injured—two severely. These were privates John Piper and William Swann, who were also nearly drowned. The latter was entangled with the horses in the water, and it was with great difficulty he succeeded in getting on the back of one of them, when he was picked up by the crew of a boat quickly manned for the purpose. Four of the horses were cleverly rescued by colour-sergeant William Jamieson and private Henry Collins, who dexterously cut the traces; but the two wheel-horses, borne down by the carriage, could not be saved. Privates Daniel Port, Henry Collins,² and Elias Garratt conducted themselves with intrepidity on the occasion by plunging from the bridge into the river to rescue the men and save the horses.

After the operation the sappers bivouacked on the ground, and dined on the day's ration taken with them from the camp. The bridge was afterwards dismantled, packed on the waggons, and then accompanied the troops to Staines. The company belonging to the Chobham force did not reach its tents till eight o'clock in the evening.

On field days the sappers, together with a company of the

² An accident occurred to this soldier at Virginia Lake, which but for his presence of mind was likely to have terminated fatally. The waggons were parked on the slopes of the water, and it being desired to pack the stores on them, private Collins with three other privates rushed to the spot, and put a waggon in motion. Collins laid hold of the shafts—the others pushed in the rear. By some mistake the men in rear quitted their hold, and the waggon thus left to itself rolled with great velocity down the slope, forcing Collins on with it. His situation was now very critical; but seeing at once the danger and the way to escape, he plunged from between the shafts, in an oblique direction into the lake, and saved himself by swimming, while the waggon with its own impetus dashed onwards, until its speed was spent by the resistance of the water. Had he not thus extricated himself, he would have been tumbled over by the waggon, and most likely drowned under its body.

Guards, on several occasions under Captain the Prince Edward of Saxe Weimar, and a company of the 23rd fusileers, represented the enemy under the command of Colonel Vicars, R.E. All acted as skirmishers; and when pressed by charges of the troops, formed squares, or resorted to such other simple manœuvres as were best adapted to their position and circumstances. On these days the expenditure of ammunition by the company was enormous; 100 rounds per man at least were consumed. On the first day of the pontooning at Virginia Water, the sappers, who were posted to prevent the passage of the troops by Blacknest Bridge, fired in an hour and a-quarter about 120 rounds a man. The firing of the main body of the division was always comparatively trifling. From the hard nature of the duties that devolved upon the enemy, the men composing it gained in camp the familiar designation of "The Kaffirs." The last field day at Chobham was one of labour and fatigue to the men. They fired more than an average quantity of ammunition, and at its close the sappers marched at the head of the line in review, before the Duke of Cambridge and Lord Seaton. Their blackened faces, dingy accoutrements, and well-worn apparel afforded a striking contrast to the clean appearance, unsoiled appointments, and bright uniform of the passing squadrons and battalions; and it was no inappropriate commendation to say on this, their last camp inspection, that in their endurance, their hardihood, their wearied but dauntless aspect, they looked like "Polish patriots—few, but undis-mayed."

On the 21st June and 5th July the Queen inspected the second company in common with the rest of the troops at the camp. The Prince Albert and Lord Hardinge accompanied Her Majesty. The King and Queen of Hanover were present on the first day. The fifth company and a detachment of the eleventh were also reviewed by the Queen and the Prince Consort on the 4th and 6th August. On the latter date Her Majesty did not personally inspect the troops. On all occasions of the royal presence at the camp, the sappers were in full notice of Her Majesty, for they possessed the advantage of

occupying a position close to the Bagshot road, and next to one of the special entrances, which led the Queen and the royal cortege immediately past their tents to the "Magnet."

After the breaking up of the camp, the sappers remained for four days to dismantle the stables and collect the stores. All the canvas was stripped off the stables, and packed in two days and a half, throughout which time the men were exposed to a ceaseless rain, which fell in torrents. The pontoons and carriages were conveyed to Chertsey, and embarked for Chatham. After completing these duties, the fifth company and the detachment of the eleventh, under Captain W. M. Inglis and Lieutenant W. C. Anderson, R.E., arrived respectively at Chatham and Woolwich on the 24th August. On that day Lord Seaton finally gave up his command. A party of one sergeant and eight privates—*the last troops at the camp*—detained for the closing duties of clearing the ground, and collecting and packing the Ordnance and Commissariat stores, joined at headquarters on the 27th August. Novel and memorable was the re-appearance of these companies with the corps, for both officers and men had doffed their plumes, and substituted for them bunches of blooming heather, gathered from the ridges and valleys of the now famous Chobham. On their route to Chertsey they were met by Colonel Vicars, who complimented them for their excellent conduct and exertions during the period of their encampment, and expressed to them the satisfaction of Lord Seaton for their alacrity and readiness at all times to meet the wants of the service. This testimony was afterwards corroborated in a letter dated Hyam's, 25th August, 1853, to Lieutenant-General Sir John Burgoyne, in which his lordship, after alluding to the active assistance of the officers of royal engineers, and the detachment of the corps of sappers under the command of Colonel Vicars, added "that their conduct and exertions on all occasions have been most satisfactory."

1854.

Staff appointments—Party to Melbourne—Mint detachment to Sydney—Survey of Aldershot heath—Department of Practical Science and Art—Dress—War with Russia—Detachment attached to Baltic fleet—Second company to the Aland Islands—Landing—Brigadier-General Jones—Preliminary services—Operations—Fort Nottich—Incidental employments—Bomarsund—Destruction of the forts—Conduct of the company—Sickness; returns to England—Detachment to Turkey—Augmentation to the corps—Seventh company withdrawn from Hurst Castle—Eleventh and seventh companies to Turkey—Odessa—Services of the first detachment in Turkey—Corporal Cray—Gallipoli; Bouläir; Ibridgi—Commendation by Sir George Brown—Tenth and eighth companies to Scutari—Redout Kaleh—Works there—Circassia—Working pay—Companies attached to divisions of the army—Buyuk Tchekmedjie—First detachment to Varna—Followed by the tenth company—Also by the eleventh—Complimentary order for services of the latter—Contrast between the French and English sappers—Works at Varna—Also at Devno—Encampments at Aladyn and Varna—Works at Gallipoli and Bouläir—Eighth company to Varna—Gallantry of corporal Swann and private Anderson—Sappers join at Varna from the fleet—Photographers—Detachment to Rustchuk—Trestle bridge at Slobedzie—Bridge of boats over the Danube—Return to Varna of a portion of the sappers from Rustchuk—Misconduct of the detachment; also of the seventh company—Spirited conduct of corporal Cray—Major Bent and party of sappers to Bucharest—Fourth company to Varna.

MAJOR WALPOLE, on his promotion to be lieutenant-colonel, was removed from the appointment of brigade-major to the corps, and succeeded by Captain Frederick A. Yorke, R.E., on the 17th February. Lieutenant-Colonel Walpole had been commissioned to the office from the Cape of Good Hope, where he had served for many years in command of the tenth company, and been twice dangerously wounded in action with the Kaffirs at Fort Peddie. During the six years he had held the appointment he carried out in all respects its requirements with a diligence, consideration, and success, that were of great

advantage to the corps, and enhanced in public estimation its services and merits.

In Major Yorke the corps has the good fortune to be commanded by an officer who, for the greater part of his military career has been much employed with it both at home and abroad. Under Colonel Matson, when brigade-major, he was the acting-adjutant at head-quarters, and thus early became acquainted with the organization, character, services, and resources of the royal sappers and miners.

On the 3rd March one sergeant and five rank and file sailed from Southampton for Melbourne to reinforce the civil staff employed in the survey of the waste districts of the Crown, and landed on the 24th July. This addition was made to the colonial establishment, as applications for land by the emigrants were increasing and urgent, and could not be met by any resources to be engaged in the colony:

In April a party, huttet on the bleak heath of Aldershot, commenced a series of surveys, having reference to the use of the moor as a military camp for periodical evolution and exercise. The detachment mustered at one time as many as twenty-four non-commissioned officers and men, and dwindled down to an initial party of a few choice hands to finish the operation. Captain Cameron, R.E., had the direction of the service; and corporal James Macdonald, a non-commissioned officer of tried ability and indefatigable activity, was its local superintendent. In ten months the detachment, after being instructed by the corporal, completed a survey of a selected district of about 800 acres for the Commander-in-Chief; another of some 1,500 acres for the professional use of Major-General Sir Frederic Smith; and a general one for the Ordnance, including the ground specially surveyed, extending over an area of 13,000 acres. Each survey provided its contours to suit particular requirements; and the whole range of duties in connection with the plans, usually performed by different parties, with qualifications adapted to each particular service, were wholly carried out by corporal Macdonald and his party.

Six rank and file to complete the mint detachment at Sydney, embarked in two parties on the 8th April and 19th June, taking with them the portable houses, shops, machinery, and stores necessary for the formation of the establishment. The men had all been instructed prior to leaving the royal mint in London in the art of coining, and were taught by Messrs. Walker of Millwall the method of fitting together the iron roofing, cisterns, girders, &c. to form the mint buildings. One man had also been instructed by Messrs. Whitworth and Co. at Manchester, in the manipulation and action of the several lathes to be used in the coining processes. They respectively reached Sydney on the 10th July and 24th October.

Three men were withdrawn from the department of science and art in the summer for service in the East, viz., two for employment as photographers, and one—corporal Dickson—as conductor of the pontoon equipment and stores. One of the photographers—corporal Pendered—had, while in that department the care of the students' drawings sent from the various local schools of art, in competition for prizes offered by the commissioners. Corporal Dickson, who until his removal had acted as a clerk at Marlborough House, received from the Board of Trade a gratuity of 5*l.* in recognition of his usefulness. The non-commissioned officers who remained under Captain Owen, R.E., were corporals Frederic Key and James Mack; the former, stated to be full of invention and intelligence, continues to act as overseer of the civil carpenters employed at Gore and Marlborough Houses; and the latter, remarkable for his good information and acquirements, is found to be a first-rate clerk and draughtsman. It should also be noted that one or other of these non-commissioned officers travelled during the autumn to several provincial towns in England and Scotland, such as Nottingham, Coventry, Sheffield, Warrington, York, &c., and exhibited to local institutions in connection with the central school of design at Somerset House, a collection of students' drawings for which prizes had been awarded at the spring examination at Gore House. The exhibition was so arranged as to be packed and conveyed from town to town with readiness

and facility, and wherever they itinerated with their charge, they were treated with attention and courtesy.

This year the moustache, under certain restrictions, was permitted to be worn; and the Kilmarnock bonnet, discarded in 1837, was revived. Its dimensions, however, were of a more reasonable measurement than in olden times, and suitable for campaigning. A yellow band was added, also a plain yellow ornament on the crown, and the scanty peak worn for nearly forty years, was replaced by one familiarly termed the war peak, sufficiently large to offer an efficient shade to the face from the sun.

To obtain a religious protectorate in Turkey, Russia menaced the independence of the Sultan, which led to a long diplomatic negotiation between the Western powers and the Czar; but as the Emperor Nicholas persisted in interfering with the rule of the Sultan, and attempted to enforce his pretensions by occupying with a belligerent army the Danubian principalities, Great Britain and France declared war against Russia. Measures were instantly taken to give effect to the declaration by despatching powerful expeditions to the East and the Baltic.

To the Baltic fleet were attached, on the 9th March, one sergeant and nineteen rank and file of the second company, under the command of Lieutenant Nugent, R.E., which embarked at Portsmouth on board the 'Duke of Wellington,' flag-ship of Vice-Admiral Sir Charles Napier, and accompanied it in its reconnaissance of the Baltic Sea and the Gulf of Finland as far up as Cronstadt. The object of sending the party with the fleet was, that it might take the lead of the seamen and marines in any escalating operations ashore; but the nature of the service was such that no occasion offered for resorting to the expedient. During the time that the cholera was rife in the fleet, several of the detachment were seized with the malady, and three died.

When it was resolved to make a descent upon the Aland Islands, a division of the French army was despatched from Calais to carry out the enterprise. The second company, of eighty strong, under Captain F. W. King, royal engineers,

was added to the force, and sailing from Deptford in the 'Julia' transport on the 15th July, with every conceivable engineering requirement, arrived at Calais on the 17th, and took on board 225 officers, non-commissioned officers, and rank and file of the 51st infantry of the line. The sappers were the only troops that accompanied the French contingent.

Before daylight on the 8th August, the second company, 600 of the royal marines, and 2000 French troops landed at a small cove a few miles N.E. of Bomarsund, and taking a winding route by the village of Monkstetta, encamped about 2,000 yards from Fort Tzee, sheltered by a hill on which the breaching battery was afterwards constructed. The advance of the van was formed by the sappers from the flag-ship, carrying besides their carbines an assortment of bill-hooks, hand-saws, axes, and hatchets, and the column was closed in rear by the second company under Captain King.

The British operations were wholly carried out under the direction of Brigadier-General Jones, R.E., an officer of matured judgment and experience, gained by hard service in the Peninsular War, and by some forty years of after study and experiment. He was assisted by Captain H. St. George Ord, and four other officers of the corps.

Nearly five days were employed in collecting the tools and stores, cutting roads, effecting preliminary reconnaissances, preparing an hospital, and in providing domiciles for the temporary accommodation of the company, by making huts of the branches of fir trees; while a strong party, about 400 yards from the hill, worked with unflagging industry in making fascines and filling gabions, which, when finished, were carried by the seamen and marines to the dépôt near the site of the intended battery.

Meanwhile two or three attempts had been made by some officers of the corps, attended by a few intrepid sappers, to trace the battery; but the enemy opened so heavy a fire upon the parties, that a suspension of their exertions necessarily followed. Determination and tact, however, got over the difficulty. No trace was used, but a simple alignment struck, from which, on

the 13th August, under shade of the evening, sergeant John Jones and twenty-four rank and file, began to construct the battery, under the orders of Captain Ord. Without the chance of digging a shovel full of earth to give solidity and strength to the cover, the battery was built on the bare rock entirely of fascines and sand-bags. The sappers reared it unassisted, except that the royal marines carried the material from the engineer's park to the hill. Sergeant John Jones had the honour of laying the first sand-bag. In ten hours, the detachment, unrelieved, nearly completed the battery, which would soon have opened upon Fort Tzee; but the French having forestalled the arrangement by obtaining the surrender of its commandant, the battery was free for other employment, and its direction was consequently changed against Fort Notich. Speedily the epaulement which flanked the battery was prolonged, the platforms promptly laid, and three 32-pounders having been placed in position, the embrasures were unmasked by some daring sappers, and the firing, which lasted about nine hours, ended at the fall of the day in the capture of the garrison. It was surrendered to Captain Ord, R.E., who had with him to receive the formal capitulation, a force of 100 of the royal marines and five rank and file of the sappers.

The added work was partly constructed in the day, under fire, as was also the laying of the platforms. Corporal Peter Leitch, a first-class carpenter with some handy men of the company, attended to this service. The working party was relieved every four hours day and night, until the battery was completed, and also during the siege, to throw fatigue and danger equally upon all. The guns fired by the seamen and marine artillery were first drawn by them to the battery on sledges of a novel construction, over steep and rugged ascents. When they reached the camp, however, their labours were considerably diminished, as a road to assist them had been cut by the sappers, up the hill to the breaching battery, under the orders of Captain King. Corporal George Luke acted as overseer in this duty. Two of the men were allotted to each of the guns to keep the embrasures in good order. This they usually

attended to while the gun was loading, and not a few displayed a stoical coolness and intrepidity in repairing the damaged merlons, and clearing away the debris occasioned by the enemy's cannonade. Though the fire upon the battery was warm at times, the casualties only embraced two killed, of whom one was the Hon. Lieutenant Cameron Wrottesley, R.E., and one wounded. None of the sappers were even touched; and this good fortune, as well for them as the seamen and marines, was attributed to the prudence of Brigadier-General Jones, who had men appointed to look out and warn the battery when the enemy's guns were fired. These "look out" men were sappers—alert spirits with quick eyes and stout hearts—who gave the alarm the instant a flash was seen at the fort. The better to enable them to give the intimation they took ground in advance of the battery in some chasms of the rock, where, although partially screened by the natural cover of their hiding places, it was a wonder that they escaped unhurt. Privates James Moncur and Thomas Ross were most conspicuous in this hazardous duty.

Without attempting to chronicle the different incidents of the campaign, in which the fleet and the French troops so gallantly participated, it will be sufficient to note that Bomarsund, the principal fort of the Aland Islands, capitulated without material opposition, and the Russians were marched out prisoners of war. The sappers and miners and royal marines formed in line, faced by a force of the French infantry; and through their divided ranks, the Russians moved pensively away to the point arranged for their departure.

No sooner were the forts in possession of the allies than measures were taken to disable the guns and dismantle the works. The sappers only were employed in carrying out the mining operations, under the direction of their officers. In this duty they worked with so much energy, that their exertions were scarcely checked by the fatigues to which they were necessarily subjected. Forts Prasto, Tzee, Nottich, and Bomarsund all fell in turn—blown up by mines skillfully laid and fired. The magazines also were exploded, the shot and shell

removed, and stores of timber, prepared for use in the contemplated fortifications, were burnt. The work of destruction extended even to the garrison chapel; it was sacked and then destroyed, and all the unfinished forts and buildings, rising from foundations which marked the extent of a stupendous engineering design, were torn up by mines and thrown down. The stone landing-pier was likewise demolished, and not a slab of granite which promised to be of service in future works was left unbroken. But a few weeks, and what a change! This proud maritime position—this formidable outport of the yet impregnable Cronstadt, studded with forts and bristling with ordnance, was one wide spread area of ruin and desolation!

Brigadier-General Jones and the officers of the corps were well pleased with the military bearing and exertions of the company, and commended the "cheerful and willing manner in which they performed the laborious duties" assigned to them. Besides the non-commissioned officers and men named above, there were others noted for their services. Privates John Williams, John Veitch, and Francis Enright, for their boldness, resolution, and zeal. Corporal George Luke, for his ability and usefulness as a miner in the demolition of Bomarsund. Sergeant John Jones, for his assistance as a draughtsman; and sergeant Richard P. Jones, for his general diligence and intelligence, as well in the general operations as in the special one of diving. The "Penelope" having run ashore on an unknown rock off Bomarsund, was compelled to throw fifteen of her guns overboard to float and save her. Several naval divers attached to the fleet were afterwards employed to bring them up, but as some submarine difficulties prevented as speedy an accomplishment of the undertaking as was desired, the co-operation of sergeant Richard Jones was found to be an acquisition, inasmuch as he recovered five 8-inch guns and one 10-inch.

There was much sickness among the sappers during the brief campaign, and on one day no less than forty-seven men out of a company not a hundred strong, were on the sick-list with

choleraic symptoms; but owing to the attention of the naval surgeons, only two died. Quitting the Baltic Sea in the 'Cumberland,' the company rejoined the corps at Woolwich on the 16th October, and before two months had intervened, was despatched in all haste to Turkey.

It is now time to turn to the East, to trace the movements and services of the corps in that interesting quarter. The van of the army sent thither under the command of Lord Raglan, was a small party of six rank and file of the sappers and miners. They belonged to the fourth company, at Malta, whence they sailed in the "Banshee" on the 25th January, and were the first British soldiers landed on the Ottoman shores.

To meet the calls for its services in the coming struggle with efficiency, the corps, by order of Lord Raglan under date the 20th February, was augmented from an establishment of 2,218 of all ranks to 2,658 officers and men, by enlarging the organization of each of the twenty-two companies with one sergeant, one corporal, one second-corporal, and seventeen privates.

To concentrate the available force for active duty, the seventh company, employed in services of a secondary character only, was withdrawn from Hurst Castle, and removed to Woolwich. While at the castle the company had assisted in strengthening the place by constructing two batteries for ten and twelve guns respectively, and also three loopholed caponiers, built of brick and cement in the moat of the castle. Quarters as it was upon an exposed shore, in a spot that was isolated and dreary, the conduct of the company was anything but satisfactory, and in the short space of eighteen months, out of a strength that scarcely exceeded ninety non-commissioned officers and men, no fewer than twenty-three privates deserted.

On the 24th February the eleventh company, under Captain Hassard, embarked at Southampton for Turkey on board the 'Himalaya' steamer, in which was shipped a store of intrenching tools for field operations. At Malta they landed on the 8th March, and were temporarily quartered at Floriana. The

seventh company—Captain Gibb's—joined them on the 27th March, and brought with them a further supply of tools and implements. Two days later both companies embarked in the 'Golden Fleece,' and steamed off with the rifle brigade to Gallipoli, where they landed with Lieutenant-General Sir George Brown on the 8th April. About forty non-commissioned officers and men of the corps were left at Gallipoli, and the remainder, marching nearly nine miles, took up a position not far from the village of Boulair, from which the camp derived its name.

On the 17th April twelve rank and file of the eleventh company, detached to Constantinople, joined the 'Fury' steamer for service in the Black Sea, and were present at the bombardment of Odessa. The squadron was hotly engaged when the 'Fury' arrived, and after firing a few rounds, was signalled from the action by the Admiral. On the 23rd April she was again in the fight for two hours, but her presence in the action is not noticed in the official despatches.

Meanwhile the six men with Lieutenant Ewart, R.E., when not on board ship, were employed surveying at Gallipoli, Boulair, and a district north of Constantinople. They also fitted up an office for the brigadier-general at Therapia, where they were quartered until they merged, late in May, into the eleventh company at Varna.

When Sir John Burgoyne was in the country prior to the arrival of the troops, private James Cray was his orderly, and accompanied him to Varna and Shumla. Majors Dickson and Wellesley, with Lieutenants Burke and the Honourable George Wrottesley and lady, were of the party. From rough roads and inclement weather the journey was not without its trials; and at night the little expedition rested by the road-side in any nook or hovel where they could find shelter.

Subsequently private Cray was orderly to the heroic Lieutenant Burke, R.E. With him he passed a few days at Silistria, and then marched to a small town on the banks of the Danube nine miles from Rustchuk. Major Wellesley had given him a sword, but this was not considered sufficient for his defence,

and he was provided from the Turkish armoury with a minié rifle and revolver. Thus armed, he joined the Ottoman forces in an action against the Russians, who were beaten, and forced to retire into Rustchuk. His next march was to Sistova. At the time the party entered the town an engagement was going on, and the Turks were again victorious. Journeying onwards they crossed to an island, where Lieutenant Burke and his orderly at imminent risk laid out new works, and traced batteries to complete the defences of the place. On that occasion private Cray exchanged between twenty and thirty shots with the enemy, who kept up a sharp fire upon the party from the opposite bank. In all his tours of inspection and survey, from the Danube to Adrianople and on to Constantinople, private Cray accompanied Lieutenant Burke, and for his usefulness and spirited conduct was made lance-corporal and afterwards attached as orderly to the Brigade-Major.

The detachment at Gallipoli erected piers at the port for landing stores, guns, &c., and prepared hospitals for the sick. The companies at Boulair assisted to form the lines on the left of the position allotted to the British troops to execute. About 1,500 men of the infantry were daily distributed for some months to the trenches and roads, and performed their tasks with ardour and cheerfulness. One man detached to Ibridgi, about fifty miles distant on the north side of the gulf of Saros, superintended the Greeks in felling and collecting brushwood and timber, for the construction of magazines, platforms, log-huts, &c. A fluctuating party, numbering at one time nine men under a corporal, was afterwards detached on this duty.

When Sir George Brown, who commanded the division, took his departure for the frontier, he communicated in orders of the 6th May "his entire approbation of the general conduct, zeal, and industry of the royal sappers and miners on the works, both at Gallipoli and the camp at Boulair."

Two other companies were quickly reorganised to reinforce the corps in the East. These were the tenth under Captain Bent, to form the pontoon train, and the eighth from Gibraltar, under Captain Bouchier. The former embarked at Woolwich

in the 'City of London' steamer, on board of which was Lieutenant-General Sir De Lacy Evans and staff, and the staff of the Duke of Cambridge. Sir De Lacy Evans was well pleased with the conduct and services of the company on board, for they had much to attend to in strengthening the horse-boxes. Landing at Constantinople on the 24th April, the company was quartered in Scutari barracks, as was also the eighth on debarking from the 'Albatross,' on the 9th May. The pontoons sent out in the 'Melbourne' in charge of corporal William Dickson, an able and intelligent non-commissioned officer, reached Constantinople on the 13th May.

The sappers attached to Her Majesty's ship 'Fury' being transhipped to the 'Agamemnon,' bearing the flag of Rear-Admiral Lyons, served with the squadron in a cruise on the coasts of Circassia, Georgia, and Anatolia, and were present on the 19th May in the reduction of Redout Kaleh.

Next morning the party landed, and were employed for two days as overseers in the defensive occupation of the place, under the orders of Lieutenant H. Cox and H. B. Roberts, of the royal marine artillery. Parties from all the ships were ashore at the works. The Turks, utterly unacquainted with the mode of protecting themselves by intrenchments, were instructed by the sappers. A Russian barrack was speedily loopholed, a stone building in a commanding situation was converted by massive planks into a block-house as an outwork, and a parapet was formed, flanked by a deep marsh. Houses, too, that could not aid in the defence were thrown down, whilst others, well sited, were turned into points of security and resistance. The old fort on the land side was also strengthened with additional works. When these services were sufficiently advanced, the Turks with two sappers were left to complete the defences, and the Anglo-French working parties, with the remainder of the sappers, returned to their ships.

Renewing its cruise the squadron anchored off Bardan. Landing Captain Brook, R.N., a doctor, and four sappers, they started, guided by an escort of Circassians commanded by Ismail Bey, over the mountains, to communicate with the prophet-

warrior Schamyl. In July two men were added to the party at Redout Kaleh, to superintend the Turks in improving the fortifications under the direction of Lieutenant G. R. Lempriere.

Late in May Lord Raglan ordered the sappers, when employed as artificers "in repairing tools, constructing wharves and the like," to receive working pay; the non-commissioned officers at the rate of 1*s.* a-day, and the privates 6*d.* to 1*s.* a-day each, according to conduct and ability. The non-commissioned officers appointed conductors of stores, photographers, electricians, &c., were granted 2*s.* a-day each.

To form a connexion between the sappers and miners and the army, the four companies with the expedition were attached to the divisions as follows:—

1st division	.	11th company	.	Captain Hassard.
2nd	„	.	.	8th company . Captain Bouchier.
3rd	„	.	.	7th company . Captain Gibb.
Light	„	.	.	10th company . Captain Bent.

Four men employed for a few weeks with Captain Chapman, R.E., in the survey of Buyuk Tchekmedjie, were recalled to Constantinople late in May, as the intention of forming that district into an encampment had been abandoned, owing to the altered character of events.

While the carpenters of the companies at Scutari were fitting up horse-boxes for the cavalry on board the transports, a forward movement was commenced by a detachment of one sergeant—John F. Read—and twenty-seven rank and file of the tenth company, commanded by Lieutenants Gordon and Pratt, which landed at Varna from the 'Caradoc' on the 22nd of May. Precedence was given to this party for the purpose of erecting jetties to land the troops, horses, and ordnance, on the arrival of the army.

On the 26th of May, the remainder of the company under Captain Bent, disembarked at Varna with the pontoons, from the 'Cyclops' steamer. The removal of the company was an expeditious operation, for in less than ten hours from the time of receiving orders, the pontoons, stores, horses, and all the miscel-

laneous gear attending a war company of sappers, were stowed into one vessel, and then transhipped into another when subsequent orders rendered such an arrangement imperative. In allusion to the company's departure, the corps was spoken of in the 'Times,' as a "most indefatigable and invaluable body of men."

Simultaneously with this movement, Captain Hassard's company sailed from Gallipoli, when their exertions elicited the following complimentary order from the officer of Royal Engineers in command.

"On board the Emu, 25th May, 1854.

"Captain Gordon thanks the eleventh company for the zealous and willing manner with which they worked during the whole of last night, and till six o'clock this morning, embarking intrenching tools and stores, immediately after their march in from the camp at Boulahar. This exertion, so cheerfully performed, as to enable the company to proceed without loss of time on active service, will be brought to the notice of the Brigadier-General." It was so, and received his hearty acknowledgments.

The company disembarked at Varna on the 27th, and the scene at the quay was strikingly interesting and animated. About 250 French sappers had also landed from the 'Cacique,' and working as they did some twenty yards from the British sappers, a good opportunity was afforded for contrasting the temperament and military habits of the two nations. The French, gay, volatile and impulsive, stirred about with elated spirits and elastic activity, that gave a cheerful, though an impetuous aspect to their exertions; whilst the English sappers, grave, impassible, and taciturn, wheeled off scaling ladders and stores so devoid of bustle and joyousness, and with so much attention to order and composure, that an air of stern and serious necessity was impressed on their labours. Nevertheless, the work was done with a business-like energy and earnestness that seemed more than adequate for any task or enterprise.

Varna for a few months was the principal frontier station and depôt of engineer stores and pontoons, from whence parties

were thrown out to Devno, Aladyn, Monister, Rustchuk, &c. At Varna the companies built a stone pier of some pretensions, and a wooden one at the south side of the bay, run out into deep water 140 feet from the beach. They also banked up the shore, deepened the little harbour, and improved the almost trackless roads beyond and within the vicinity of Aladyn, making them passable for heavy wheeled conveyances. Much of the work was carried on in bog and water, which, however, was ultimately discontinued, as it was found that some of the men who were so employed, died from cholera, traceable to their exertions and exposure.

About seventy men marched to Devno on the 29th of May, and marked out the encampment ground for the light division. They also repaired the roads, removed the accumulations of years from deserted fountains, rendering them again useful for thirsty wayfarers, built ovens for baking bread, raised dams to collect water for the troops, and constructed a bridge across the lake. From a lonely burial-ground, filled with blocks of unhewn and unsculptured granite, marking nevertheless the sites of numerous graves, the sappers took the largest stones, and used them in erecting a bridge over one of the narrow channels which join lake to lake. The men worked very hard, at times up to their breasts in water. The correspondent of the 'Times,' in speaking of this work—June 29th—termed the sappers "a most utilitarian corps;" while Captain Gordon, in a letter to a brother officer, remarked with respect to its general services, "that the men work well and behave well. To be with them is a pleasure."

A party of twelve men with sergeant Thomas Dumvill, under Lieutenant Creyke of the engineers, was employed for three days at Carra-Houssan; and having placed the several wells in order, and rendered the neglected fountains available for use, it returned to Devno. It was expected that the light division would march through the village of Shumla, but the intention was afterwards abandoned. The sappers therefore were the only British troops at this advanced frontier station.

At Aladyn, the sappers were encamped in a valley covered

with the thickest foliage, and its many rural accessories of creepers, clematis, wild vines, &c., made the scene as picturesque as grateful. At Varna the companies were tented as nearly as possible to their work, while a detachment was quartered for a time, close by the city walls, to be ready for any emergency: but when the cholera had to some extent decimated the camp, the sappers were removed, to improve their sanitary condition, to a healthier location on the south side of the bay.

The seventh company at Gallipoli and Boulair, in addition to their duties on the lines, constructed a number of log-huts, stores, and stables for the cantonment of a regiment, in the event of the army being compelled to fall back to the isthmus, as to another Torres Vedras, for succour and safety.

The eighth company from Scutari landed at Varna on the 19th of June from the 'Golden Fleece' steamer, and joined the frontier companies.

Lance-corporal William Swann and private Andrew Anderson accompanied Captain Bent and Lieutenant Burke to the beleaguered fortress of Silistria, starting on the 17th of June. Arriving too late to share in its defence, they shortly afterwards repaired to Rustchuk, where a hazardous attack upon the Russians holding the opposite bank of the Danube, was undertaken on the 7th of July by Hassan Haki Pacha, the commander of the Turkish force at that fortress. The attack was made on three points, Captain Bent leading one of the divisions. Lieutenant Burke also led a detached party of Turkish troops across the river in boats. The two sappers were attached to him, and it is of their conduct particularly, and not the general incidents of the battle, that the following record will give an account. Gaining the island, the party of Turks jumped on shore, and forming in line, gallantly pushed on, and were met by superior numbers. A fierce hand to hand struggle ensued, and Lieutenant Burke, with desperate valour, slew with his own strong arm six of his opponents, falling early on the strand covered with frightful wounds. The sappers stood by their officer, and fought "well and bravely." In the midst of the conflict, private Anderson, a stalwart soldier, tried to save the heroic young

man whose spirit infused all with courage; but though the attempt unhappily failed, he dealt out slaughter among the Russians with incredible effect. It was not long before the little band of Turks, overpowered by numbers, retreated to the boats. Mindful of the sacred duty that devolved upon him, Anderson, with daring devotion, three times threw himself into the ranks of the enemy, and at last rescued the bleeding body of his officer. Though encumbered with his carbine and other arms, he endeavoured to bear it away on his back, but such was its weight—for the lieutenant was a powerful man, and of robust stature—and such the heaviness of the fire upon him, he was obliged to relinquish his purpose, leaving the body concealed in some long grass. Taking the dead man's sword to save it from falling as a trophy into the hands of the enemy, he made good his retreat to the river. Scrambling down its sedgy bank, which varied from three to six feet in height, the party renewed the conflict, and improved their cover by a hasty entrenchment, in the formation of which the Turks used their hands and bayonets, and the sappers their swords. Corporal Swann was here soon disabled, and, wounded in the head by a blow from the butt end of a musket, he was falling, when, a second blow across the shoulder-blade, threw him into the water. There for four hours he lay insensible, and was providentially saved from drowning by a thick woollen shirt he wore. Anderson, now the only British soldier with the little batch, acted as became his manly character, and encouraging the Turks by his prowess and endurance, the brave detachment maintained the unequal contest with veteran firmness, and only recrossed the Danube when the necessity for their services had ceased. In that hard-contested battle, private Anderson killed no less than fourteen Russians, himself escaping miraculously without wound or hurt. Next morning, though it was uncertain whether the enemy was in ambush or not, he pushed over to the island again, and recovered the body of his officer, but what a sad spectacle did it present! It was headless; thirty wounds from bullet, sabre, and bayonet, riddled his remains, and his fingers had been chopped off to secure the rings he wore! The battle

of Giurgevo ended in a victory for the Turks. Ten hours the fight lasted, and the loss on both sides was considerable. For their gallantry Swann was promoted to be second corporal, and private Anderson decorated, by Omar Pacha, with the order of the Medjidie. His highness himself placed the star on the brave man's breast, and then, in friendship, warmly shook his hand. In the 'London Gazette' of January 12, 1855, appeared the following gratifying announcement. "The Queen has been pleased to grant unto private Andrew Anderson of the Sappers and Miners, her royal license and permission that he may accept and wear the order of the Medjidie, which the Sultan has been pleased to confer upon him, in approbation of his distinguished bravery and good conduct at the passage of the Danube on the 7th of July last, and subsequently in rescuing the body of his commanding officer, Lieutenant Burke, after he had fallen; and that he may enjoy all the rights and privileges thereunto annexed."—"And also to command that Her Majesty's said concession and especial mark of her royal favour be registered, together with the relative documents, in Her Majesty's College of Arms."

The four sappers landed from the 'Agamemnon' in May, were for six weeks in Circassia with Captain Brock, R.N. In returning to the ship, they, with six other men of the detachment on board of her, accompanied the fleet in its subsequent cruises along the coast, and in the Black Sea. No longer required for service afloat, the party landed at Baltschik, and marching to Varna, rejoined their companies on the 16th and 18th July.

Corporal John Pendered and lance-corporal John Hammond arrived at Varna on the 24th July, and were attached as photographers, under Captain Hackett, 77th regiment, to the head-quarters of the army. Previously to leaving London they had been instructed in the art by Mr. Thompson, and had practically tested their efficiency at Chatham, where patches of broken ground, and military scenes and fortifications, gave them a variety of subjects to portray. Many of their photographic sketches, taken under circumstances of difficulty and

disadvantage, were exhibited at Gore House during the summer months; but without having the chance of proving their usefulness and skill, these two young men, promising and enterprising, perished in a storm.

At the request of Omar Pacha a detachment of the corps, under Captain Gage, R.A. and Lieutenant Pratt, R.E., started from Aladyn for Rustchuk on the 8th July, to form a bridge over the Danube for the passage of the Ottoman troops. It consisted of sergeant John F. Read, one bugler, and thirty-two rank and file, accompanied by fifteen French pontoneers, and thirty-five English seamen from the fleet, under Lieutenant Glynn and Prince Leiningen, R.N., twenty of whom led the way, and fifteen covered the rear. With characteristic pride, the seamen gave importance to the honour accorded them by carrying unfurled, both in front and rear, a large union jack. All were on horseback. Next to the advance sailors were the sappers, unskilled in equitation, in every conceivable attitude, mounted on young horses. Each led a second horse loaded with intrenching tools, &c. Behind them followed about 150 horses ridden by native grooms and guides, bearing tools, baggage, and forage; and then came the party of French pontoneers. The expedition went from twenty to thirty miles in twelve hours, killing three horses in the first two days. Many of the animals, unaccustomed to the rattling of picks and shovels against their flanks, were difficult to manage, and in their fright and restiveness, frequently dashed away from the cavalcade. Considerable delay occurred in recovering and restraining them, and what with unavoidable halts at Schumla and Rasgradt, the party did not reach Rustchuk until the 13th July, though the distance travelled was only 120 miles. This novel equestrian journey was accomplished without any material mishap, except a few almost harmless falls, and the occasional diversion of a horse and his rider rolling together in the road. Hard riding, however, on ill-formed and broken tracks, made the men so sore and stiff, that when the time for rest arrived, they found it preferable to sleep standing.

On the 15th, the sappers were sent over to Giurgevo, and

for a few days assisted to intrench the position of the Turks; when, on the 19th, at the desire of Omar Pacha, they moved up to Slobedsie, and under the superintendence of Captain Bent and Lieutenant Pratt constructed, in a very creditable manner, a trestle bridge over the Slobedsie Creek, which was 450 feet across, to a small island in the Danube. Notwithstanding that several of the men, as many as fifteen in one day, had been ill during the operation, the work was finished on the 25th.

Next day the sappers joined the French pontoneers and English sailors, in throwing a bridge of boats across the main stream, at a place some 890 yards wide. A few boats had been laid when the sappers commenced. The pontoneers worked from one shore, the sappers from the other; whilst the sailors rowed up the boats and assisted to secure them in position. The boats, fixed with a clear bay of twenty feet between, gave for each of the series about forty feet of bridge. The breadth for the roadway was eighteen feet six inches. Wood was scarce at the spot, and the timbers for the superstructure in great part were obtained from Sistova and Widdin. Intended for heavy service the bridge was made of massive baulks and stout oak planking, strongly bolted, cramped, and racked. Much "difficulty was experienced in securing some of the boats in the more rapid part of the stream, but by mooring them with four anchors each, and the aid of heavy ordnance sunk above the boats and securely fastened to them," they stood against wind and surge, firm and unbroken.¹ "It was completed on the 4th August, and on the 5th received some damage from the first Austrian steamer that passed during the war. This was soon repaired,"² and to obviate a similar casualty, an opening was contrived to permit the navigation to continue, which, when not required, was closed up again by a moveable raft to make good the bridge. In appearance it was as artistic and elegant as useful. The longest boats occupied the centre, from which the smaller craft gradually fell away to the two shores. Like ancient galleys they were shaped with

¹ The 'Times,' Sept. 15, 1854.

² *Ibid.*

stems and prows curving gracefully upwards from the water,³ and the bridge was no unworthy rival of the celebrated one formed by Xerxes, in his passage of the Hellespont at Abydos. "On the 10th Omar Pacha opened it in person, and complimented the officers and men for the zeal and ability they had shown in its construction. Captain Bent was in command of the sappers."⁴ For the ceremony two triumphal arches of evergreens were run up, one at each end of the bridge, and above them proudly waved the allied banners of England, France, and Turkey. To crown the service, both French and English met in unmixed cordiality and friendship, at a costly repast provided by Omar Pacha.

No longer required for service with the force of his highness, eighteen of the detachment returned, on horseback, to Varna, under Lieutenant Pratt, R.E., passing through Turtukai and Silitria, where joining the English seamen, they quitted it again on the 15th August. At night, after a march of twenty miles, the party halted at Kinarjik. On the next day a further march of thirty miles found them encamped at Karapelt; another thirty took them to Karayal, where a sapper who had died on the route was buried. A beautiful spot was selected for the encampment, and at sunset the deceased was interred in a hastily excavated grave, beneath the sombre shade of a wild pear-tree.⁵ All the officers and men were present, and from the absence of all display, and the fatigued, rusty, and travel-stained aspect of the men, the ceremony was impressive and mournful. On the 18th August, travelling fifteen miles that morning, the sappers reached head-quarters, and rejoined the tenth company. Corporal Swann, who had been appointed by Lord Raglan provost-sergeant to the mule drivers at Rustchuk with a salary of 4s. 6d. a-day, returned to Varna with the party.

Not without mortification it is necessary to introduce in this place a record relative to the misconduct of the Rustchuk detachment. Honoured as they were by being the only British soldiers selected for an advanced frontier duty, much was

³ The 'Times,' Sept. 15, 1854.

⁴ Ibid.

⁵ Ibid.

expected from their conduct and exertions ; but their extreme irregularity and drunkenness, with few exceptions,⁶ offered a striking contrast to the behaviour of the party of sailors and the Turkish garrison. To mark therefore the displeasure of Brigadier-General Tylden, he subjected the detachment to a course of severe discipline, and stopped the promotion of some of the non-commissioned officers. Several men of the seventh company also, who had commenced a career of intemperance at Hurst Castle, behaved with equal discredit, and disgusted their officers. It is a pity in a corps possessing the advantages of education, skill, and mechanical attainments, that there should exist anything to tarnish the fame the well-intentioned are striving to brighten.

As a set-off against this censure, it is well there is occasion to give place to an instance of individual good conduct, as honourable as meritorious. Varna was set on fire by some Greek incendiaries, instigated by Russian agents, and was only extinguished after much of the city had been laid waste, and considerable munitions destroyed. Brigadier-General Tylden directed the operations for saving the town. The companies of sappers, being on the south side of the bay, were not present, but lance-corporal James Cray, whose services under Lieutenant Burke have been already noticed, acting as the Brigadier's orderly, lent material aid by his intrepidity in arresting the flames. "When the danger was greatest," says the official report, "and the spreading flames threatened to reach the large Turkish powder-magazine, corporal Cray laboured voluntarily and incessantly, by mounting scaling-ladders and closing the openings with blankets, thus not only largely contributing to the safety of the magazine, but setting an example to the sailors and others assisting, which was of the greatest service." He was promoted to be second-corporal for his conduct.

Captain Bent with fifteen non-commissioned officers and men left at Rustchuk under Omar Pacha, accompanied the Ottoman troops into the Wallachian principality, entering the capital

⁶ Sergeant John F. Read, corporals William Harding, William Swann, and privates Robert M. Rylatt, Michael Westacott, and John Piper.

on the 22nd August. Corporal Harding, a zealous and able sapper and pontoneer, died that day from cholera on the line of march, and was buried in the graveyard of a small country Greek church. His remains, covered with a union jack, were attended to their final resting-place by all the Englishmen in Bucharest, and the service was read by Mr. Meyer, a missionary clergyman. A private was attacked by the grave of his comrade, and returning to his tent, soon afterwards died. He was buried in the Lutheran churchyard. Several other choleraic seizures occurred in the detachment, which were ascribed to the intemperance of the men, and their imprudent use of fruits. No British soldiers, save this small party, served during the campaign in the Wallachian capital.

The fourth company from Malta, under Captain Craigie, reinforced the corps at Varna on the 14th August, and a detachment of the third company at Corfu was also sent thither, arriving at the head-quarters on the 25th August. They were ordered from their respective stations to the seat of war by Lord Raglan.

1854—1855.

CRIMEA.

Instructional operations—Embarkation for the Crimea—Landing—Alma—March to Balaklava; Sir John Burgoyne; services of the third company—Corporal Macqueen and private Brennan—Encampment at Balaklava—Removal before Sebastopol; misery from the want of tents—Upton's aqueduct—Tracing the lines—Position on the heights; staff engineers—The attacks; parks—Sapper brigades—Reliefs—Breaking ground—Duties of the sappers—Progress of the works; party wanders from the trace—Sergeant J. Morant misses his way; a sortie frustrated—Night before the bombardment; storming parties of sappers—The batteries—Opening the siege—Injury to the works; their restoration—Gabions, &c.—Platforms—Magazines—Battle of Inkermann—Submarine divers—Hurricane of the 10th November; wreck of the 'Prince'—and the 'Rip Van Winkle'—Effects of the storm on shore—Lines of Inkermann—Field electric telegraph—Sergeant Anderson—Reinforcements; first company at Balaklava; divers—Services of party with the Turkish army; Omar Pacha's acknowledgments—Bridge over the Danube—Sickness—Warm clothing—Strength of the sappers in the East—Casualties—Sergeant James Drew—Private Andrew Anderson—Conduct of the corps in the campaign.

PRELIMINARY to active operations in the Crimea, the companies of the corps at Varna superintended contingents of the line in preparing a park of gabions, fascines, and sand-bags for siege purposes. Each sapper at the duty had charge of fifteen men of the line, divided into three squads of five in a squad. The troops were also practised in the hasty formation of field-works; and these instructional services were not without profit to the men of the corps, who, as overseers, superintend their execution.

Early in September the allied forces embarked for the Crimea, and the naval arrangements for the occasion, though vast and complicated, were comprehensive and perfect. To each of the British divisions was attached a body of sappers

and miners, bearing with them intrenching tools. Up to this time there had landed in Turkey six companies of the corps, mustering a force of 513 non-commissioned officers and men, which had been reduced to 492 men by the decease of 21 non-commissioned officers and privates, chiefly from cholera and exposure. Leaving the seventh company at Gallipoli, also detachments at Varna, Redout Kaleh, and Bucharest, and the sick on board the transports and at Scutari, the force of sappers and miners that landed in Kalamita Bay on the 14th and 15th September counted a total of 308 of all ranks.

Under a teeming rain the companies debarked, and without tents or covering, took up a miserable bivouac with their divisions. In the night they lay huddled together for warmth, while the storm beat ceaselessly upon them, and turned their selected resting-places into pools and quagmires. The returning day found them drenched, stiff, and comfortless; but in none, except those poor enfeebled fellows still suffering from the pest that had proved so fatal to the troops at Varna, was there wanting a cheerfulness to work, a spirit to master hardship, and a determination to endure. Unsheltered as they were, that fearful weather brought on many aggravated cases of cholera.

On the 20th September was fought the battle of the Alma, which was gained in three hours by the allies, with a loss to the British exceeding 2,000 killed and wounded; whilst the carnage amongst the Russians was even greater. The sappers and miners during the action were thus distributed:—

	No.
Head-quarters, 3rd Company . . .	36
Light division, 10th „ . . .	62
1st „ 11th „ . . .	62
2nd „ 8th „ . . .	77
3rd „ 4th „ . . .	34
4th „ 4th „ . . .	35

The fourth division was not engaged, being in reserve; but the sappers with the other divisions, though not called upon to participate to an extent that placed them in much danger, were

under fire. The companies were held back, ready with their intrenching tools, to perform any service for which they might suddenly be required; but the daring advance and overpowering prowess of the British rendered a resort to field-works as a means of defence wholly unnecessary. During the action, the eighth company, attached for the moment to one of the field-batteries, assisted in dragging through the river some field-carriages belonging to the royal artillery, one of which, having become disabled, capsized in the stream. The third company rapidly repaired the broken timber bridge of Buliak, part of the sheeting of which had been removed by the Russians, leaving the end on the side of the British untouched. Had this artful contrivance not been discovered, the troops would doubtless have suffered fearfully in their attempt to cross the bridge.

On the night of the 20th the companies bivouaced on the site of the battle, where one of the privates, worn out with disease and fatigue, covered himself with his blanket and died. Resuming the march, the allies passed the Katscha on the 23rd September, on which day the third company, attached to the headquarters of the army, was reinforced by the arrival from Woolwich of 66 non-commissioned officers and men under Captain W. M. Inglis, R.E. Two days later the march was continued across the Belbec, and on the 26th to Balaklava by a bold flank movement through a difficult and thickly-wooded country. Sir John Burgoyne passed a night in bivouac with the company, and all that could be got for him to rest upon was an old door. Upon that the aged warrior stretched himself with a composure and satisfaction that showed how well he had braced himself to the vicissitudes and hardships of war. On the way the baggage of a Russian division, spreading over a vast extent of road, fell a prize to the British army. The third company was hurried to the front with the artillery to remove it, and tumbling the waggons over the hill they broke in fragments in the valley. When the army pushed forward the third company remained, blew up a magazine of thirteen barrels of gunpowder which was found with the train of baggage, and then

hastened to Balaklava. All the companies arrived there on the 27th September, and were at once disposed of in making roads, sinking wells, and repairing shattered waggons, while the third company made good a pier at Balaklava, at which were landed the heavy ordnance, ammunition, and siege stores.

It being necessary to despatch letters from the first division to that of General Cathcart's on the heights S.W. of Sebastopol, corporal John Macqueen and private James Brennan were sent on the duty. Losing their way, they were allured by a glimmering light into the Russian lines, where they determined to remain till an opportunity offered for their escape. Under some of the enemy's works they lay down unperceived; but early in the morning, as they were preparing to decamp, a Russian guard observed them. The sappers, unarmed, ran at a speed much accelerated by the danger of their situation, pursued by some swift-footed sentinels. A wide ditch interrupted their course, and just as they were bounding high over it they each received a bayonet thrust in the body. The corporal was transfixed, but the private was only slightly wounded. The Russians, wanting the agility to leap the yawning moat, were stopped in the pursuit, and the resolute private gathered up his comrade and bore him from the ditch to the British camp, where the poor fellow soon afterwards died of his wounds.

The royal engineers formed their encampment on the S.S.E. of the harbour of Balaklava, whither the siege material was conveyed. With great promptitude, guns and ammunition, gabions, fascines, sand-bags, and tools of all descriptions, unsurpassed in magnitude, were collected, and then despatched to the depôt about four miles nearer to the scene of operations.

On the 30th September a strong force of sappers moved to the ground, and soon commenced those services which the public, too enthusiastic in its anticipations, expected would reduce a fortress of unexampled strength in a few days. Full twenty days the companies were without tents, their camp equipage having been left in the ships which conveyed the sappers from the shores of Bulgaria; and, exposed as they were in bivouac to the damp and chills of night, many robust and

able men fell a prey to cholera at Balaklava, or predisposed, by these early trials and rigours, to disease, were struck down by suffering and exhaustion in the camp before Sebastopol.

Meanwhile a party of twelve sappers, directed by a subaltern of the royal engineers, repaired to a ravine, and cut off the main aqueduct which supplied the fortress with water. This was known as Upton's aqueduct, and the perilous attempt was fortunately effected without opposition.

A few days later some sappers, pushed forward under their officers, assisted to trace the required parallels and batteries in front of the fortress towards Chersonese Bay; and although at times within rifle-range of the walls, were unmolested by the Russians. It was at first intended that the English troops should occupy this position, but in consequence of the tools of our allies being too light to carry out the heavy intrenchments assigned to them on the right, the disposition of the forces was altered to adapt them to the situations for which their material seemed to render them adequate. This change in the arrangements was followed by the preliminary duty of tracing the sites of the required trenches and batteries inland, in which some sappers were permitted to participate.

Charged with the right attack, the British held the position which approached the Tchernaya valley, while the French spread in a curve to the left, as far almost as Chersonese Bay. Sir John Burgoyne conducted the British portion of the siege, supported by Colonel Alexander, Major J. W. Gordon, and many officers of the corps. Colonel Alexander, from overwork and anxiety, soon died, and the executive direction of the works devolved on Major Gordon. In time the veteran engineer Sir John Burgoyne, recalled to England to discharge the responsible duties of his home appointment, was succeeded by Major-General Jones, who had received honour and promotion by his distinguished services in the capture and destruction of Bomarsund. Major Gordon now commands the companies in the Crimea as a regiment; Captain C. B. Ewart fills the appointment of adjutant, and Lieutenant A. Leahy that of quartermaster.

The British force was divided into two attacks, called "right" and "left," their contiguity being broken by a deep ravine. The right abutted on the heights of Inkermann, and the left leaned away to the position of the allies. No longer attached to divisions, the fourth, eighth, and tenth companies of sappers were appointed to the right, and the third and eleventh companies to the left. The united strength of the companies amounted to a force of about 350 non-commissioned officers and men. On the high road leading from Sebastopol, and near the windmill, was stationed the engineer depôt for the right attack; while that for the left occupied an area in rear of the third division, on a plateau adjacent to the artillery depôt. At both the parks, the carpenters, sawyers, and blacksmiths of the companies carried on the mechanical requirements of the operation unprotected from the weather. In order that the sappers might be easily distinguished in the trenches, they were ordered to wear a band of white tracing tape round the forage-cap.

The strength of the brigades of sappers altogether depended upon the exigencies of the duty, and the numbers available for work. As a general rule, however, each brigade of sappers comprised a non-commissioned officer and eight privates; and each brigade of carpenters a non-commissioned officer and three privates. Whatever may have been the changes in the distribution of the men, there were seldom less at work, on the right, than three brigades of sappers and two of carpenters by day; and two of sappers and one of carpenters by night; while on the left, where a diminished force was employed, the arrangements only permitted for the daily routine two brigades of sappers and one of carpenters; and, for the night duty, one brigade of each.

Usually, the brigades remained twelve hours in the trenches, being relieved at daybreak and soon after dusk; but this period of duty, on many occasions, was necessarily prolonged, when any pressure required particular works to be completed in haste. Fatigue and sickness caused very inconvenient fluctuations in the numbers disposable for the operation; but when

less vigour was demanded in the formation of the lines, the men were relieved from duty in the trenches for three or four days at a time—the interval being filled up with labours in the camp, and in the performance of a variety of services subsidiary to the siege.

At nightfall, on the 7th October, ground was broken before Sebastopol, and by order of Lord Raglan, the working parties, after receiving the necessary tools and instructions, were marched from the park, guided by engineer officers and sappers, to the trenches. This proceeding was followed throughout the siege; and it was also a practice to send both sappers and operatives into the batteries unarmed, to prevent the paramount work of the lines being neglected for the more natural one of resorting, on any slight instance of alarm, to measures of personal defence.

Acting as overseers, it was the province of the sappers and miners to instruct the line and the Turks in forming the trenches and batteries, attending themselves to the more constructive portions of the works requiring art and skill;—such as laying the gabions, fascines, sand-bags, and platforms; erecting the splinter-proof magazines, and sloping and lining the embrasures. Formidable obstacles occasionally offered serious impediments to the progress of the excavations, for the soil was rocky: to overcome the difficulties, the sappers led the way with an earnestness and zeal that stimulated the workmen to activity and exertion; but such was the sacrifice of useful energy, that many a brave fellow, already enfeebled by overwork, scanty rations, and hard weather, faltered from the trenches never more to return.

Everywhere the lines continued to be prosecuted with commendable rapidity, and to claim even the fastidious attention of the sappers with regard to the smoothness and accuracy of the slopes of the interior revetments and the sharpness of the angles. There were times, however, when, from the guiding sappers missing their way to the appointed hill, the works were somewhat retarded in their execution. An instance of this kind occurred on the 11th October, when some sappers, sent to

throw up a battery in front of the light division, could not discover the position. Although the night was stormy, and the cold keen and biting, they endeavoured for more than two hours to find the trace, passing from one bleak hill-top to another ; but finally seeing the fruitlessness of their efforts, they quitted the front and returned to the dépôt.

A more serious mistake occurred the next night, when, with two brigades of 400 men, it was intended to break ground on the brow of a hill to the left of the light division. Sergeant Joseph Morant and seventeen sappers preceded the workmen. By one of those accidents which not unfrequently happen in night adventures, the sergeant lost his way, and led the detachment close to a Russian outpost. Alarmed, the enemy's picquet at once fell back on the main body, and then opened a smart fire upon the wandering sappers. This unlooked-for warning prevented them from rushing to certain destruction, and being unarmed, they prudently retreated to the lines, relieving themselves as they ran of such encumbrances as were likely to impede their haste. Their greatcoats and intrenching tools were therefore left behind ; and the distance between them and the enemy being only a few yards, it is somewhat extraordinary that not a man of the party was struck. This mishap was not without advantage, for it frustrated the execution of a sortie which was then preparing. From the flashes of the Russian fire, strong battalions of infantry could be seen moving towards our works, to repel which the second and light divisions at once turned out ; the riflemen too, always ready, poured a destructive fusillade into the advancing battalions, and the artillery, never from their posts, saluted them with volleys of shot and shell. For nearly an hour the combat lasted, when the enemy, flying before the rush and cheer of the 88th, took shelter under the walls of the fortress, keeping up, however, for the rest of the night a desultory fire upon the works. The loss in the trenches was trifling, and our batteries, which were much exposed, remained intact. Notwithstanding this attack, the trace of the new battery was that night discovered, and some little advance made in its construction before

the morning. It was afterwards known by the name of the "Gordon Battery."

By the 15th October the vigilance of the working parties had placed the lines in so forward a state that, on the following evening, orders were issued to the troops respecting the bombardment. No exertions were spared throughout the night to complete the works in every detail, and the sappers, being told off into storming parties of twenty men each under an officer of the corps, were attached to the several divisions of the army to lead the way in any enterprise in which their professional services might be demanded. For this purpose they were furnished with picks and shovels to form lodgments; crowbars, felling axes, and sledge-hammers to remove impediments; bags of gunpowder for blowing in gates; and scaling ladders with which to storm walls and towers.

Four distinct works had been erected, mounting about seventy guns, including Lancasters, which, during the siege, were increased or diminished according to circumstances. The chief batteries—named after the officers of engineers who superintended their construction, held a position on the heights at a distance exceeding 1,300 yards from the Russian lines, while the French, working in easy soil, pushed up much nearer to the fortress by the usual process of sapping and mining. On the part of the English the plan of attack was necessarily a departure from the recognized rules, owing to the rocky character of the ground, and the deep glens which separated the works. Later in the siege some intrenchments, by the ordinary means of approach, had been thrown up considerably in advance of the 'Chapman' and 'Gordon' batteries, with a view to establish other batteries to insure a more destructive effect on the enemy's defences. The guns, however, were not in position when the last accounts left the Crimea.

On the morning of the 17th, under cover of the darkness, the embrasures of the batteries, blinded with gabions, were quickly unmasked by the sappers, and before the dawn had fairly opened, at least seventy guns belched their fire upon the fortress. By a preconcerted signal the French commenced the

siege simultaneously with the English, and the allied navies took part in the contest. This was the first day's firing on the part of the besiegers, and although the garrison kept up a warm cannonade upon the allies from the moment that any show was made in the construction of the trenches, the Anglo-French never once attempted, by the discharge of a single piece of ordnance, to lessen the interference of the enemy, or to interrupt the progress of their defences.

From both sides the cannonade was continued with more or less vigour according to the nature of events, and the result evidenced only too plainly the devastating effect of the firing. Our batteries were much damaged, but those of the enemy were in some places almost demolished. There was much skill, however, in the Russian engineers, and before morning, by extraordinary exertion, the works were restored and replaced with guns. No less energetic were the English sappers in strengthening the lines and repairing the batteries; for although erected with admirable solidity, the shells from the fortress ploughed up the works and tore down the embrasures. In all such cases, if the restoration could not be deferred till night, the sappers, with a daring equal to their usefulness, would spring into the openings, and while exposed to the hottest of the fire, make good the breaches.

When the soil from the excavations was insufficient to fill the gabions, earth was brought for the purpose from the rear, in baskets. The sand-bags, ready for use, were also brought from the park, where the earth could readily be obtained. As they frequently caught fire and burst on the explosion of the guns, a substitute was found by making the bags from the skins of sheep and from bullocks' hides, which stood the rough work remarkably well. The inner necks of the embrasures were revetted with sand-bags and the cheeks lined with fascines. The basis of all the works was the never-failing gabion.

It was not long before the Madras traversing platform, considered to be the specific for a great siege, was shown to be a failure. From the hard and uneven bottom of the trench the

platforms were, to save them from injury and secure their efficiency, laid upon sand-bags well tamped, but the violent and sudden action of the guns in their recoil shattered the platforms to pieces. A rude substitute was expeditiously furnished by tearing down some dilapidated wooden houses in the neighbourhood of the camp, and resorting to the old expedient of sleepers and floors, the platforms, so prepared by the sapper carpenters, were found to be far less liable to derangement than the engineering exotic from Madras.

While the Russians and our allies experienced very heavy losses in the destruction of their magazines, no accident whatever occurred to the English powder-magazines, "although more than once exposed to the test of the fall and explosion of a twelve-inch shell."¹ Offering, as the record does, a tribute of credit to the efficiency of the contrivance, it is no less a testimonial to the skill of the sappers, who, in consequence of the special nature of the service, constructed the magazines themselves.

Neglecting to erect earth-works to defend the right of the position towards Inkermann led to an attack by the Russians, which was met and repulsed with vigour on the 26th October, by the division under the command of Sir De Lacy Evans. Another attack followed on the 5th November, in which the English and French, numbering about 14,000 bayonets, were opposed by an army of nearly 60,000 fighting men. For upwards of ten hours the conflict lasted, and ended in a victory to the allies, while the Russians, driven from the hills at all points, took refuge in flight. The losses in the Anglo-French ranks were very severe, but those of the enemy, incredible as it may seem, far exceeded the total force of the allies engaged. This splendid achievement, in which the soldiers stood against overwhelming odds with unconquerable firmness and bravery, will ever rank in the annals of war as one of the most remarkable struggles of modern times. Occupied in the trenches, and forming a guard over the engineer park, the sappers and miners did not fire a shot in either of the engagements. They

¹ 'Quarterly Review,' vol. xcv., p. 239.

were, however, drawn up, prepared to defend the siege depôt had the Russians penetrated to the engineer plateau. Being in position during the battle, the sappers and miners have been considered entitled to the Inkermann decoration, and 341 non-commissioned officers and men of the corps present on the occasion will have the honour of wearing the clasp.

When the Russians learnt that a descent was to be made on the Crimean coast, they sank several of their large war vessels and blocked up the passage into the harbour of Sebastopol. Since nautical skill and manœuvring were confessedly unequal to master the difficulty, submarine blasting was proposed as the readiest and most effectual method, and four sapper divers, selected from volunteers at Chatham, accompanied by the necessary apparatus and stores, sailed in the 'Prince' on the 27th October, and arrived in the harbour of Balaklava on the 7th November. Several other sappers, tifen before Sebastopol, who had been practically trained in the art by actual service in the demolition of the wreck of the 'Royal George,' were to have been engaged in the perilous duty.

About this period the weather set in unpropitiously. Snow was upon the ground, and sometimes rain, sleet, and hail varied the inclemency, while frost intervening, nipped the men with its cold grasp, and added to their sufferings. The prevailing aspect of the clouds was gloomy and lowering, but there was nothing to indicate the approach of that memorable storm, which on the 14th November, swept over the Black Sea and the Crimea. Early in the morning the hurricane began its portentous howling, and it was not long before it committed terrific havoc at sea. Ingenuity and precaution did much to save the ships from disaster, but many of the transports, too soon becoming unmanageable, were engulfed as by a spell in the raging surf, or broken to pieces on the shore. Among these was the 'Prince,' a magnificent steamer of heavy tonnage, freighted with winter clothing for the army and the diving machinery. For two hours she stood bravely against the storm, but at length driven against the rocks at Balaklava, her timbers were rent in every direction, and she went down.

The four sapper divers on board of her sank in the wreck, as also Captain W. M. Inglis, who had been observed on a spar struggling to gain the shore, when a wave of foam broke over him, and he was seen no more.

A like fate attended the 'Rip Van Winkle;' and the two sapper photographers, well educated and trained at a great expense in the art, perished in the foundered vessel. The knapsacks and kits of the eighth company were also lost.

On shore the hurricane was not so calamitous, but the tents were all torn up and blown to a distance. Only one solitary marquee remained to mark the site of the encampment. In common with the army the sappers and miners felt the shock of the storm, and were left shivering on the heights, unclad and comfortless. Those in the trenches experienced equal misery, but their zeal in the prosecution of the works was only checked by the fury of the raging wind and the deluging rain. The road to Balaklava soon became one long morass, and both man and horse, in travelling to the port, had to wade the distance up to their knees in mud. From this time the suffering and privations of the troops considerably increased in extent and severity; but, borne with uncomplaining endurance and fortitude, earned for them the abiding admiration and sympathies of their countrymen.

Soon after the fight at Inkermann, parties of the corps were allotted for the duty of raising appropriate field-works to protect the right; and to expedite the project, the seventh company under Captain Gibb was removed from Gallipoli to take part in the operation. Arriving at Balaklava on the 28th November, the company reinforced the camp before Sebastopol on the 2nd December, Until the 17th, it was employed in the work of the trenches forming the 'right attack,' but on the following day it moved to the heights of Inkermann to complete the approaches against the town, and to erect batteries to oppose those of the enemy on the side of the Tchernaya. At these lines the sappers worked only by day; and later in the siege the officers of the corps, finding that the progress of the works was much facilitated by augmenting the number of sapper

brigades for day duty, reduced the employment of the sappers by night to one solitary brigade. The beneficial effect of this change was very apparent, for while the sappers actively carried out the business of overseers, their numbers and habits of industry made them cheerfully turn to the general labours of the lines.

Two sappers in charge of the field electric telegraph for service in the Crimea, arrived at Balaklava on the 7th December, and repaired to the camp on the 17th, taking with them the instruments, batteries, insulated wire, and appliances, packed in two waggons. Twelve coils of wire, each a mile long, were packed in them, as also a subsoil plough, appropriate tools, and boats. The apparatus is only available for short distances and can be worked by six or eight men. To establish a communication between any two points, the wire, which uncoils from a drum revolving horizontally in a carriage drawn in advance, is laid in a shallow trough made by the plough, which serves the double purpose of cutting the furrow and depositing the line. The trough is just deep enough to protect the wire from ordinary accidents. Equally effective is the apparatus for communication with vessels at sea; and on any sudden removal of the army from one position to another, the wire can be so easily taken up that the men in charge of the telegraph are not likely to be embarrassed in any movements that may be determined upon. The two sappers were specially instructed in the electric telegraph establishment at Lothbury in the mode of working the instruments, laying the wire, and in the ingenious manipulation required to give effect to the process. Such, however, has been the state of the weather from snow, that no opportunity has yet occurred of employing the telegraph; but regarded as an important appendage to the army, sergeant James Anderson¹ and two

¹ This non-commissioned officer wrote some graphic and interesting letters about the siege, in one of which he says,—“After setting my working party to their task in the trenches, I went to the front to show corporal Kirkwood—a new arrival—the extent of our works, and to give him an introduction to Sebastopol. The trench in some places not being deep enough to cover us, we sometimes had to run along the top, and whenever we did so, the enemy

privates have since been educated in the art, so that when the time arrives for using it, there will be an adequate staff of operators to attend to its scientific details.

The second and first companies subsequently reinforced the sapper strength in the Crimea, landing respectively on the 20th December 1854 and 7th February 1855. The former was forthwith added to the 'right attack,' and the latter was retained for engineer services at Balaklava, chiefly in the removal and construction of the huts. The employment of the company at this port was considered sufficient for its requirements, and the detachments hitherto cantoned there, were recalled to their companies at the siege. Two sapper divers arrived in the 'Robert Lowe' on the 4th January 1855, under the command of Captain De Moleyns, having in charge Mr. Rendel's loaded cylinders to be applied for blasting the sunken ships at the mouth of the harbour.

The small detachment under Major Bent of the engineers joined at the camp about this time from Bucharest, marching with the Turkish army; and the following despatch from his Highness Omar Pacha, so complimentary to its efficiency, was communicated by Lord Raglan to the Minister of War:—

MY LORD,

Varna, January 8, 1855.

His Highness Omar Pacha has requested me to write to your lordship, to return his best thanks for the services rendered to his army by Major Bent of the royal engineers, and the detachment of sappers under his command.

His Highness desires me to express his regret at the losses which have been

peppered us well with grape and rifle bullets at about 300 yards. So I borrowed a Minie rifle from the 38th, and returned the compliment. This was the first time I had ever fired at a human being. Two 38th men loaded for me as fast as I could fire, and we soon cleared the embrasures of the Russian gunners; but they shot my comrade—a sergeant of the 38th—at my side. I bound up his wound with my handkerchief, and fired away again with his rifle. I have had many narrow escapes and much hard work, but I feel truly thankful to the Almighty for having brought me through all without a scratch. I hope soon to write to you from the Imperial barracks *inside* Sebastopol. I hope," says he, again, "we shall soon be allowed to storm. I could lead a party in by a short cut that I know of, and I think it would soon be over and the place ours." The letters from which these extracts are taken were kindly lent for my perusal by an officer of the corps.

sustained by this small detachment, who, under the direction of Major Bent, have well sustained the character of the British army.

His Highness has already expressed to your Lordship his regret at the loss of Lieutenant Burke, of the royal engineers, whom his Highness considers to have been an officer of much merit.

His Highness desires me to inform your Lordship, that he has done himself the honour to write to the Turkish Ambassador at the Court of St. James's, expressing the desire of His Majesty the Sultan that private Andrew Anderson, of the royal sappers and miners, may receive and wear the decoration of the fourth class of the order of Medjidie, in commemoration of his gallantry in recovering the body of Lieutenant Burke, after he was killed at the passing of the Danube on the 7th of July last. In the meantime he has presented private Anderson with the decoration, and trusts your Lordship will allow him to wear it until the commands of Her Majesty may be received.

His Highness further desires me to express to your lordship his entire approbation of the manner in which Major Bent has conducted his duties.

He desires me to inform your lordship that this officer showed great energy in his endeavours to enter Silistria before the siege was raised; that he subsequently showed great gallantry at the passage of the Danube, when he was the first to land on the left bank, and covered the landing of the Turkish troops with a detachment of riflemen, who maintained their ground under a heavy fire until the disembarkation of the supports was effected.

Major Bent and his sappers were subsequently of great service in throwing up the *tête de pont* at Giurgevo, and in the construction of the bridge across the Danube.

His Highness desires to take this opportunity of expressing to your Lordship his high sense of the services rendered by Lieutenant Glyn, R.N., and H. S. H. Prince Ernest of Saxe Leiningen, with the detachment of sailors of Her Majesty's fleet under their command, in the construction of the bridge across the Danube.

His Highness considers that the success of the construction of this bridge is in great measure attributable to their well-planned dispositions, which, although executed with limited means, proved fully effective to resist the storms and strong currents of the Danube.

He desires me to say that he is fully satisfied with the zeal and indefatigable energy of this detachment of Her Majesty's fleet under the able direction of Lieutenant Glyn, whom he considers a very promising officer, and entirely worthy of the confidence of your Lordship.

His Highness desires me to add, that it would be very gratifying to him if Her Majesty could in some way reward these officers for the able services they have rendered to the Ottoman army and the common cause.

I am, &c.,

(Signed) J. L. A. SIMMONS, Lient-Colonel.

Field-Marshal Lord Raglan, G.C.B., &c.

The bridge alluded to across the Danube was constructed under the direction of Major Bent by the sappers and miners and a party of French pontoneers. The duty of the seamen

was confined to the nautical arrangements for the undertaking, which comprised the labour of bringing the boats, anchoring them in their places, and securing them stem and stern.

From the laborious nature of the duties in the trenches, the sappers were absolutely ragged; and as the frost had set in, late in December, with unusual rigour, it is surprising that they possessed stamina and spirit enough to bear up against the exposure to which they were subjected. Nevertheless the sickness was trifling compared with the appalling details of casualties reported in other corps; for, on the 1st January, out of a strength of 628 non-commissioned officers and men, only ninety-two were in the field-hospitals and at Scutari. Diarrhoea, fever, and frostbite were, however, very prevalent during the month, and the increase in the sick was considerable. In that period no less a number than 273 had been under treatment, exclusive of the invalids sent to the hospitals on the Bosphorus.

As soon as it was determined to provide the troops with winter clothing, an ample supply was furnished for the sappers and miners, at an expense of 4,260*l.*, which enabled the following articles to be issued to each man :—

- 2 pairs of worsted stockings.
- 2 pairs of woollen drawers.
- 2 pairs of woollen mitts.
- 2 woollen guernseys.
- 1 woollen neck-comforter.
- 1 blanket-cover.
- 1 railway-wrapper.
- 1 fur cap.
- 1 overcoat.
- 1 pair of long boots.

All the articles were excellent in quality, strong, warm, and adapted to the Crimean climate.

Including thirteen men sent from England in separate vessels in charge of the portable huts for the troops, the total number of the corps that landed for service in the East amounted to

817 of all ranks. Of this number, 735 had served in the Crimea. The casualties reported during the campaign were as follows :—

Killed in the trenches	3	Privates Samuel Coles, William Denham, and James Dilling.
Died of wounds	2	Sergeant James H. Drew, ¹ and corporal Macqueen.
Perished by drowning	6	Sergeant William Carne, corporal John Pendered, lance-corporal John Hammond, and privates Samuel Lewis, Thomas Price, and Thomas Toohey.
Frozen to death	1	Private James Deacon.
Missing, supposed to have perished	2	Privates Thomas Callaghan and John G. Williams.
Found dead in his tent	1	Private Andrew Anderson. ²
Died from cholera, diarrhœa, &c. . .	98	
		—
Total	113	
		—

¹ Was a well-educated and an active non-commissioned officer. For many years he was the confidential clerk of Sir Frederic Smith at Chatham, where associating himself with a temperance society, he became an able advocate of its principles, and received from its members a silver medallion in testimony of his talented lectures on the subject. After serving a few years at Malta, he was sent to the Crimea, and in the trenches before Sebastopol, he earned the good opinion of his officers for fearlessness, ability, and success as an overseer. On the 10th of November he was wounded at the siege by a shot striking his shoulder, and breaking his collar-bone. Removed on board the 'Avon,' he was much shaken in the storm of the 14th, and died on the 22nd of November, off Scutari.

² Distinguished at the battle of Giurgevo for his gallantry. A fine, handsome soldier, he was admired by both officers and men. When work had to be done, he would toil like a slave to accomplish it; and when duty demanded his services, he was never absent. His propensity to drink, however, placed it out of the power of his officers to award him promotion. At the Cape of Good Hope, he earned a medal for his services in the Kaffir war of 1846-7, and received another medal and a second-class prize for his conduct and usefulness at the Great Exhibition of 1851. He was employed in that duty at the instigation of Major Bent, who generously became a surety for his good behaviour. Well did he support the Major's recommendation; but on his removal from London at the close of the Exhibition, he soon relapsed into his former habits. His bravery in the battle of Giurgevo is already told; and the decoration of the order of the Medjidie, placed on his breast by Omar Pacha—a distinction never before conferred upon one of so humble a rank—failed to inspire him with sufficient pride to curb his excesses; and there is reason to fear, that his melancholy fate was brought on by his infatuated indulgence.

The under-named men were wounded in addition to the two non-commissioned officers stated above :—

- Private James Brennan ; slightly, by a bayonet.
,, John Hutton ; slightly, in the head.
,, James Wheeler ; severely, by splinter of shell in shoulder and back of head.
,, James Bland ; dangerously, by a musket-ball in both thighs.
,, John Maclean ; slightly, by the bursting of a shell.
,, John Giles ; severely, by a ball in left clavicle, and collar-bone broken.
,, Robert McFarlane ; dangerously, by splinter of shell in the thigh.
,, David Cuthbert ; severely, by explosion of a shell, in the right shoulder.
,, Thomas Gilchrist ; slightly, in the left hand, by a rifle bullet.

After the first week of opening fire the siege was carried on with more or less spirit as events dictated, but latterly the resistance of the besiegers has been almost passive. Protracted as it has been, no opportunities have occurred for the sappers to display their military qualities by individual acts of daring ; but, as far as the work of the trenches is concerned, it is not too much to say, that in their zeal, steadiness, and constancy, no troops in the world could surpass them. No more signal proof of their capabilities and usefulness need be adduced than the fact, that the works, under great difficulties, were erected with expedition and solidity. There is, however, one other point to add which bears a remarkable testimony to their efficiency. It must have been observed, that the casualties among the officers of the Royal Engineers have not extended beyond one subaltern wounded. In the Peninsular sieges, the appalling losses in their limited number, was ascribed to the necessity which existed for their combining with their professional services, the practical duties of overseers and sappers. The men then required to be instructed in the art, in the presence of the enemy ; but in this siege, far exceeding in duration the most prolonged struggle in the Peninsula, the officers have, very properly, been relieved from subordinate employments by the intelligence of the sappers, who have not only conducted the works to their satisfaction ; but have had the sagacity, by a rigid attention to system, to escape from more than ordinary casualty. Curiously enough,

by comparison with the hard-fought siege of Badajoz in 1812, the losses among the twenty-four officers engaged in it, exceeded those of the royal sappers and miners in the more extended siege of Sebastopol.

The above narrative of the Crimean campaign has been collected in fragments from various private sources, and is consequently very deficient in matters of detail and incident. No official statement of the services of the sappers has yet been rendered, the siege not having terminated ; but there is scarcely a doubt, when it does appear, that it will contain a just acknowledgment of their creditable exertions in the operation, and honourable mention of many who deserve to be known, for their skill, their labours, and the unshrinking discharge of difficult duty in times of peculiar trial and danger.

1855.

Establishment of the corps—Organization of companies—Distribution—Services of the sappers at the several stations—The Ordnance Survey—Its divisional districts—and military character—Qualifications of the observers—List of the non-commissioned officers employed as such—Greatest distances observed by them—Importance of the services of the non-commissioned officers, as proved by the reduction of the officers—Situations of trust filled by them—Strength of the companies—Average distribution in the United Kingdom—Division of labour—Great triangulation—Private James Weir—Secondary and minor triangulations—Other general survey duties—Perambulation of boundaries—Sergeant Robert Meade—Pay and allowances—Skilful and distinguished talents and usefulness of eleven non-commissioned officers; and of Quartermaster William Young—Merits and services of the survey companies.

THE establishment of the corps, excluding the five staff officers attached to it, counts a total of 2,655 of all ranks. This number is divided into twenty-two companies, eighteen of which were raised for general service, and four for the duties of the national surveys.

Each general service company is organized, with respect to trades, in numbers equivalent to the assumed wants of the service; and thus constituted, it is in a position, in proportion to its numerical efficiency, to undertake and accomplish any work within the scope of military purpose and requirement. The skill of the workmen and their ability as a body are rendered certain, by the enlistment of none but good artificers, and the extreme care taken to form a company for duty.

Such, however, is not the rule in completing a survey company, for men of superior intelligence and acquirements only are drafted to them, irrespective of any classified organization of their establishment with respect to trades.

The distribution of the corps is as follows :—

	Companies.
Woolwich	1½
Chatham	1
Gibraltar	1
Bermuda	1
Halifax, N. S.	1
Mauritius	1
Cape of Good Hope	2
Crimea	8
Western Australia	1
New Zealand	0½

Detachments :—

Corfu.
 Port Adelaide, South Australia.
 Melbourne, Victoria.
 Hobart Town, Van Diemen's Land.
 Sydney, New South Wales.

Service companies	18
Survey companies	4
Total	22

The companies at Woolwich are daily employed in the royal engineer department. As most of the work is executed by contract, that which falls to the lot of the sappers is generally of a minor character. When, however, their numbers have been sufficiently large, and have not been materially diminished by sudden demands for their services elsewhere, buildings have been specially allotted to them to execute. A few works have in this way been reared by them, which attest their skill and efficiency as craftsmen. The non-commissioned officers have frequently been found of great advantage to the public in superintending the works of the contractors. Parties are furnished from Woolwich for duty at Purfleet, Shoeburyness, Alderney, and Sandhurst, and also for employment with the Department of Practical Science and Art in London. The occupations of the men at the first two stations are akin to those of the men at Woolwich. At Alderney three rank and file are quartered, two as clerks and draughtsmen, and one as a modeller. For Sandhurst a detachment is furnished twice in each year, for the practical instruction of the cadets in field-

engineering, pontooning, and bridge-making. Invariably the party returns to the corps with the highest character for efficiency, zeal, and good conduct. A similar party is also provided for the instruction of the gentlemen cadets at Woolwich, but its services are simply confined to the construction of a few field-works, and the making of fascines and gabions. The two non-commissioned officers with the Department of Science and Art, fill the offices of clerk and draughtsman, and modeller. The latter is also overseer of the carpenters employed at Marlborough and Gore Houses.

At Chatham the sappers receive instruction in the field services of the royal engineer department. The course followed is very complete, omitting no detail with which a sapper should be acquainted, and embraces the teaching of a system of pontooning with every variety of means and appliance, and also bridge-making. Now that permanent teachers are appointed to the establishment to afford tuition in the elementary principles of fortification, and in plan-drawing and surveying, there is every reason for anticipating that the corps will much improve in the theoretical as well as practical knowledge of its peculiar duties, and be better fitted—when thrown by accident away from their officers into circumstances of difficulty and danger—to apply the resources of their acquirements and experience to master the one and conquer the other.

At Gibraltar the company has excellent employment in carrying out the authorized improvements and alterations of the fortifications. Early in 1850 Sir Robert Gardiner, the governor of the fortress, wrote a complimentary letter to Sir John Burgoyne, relative to the companies then under his Excellency's command. "My opinion of the sappers," he says, "is everything that you, in your personal, natural, and official station, would desire; their movements surprise me, and are proofs of the care and attention of the officers, who must be good tacticians, as well as good engineers."

At Corfu, Bermuda, Halifax, the Mauritius, and New Zealand, the companies have generally a very good class of work to perform. From Corfu parties are occasionally de-

tached to Vido, Zante, and Santa Maura. In Bermuda many of the men superintend and regulate the labours of the convicts at the various works. The company there is divided between St. George's and Ireland Island, having parties at Prospect Hill and Boaz Island. The company in Nova Scotia is principally occupied in completing the citadel of Halifax. When the company was sent there in 1850 it was considered expedient to fill it with married men, as the temptations and facilities to mechanics to desert were great. The company it relieved during its seven years' service there, lost by desertion no less than fourteen men. The experiment has so far been successful.

At the Cape of Good Hope the companies are widely scattered, in small sections, on the frontier. Including Natal, parties are cantoned or encamped at sixteen different posts and forts. The companies are fully occupied in the current services of the department, and in building such defensible forts and barracks as the late Kaffir struggle proved to be indispensable. The exigencies of the war with Russia have necessitated a reduction of the force of sappers in the colony, and orders have recently been despatched to the Cape recalling a company to Woolwich.

In Western Australia, the company assists in the organization of the convict establishment, and is much scattered in forming labour stations for ticket-of-leave men. The penal settlement is daily growing into importance, and likely eventually to absorb the whole convict establishment of Van Diemen's Land. In the execution of the buildings and bridges that are deemed necessary, the sappers are found useful both as tradesmen and overseers.

The Hong-Kong half company landed at Woolwich on the 3rd January. During its service in China its character was uniformly exemplary, and Sir John Burgoyne in a general order highly complimented the men. On embarking for England, Captain Whittingham, the commanding royal engineer, made a flattering report of their conduct. "The proofs," he wrote, "are patent in the few deaths, in the few cases of in-

termittent or other climatal diseases, and in the absolute cessation of trials by courts-martial, although the ratio of exposure to a tropical sun—the engendering cause of disease and drunkenness—has been far greater than that of other troops, and has almost exhausted the stamina of the men.” “Their extreme good conduct” was also the subject of a report from Lieutenant and Adjutant Lloyd, 59th regiment, who commanded the troops on board. A few years ago three privates superintended, under the colonial clerk of works, the erection of the government offices. Since the 4th December, 1852, three other men were employed under Mr. Cleverly, the surveyor-general, as overseers in building the government house, and on quitting the island, he testified to the very great benefit that had been derived from their supervision of the works, inasmuch as from their steadiness, usefulness, and skill, the edifice had been erected in a careful and substantial manner. For more than eleven years a small force of the corps had served in China, the first party having landed in October, 1843. Six reinforcements and reliefs had since been sent out to supply the place of casualties. The total sapper force which had served there amounted to 113 non-commissioned officers and men, of whom thirty-three died, twenty-seven were invalided, one was discharged in the colony, seven deserted, twenty-three returned to England by reliefs, and twenty-two on the final removal of the detachment from China, which landed at Woolwich on the 3rd January.

At New Zealand, Auckland is the head-quarters, where a portion of the company is employed in building the council chamber for the provincial Government, and parties are detached on engineering services to Wellington and Manakan Harbour.

In South Australia a portion of the detachment is constantly retained at Port Adelaide for the departmental works, and the other portion is detached into the bush, north, south, and east of Adelaide, and also to the district of Mount Gambier, surveying sections of land for individual purchase and colonial allotment.

The small party of three men at Melbourne for general service, are awaiting the decision of the provincial parliament with respect to the works to be undertaken by them. The defence of the harbour, which was contemplated by the authorities, has been reported impracticable by Captain A. G. P. Ross, R.E. In the meantime they are efficiently employed in carrying on some subordinate duties connected with an exhibition at Melbourne, which is in course of preparation. The survey party of six men assist in the trigonometrical surveys of the colony, but a few of them are specially attached to the working staff of the Melbourne exhibition.

In Van Diemen's Land, the detachment is employed surveying for local and imperial purposes. Hobart Town is the head-quarters, from which men, singly, or in twos and threes, have been detached to Bothwell, Port Sorell, Huon, Avoca, and Sung River.

The Sydney party have commenced the establishment of the branch mint, under the directions of Captain E. W. Ward, R.E. Previously they were for a time employed in erecting iron houses at Middle Head, Port Jackson.

The four survey companies are engaged in completing the secondary and minor triangulation of the United Kingdom; and in the detail survey of the five northern counties of England, some large districts of Scotland, and in the revision and contouring of the northern counties of Ireland. Occasionally they are deputed to execute work for sanitary purposes for local boards of health, and to make special surveys of particular towns, parishes, and manorial estates—for municipal service or proprietary record and reference—at the expense of local corporations or of private noblemen and gentlemen. Small parties have at times been employed in making tidal observations for scientific uses, and in collecting much subsidiary information, to be embodied in the Ordnance Memoir of the Survey, should it at a future day be published. In Ireland the companies did excellent service in the initial duty of gathering minerals, fossils, and objects of natural history, to assist in developing the investigations of those interesting subjects. In

conducting the survey of Great Britain, however, that branch of the duty has been abandoned.

The survey department comprises seven divisions, the headquarters of which are at Newcastle-on-Tyne, Darlington, Glasgow, Edinburgh, Kelso, Ayr, and Dumfries. Southampton is the chief station. Special divisions also include detachments employed in the triangulation, perambulation of boundaries, in the duty of contouring and levelling, and hill-sketching, while a respectable force is employed in Ireland, with its principal offices at Dublin, Belfast, and Enniskillen. No idea, however, can be formed from this detail of the actual distribution of the survey companies, for the men are dispersed, singly or in small numbers, throughout the United Kingdom. The duty of levelling alone engages no less than thirty-six detached parties.

The survey is organized and conducted on a military principle, and though the assistance of civilians is largely made available, it is simply to serve as the muscles for the military skeleton. No branch of the duty, except the engraving, is performed exclusively by civilians. The officers of royal engineers have the chief direction. Their number, however, is by no means constant, but is regulated by the extent of ground under survey, and by the degree of proficiency of the non-commissioned officers.¹

Until 1843 one or more officers always remained with each great instrument, but now the non-commissioned officers are so well instructed, that they can observe as correctly as their superiors, and the presence of an officer is no longer necessary.²

The non-commissioned officers who have, as observers, had charge of the different great instruments are as follows:—

Ordnance 3-feet Theodolite by Ramsden.

Sergeant James Donelan from December, 1841 to April, 1842, and again from January, 1843 to September, 1849. He also held the charge for some months in 1849 and 1850 of the Royal Society's instrument, which he set up at near stations to his own.

Corporal William Jenkins, from September, 1849 to October, 1852, when it was returned into store at Southampton.

¹ 'Aide Memoire,' iii., p. 612.

² Ibid.

Royal Society's 3-feet Theodolite by Ramsden.

Corporal James Mulligan, January to March, 1843, when he quitted for the boundary survey of America.

Second-corporal Thomas Cosgrove, November, 1843, from Lieutenant Luyken, R.E.

Second-corporal James Stewart, August, 1844.

Corporal James Steel, June, 1845.

Corporal Robert Forsyth, August, 1845.

Corporal John Winzer, January, 1846.

Sergeant James Donelan, March, 1849.

Corporal Walter Grose, November, 1850.

Colour-sergeant James Donelan and corporal Walter Grose, August to December, 1852, at Goat Fell, relieving each other constantly.

Corporal Walter Grose, December, 1852, and still retains it.

This is the instrument that was used by General Roy, and subsequently by Captain Kater, in making the trigonometrical observations for determining the difference of longitude between the observatories at Greenwich and Paris.

The greatest distance ever observed by sergeant Donelan was to an object 106 miles from his station. His next two greatest were to points between 104 and 105 miles off. Corporal Jenkins even gained upon his instructor, and observed distances of 106 and 107½ miles. Corporals Forsyth and Stewart were more successful still. One distance obtained was 106 miles, another 108 exactly, and both observed an object upwards of 111 miles away. This achievement records a measurement which exceeds in distance any observation heretofore made on the Ordnance Survey.

The 2-feet Theodolite was used by—

Corporal Andrew Bay from March, 1843, to May, 1847, and by sergeant James Beaton from May, 1850. He still retains its charge.

The 18-inch Theodolite has been employed by—

Corporal James Steel, from August, 1841. Corporal James Beaton had charge of it for about three months when corporal Steel was at Southampton, in the summer of 1844.

Corporal John Winzer, June, 1845.

Sergeant James Steel, February, 1848, for the London survey.

Corporal William Jenkins and second-corporal John Wotherspoon assisted sergeant Steel in the London triangulation.

Second-corporal John Wotherspoon, November, 1848.

Mr. late sergeant James Donelan, January, 1853, and still retains it.

At one period there were forty-five officers on the survey ;

at another nine only; now there are eighteen. Although the number of officers is very small, considering the extent of the total force employed, yet, by a simple arrangement, the numerous detachments are effectually commanded by the officers. The strength of the different parties is not proportioned to the ranks of the officers, but to the exigencies of the service on which they are employed.³

Nearly all the offices of importance and trust on the survey are filled by sappers, no civilian, except in a few instances, being responsible for more than his individual labour. Each party therefore, however small, on the triangulation, detail, and contouring duties, is under the charge of either a non-commissioned officer or private, who is responsible that the work is carried on according to orders, and that every precaution to prevent negligence or deception is taken. In the office likewise, a non-commissioned officer superintends each department of the work and reports either directly, or through a senior non-commissioned officer, to the officer of engineers in charge. Every division having commonly several detachments in the field, the payment of each detachment is attended to by a non-commissioned officer in charge of it.⁴

The actual strength of the corps on the survey on the 14th June, 1849, taken from a return presented to the Committee of the House of Commons on Army and Ordnance Expenditure,⁵ is subjoined:—

ENGLAND.			Rank and File.
	Sergents.	Engt.	
Head-quarter office—general work and computing	0	2	38
Principal triangulation	2	0	28
Inserting improvements, &c., in the one-inch map	0	0	1
Secondary and minor triangulation	0	0	1
Levelling and contouring	1	0	9
Six-inch survey and plan drawing of Yorkshire and Lancashire	8	1	110
Survey of London for sanitary purposes	5	0	20
Survey of Devonport for military purposes	1	0	11
Total	17	3	218

Head-quarter Stations.—Southampton, Wakefield, York, and
Doncaster.

³ 'Aide Memoire,' iii., p. 612, 613.

⁴ Ibid. iii. pp. 612, 613.

⁵ Appendix H, p. 1055.

SCOTLAND.			
	Sergeants.	Bugl.	Rank and File.
Secondary and minor triangulation	0	0	6
Six-inch survey and plan drawing of Kirkeudbright, Dum- fries-shire, and the Isle of Lewis	3	0	63
Total	3	0	69

Head-quarter Stations.—Dumfries, Stornoway.

IRELAND.			
	Sergeants.	Bugl.	Rank and File.
Plan drawing, printing, workshops	1	1	5
Contouring Donegal.	0	0	3
Revising Donegal and Londouderry	3	0	15
Total	4	1	23

General Total 24 4 310^e

Head-quarter Stations.—Dublin and Londonderry.

For the last eleven years the strength of the corps on the duty has been disposed of as follows: The totals calculated from the monthly records are the annual averages. Of this force a strong detachment has always been employed in the work of the triangulation, at one time amounting to fifty-four men, who alike visited the mountains of Scotland and England. Such also was the case with the contouring detachment, which in the early part of 1853, numbered above forty men of all ranks. Both parties are included in the averages for England, as their location, from being constantly on the move, has not been determined in the general monthly returns of the corps:—

	North America.					Total.
	England.	Scotland.	Ireland.	Bound. Survey.	Explor. Surv.	
1844 . . .	199 . .	6 . .	26 . .	20 . .	0 . .	251
1845 . . .	209 . .	14 . .	25 . .	10 . .	0 . .	258
1846 . . .	198 . .	28 . .	23 . .	7 . .	13 . .	269
1847 . . .	206 . .	30 . .	29 . .	0 . .	11 . .	276
1848 . . .	216 . .	43 . .	28 . .	0 . .	10 . .	297
1849 . . .	233 . .	71 . .	28 . .	0 . .	0 . .	332
1850 . . .	202 . .	79 . .	28 . .	0 . .	0 . .	309
1851 . . .	203 . .	61 . .	28 . .	0 . .	0 . .	292
1852 . . .	190 . .	57 . .	26 . .	0 . .	0 . .	273
1853 . . .	169 . .	84 . .	35 . .	0 . .	0 . .	288
1854 . . .	182 . .	89 . .	75 . .	0 . .	0 . .	346

The greatest strength of the sappers employed on the survey duty, was early in January of this year, 376 of all ranks.

^e The above detail is the last official statement published.

The division of labour is perfect in detail, and as comprehensive as its delicate minutiae will permit. To each department of duty a proportion of sappers is attached with reference to their acquirements and experience, and the wants of the service. In the principal triangulation the sappers have always taken an important part, and young soldiers newly posted to the companies, who display no particular aptitude for finer work, are usually sent upon it. The duty is arduous and severe, and the men invariably sleep in tents or portable huts, on mountain slopes at high altitudes. A sketch of a survey hill encampment may be seen in the Aide Memoire, which graphically illustrates the rugged character of the site, and by inference, the difficult and trying nature of the duty.⁷

In the great triangulation, the 3-feet, 2-feet, and 18-inch theodolites are used to make the required observations. At the several stations selected for the work, each instrument is fixed in a "crow's nest" on some mountain peak or crag, or perched upon the turret or narrow towering steeple of some country church or city cathedral, or stayed by guy ropes among the battlements of some deserted old castle.⁸ For about ten

⁷ Vol. iii., p. 614.

⁸ Private James Weir was perhaps the most daring sapper in building the stages for the observatories. Like the chamois, he could climb heights almost inaccessible, and stand or sit at work on ledges, copings, pinnacles, vanes, and pieces of timber, where scarcely any human being would dare to venture without all the accessories and appliances which precaution could command for insuring safety and preventing alarm. At Ely minster, the tower of which is about 200 feet high, and at Norwich cathedral, the spire of which is the most elevated in England, being 327 feet from the ground, he was as agile and self-possessed as in an ordinary workshop. At Norwich spire, a brace broke under him, and he fell a distance of nine feet, but in his descent he caught hold of another brace, and thus saved his life. The accident did not in the least daunt him, for the next moment he was at work again, as cool and as brisk as ever. At Keysoe, in Bedfordshire, the builder who contracted to take down a portion of the spire was about to relinquish his engagement as hopeless, but our adventurous scaffold-builder was lent for the occasion, and the removal was soon accomplished. Weir took up his ladders and fixed them, but before placing the last one, he climbed the spire, unaided by scaffolding or supports, and, to crown his success, took off the vane, and brought it down with him. He achieved a still bolder feat at Swaffham, in Norfolk. Upon a projecting joist which he had fixed, and the dimensions of which were four inches wide by twelve feet long, he walked steadily forward to its end, at a height of about

years past, non-commissioned officers with strong camp parties under them have fulfilled this duty, and have visited, in every vicissitude of weather, nearly all the leading trigonometrical stations in Great Britain. "It is, perhaps, right," says Captain Yolland, "to mention, that whereas formerly, it was deemed necessary to employ general officers of the army and scientific individuals to make the required observations with the theodolite to carry forward the principal triangulation, the whole is now done by non-commissioned officers of sappers, the only difference being, that in the one case the general officer worked out his own results, and in the other the non-commissioned officer simply forwards his observations to Southampton for computation."⁹

Several parties are also employed in conducting the secondary and minor triangulations. In prosecuting the former, theodolites of 12 and 10 inches diameter are used, in the latter 9 and

120 feet, and with astounding coolness and dexterity performed his hazardous duty. At Thaxted, in Essex, he climbed the outside of the spire by the crockets, and at the giddy altitude of about 210 feet from the ground, sat upon the creaking vane, and whirled himself round upon its grating pivot. This was on the 11th April, 1844. A drawing of the scaffold and stage was given in the 'Illustrated London News' of that date. At Danbury, in July, 1844, his services were very distinguished. To take the initiative or first step in any one of these perilous services was always the most important task; but however difficult or dangerous it promised to be, Weir never shrank from its performance. Climbing the inside of the steeple, he reached its topmost sounding aperture, in which he secured a piece of timber. This projected some feet beyond the spire. Upon the end of this joist he stood, and after hauling up a ladder, fixed it upon the projecting timber, and then ascended by the shaking ladder to the top of the spire. There he hauled up the block and tackle, made it fast to the steeple, and descended amid the cheers and wonder of the crowd who witnessed his fearful exploits. The services of this daring man were frequently alluded to with especial particularity by the provincial press, and alike insured the applause of his comrades and the approbation of his officers. He afterwards served on the exploration survey for a railway in North America. In May, 1848 he purchased his discharge, and set himself up in business in Halifax, Nova Scotia. His industry and mechanical ingenuity soon brought him success in his new line of life, and he received the appointment of Superintendent to the Water Company in that town, which he now fills, at a salary, with other emoluments, of about 200*l.* a-year. On receiving this appointment the company purchased his stock of goods from him for about 700*l.*, and he bids fair, in a few years, to be a wealthy man.

⁹ 'Army and Ordnance Exp.,' 1849, p. 508.

7 inches. The use of the smaller instruments was commenced about 1826 by the sappers, who carried on the observations in connection with the chain survey. In 1833 some expert men were attached to the mountain party of Captain Portlock, who thoroughly trained them as observers. About 1838 a selection of some forward and enterprising sappers was sent to Lieutenant Downes, to replace the civilians in charge of the observing parties. From this time is dated the employment of sappers in the use of the secondary class of instruments. The system of employing trained sappers in the work of the triangulation, and in the use of the zenith sector was introduced by General Colby, and during his time obtained its fullest development.¹⁰ Here it should be noted, however, that the sappers are confined to the practical duty of observing only, and consequently take no part in the responsibility of the calculations, which are entirely carried out under the direction of the officers of royal engineers. As mere observers the non-commissioned officers have succeeded eminently, and their observations will bear the strictest comparison with any previously made either with the great instruments or the zenith sector.

The other duties of the companies comprise the computation of distances, areas, altitudes, latitudes and longitudes, the detail survey of the kingdom, and the drawing and colouring of the necessary plans for engraving and publication. Several men have the important duty to discharge of examining the work on the ground, before the plans are fairly finished; and a number are constantly employed in contour levelling. The great bulk, however, of the companies is dispersed on the detail survey and in plan drawing.

A few non-commissioned officers are also engaged in the perambulation and notation of public boundaries—a branch of duty demanding from those selected to carry it out a good understanding, a habit of sifting and weighing evidence of a confused and contradictory character, and mental vigour sufficient to bear up against the hard and depressing study of wearying and uninteresting details and registries. Long-stand-

¹⁰ 'Professional Papers, R. E.,' N. S., p. xxiii.

ing litigations between parishes and townships respecting the demarcation of certain lands have often been investigated by the non-commissioned officers, and upon the accuracy of the reports drawn up by them depended the decisions of the superintending officer. In elucidating the features of particular territorial disputes, dry legal enactments and charters, corporate and manorial records and histories, have not unfrequently to be consulted. Some important cases, shrouded in difficulty and complexity, have called for a more lengthened inquiry and application; and the plodding perambulators, to make themselves masters of the points at issue, have even extended their researches to the study of old and abstruse authorities, such as Pope Nicholas' Taxation, the Valor Ecclesiasticus of Henry VIII., and the MSS. of Torre and Archbishop Sharpe. Some of the reports display a more than average amount of talent, argumentative skill, and antiquarian information.¹¹

The following detail shows the regimental and survey rate of pay received by the sappers on the 14th June, 1849, at the time the committee was sitting on army and ordnance expenditure:—

	Regimental Pay.		Survey Pay.			
	s.	d.	s.	d.	s.	d.
1 sergeant-major . . .	4	7½	4	0		
3 colour-sergeants . . .	3	3½	2	9	to	4 0
20 sergeants	2	9½	2	1	to	3 0
25 corporals	2	3½	1	4	to	2 10
26 second-corporals . . .	1	11½	1	4	to	2 6
2 privates	1	3½	2	0	to	2 6
170 privates	1	3½	1	0	to	2 0
91 privates	1	3½			under	1 0
<hr/>						
338 Total.						

'*Army and Ordnance Exp.*,' 1849, App. H., p. 1056. This is the last official statement published.

¹¹ Sergeant Robert Meade is perhaps the most distinguished in this department of duty; for, combining the powers of a ready intellect and keen perception with unsparing assiduity and patience, he has succeeded in unravelling some extraordinary cases. Skelton in Cleveland, Yorkshire, in which had existed a dispute from time immemorial affecting the legal appropriation of nearly 2,000 acres of moor and enclosed lands, was decided, on his exposition, by the officer intrusted with the responsibility; and the boundary between the

The majority of the lowest class in each year were men who had but recently joined the survey, and whose attainments and usefulness had not been sufficiently known to warrant their being advanced to the higher classes. The working pay is fixed by the superintendent at a rate for each according to his acquirements and industry; and for the satisfactory performance of duties requiring management and ingenuity, such, for instance, as reflecting with the heliostat, piling hills with judgment, accuracy and expertness in taking astronomical observations, &c., it is customary to allow special rewards.¹⁸

A few of the non-commissioned officers and men not already mentioned in these records, who have been conspicuous on the duty, and have gained special attention for their abilities and advantageous services in very responsible situations, are here given as examples, to encourage others in the corps to seek and cultivate still higher attainments, and to emulate their usefulness and zeal.

Second-corporal William Lowrie. Enlisted in July, 1833. Application and industry soon made his services of value to the survey. His maps of the city of Limerick and town of Liverpool have ranked him among the first class of draughtsmen. In January, 1845, he purchased his discharge, and obtained profitable employment in the Assessionable Manors' Commission. He is now surveyor and draughtsman at a high salary to the harbour department of the Admiralty.

Sergeant James Sinnett. A non-commissioned officer of indefatigable energy and intelligence; was one of the best draughtsmen in the corps, and excelled in landscape drawing; was also an efficient superintendent, and after a service of more than eighteen years, he died at Liverpool in August, 1844.

townships of Ryhill and Camerton, in the same county, was altogether unknown to the authorities of the respective townships till he obtained access to some old documents, which enabled him to mark out the ancient line of boundary. Indeed, it may here be added, that scarcely a single township is perambulated without the non-commissioned officer finding it necessary to rectify some error in the rating of lands and premises, or to draw up a report, detailing the circumstances of some feud between neighbouring parishes, respecting boundaries or parochial apportionments.

¹⁸ 'Aide Memoire, R.E.,' iii., p. 613.

Sergeant William Jenkins. Has been principally employed in the triangulation, and has observed with the 3-foot theodolite from some of the most important trigonometrical stations in the kingdom. During the London survey in 1848 he assisted sergeant Steel in taking observations from the station above the ball and cross of St. Paul's. He also distinguished himself in the use of the zenith sector at Southampton, and subsequently was second in charge in the remeasurement of the base on Salisbury Plain. He now bears the reputation of being the best observer on the Ordnance survey.

Sergeant William Scott, after a service of twenty years, left the corps in November, 1845. He joined it a lad from the Hibernian School. His acquirements were varied, and above the average of intelligent men. Whether as a surveyor, draughtsman, examiner, or superintendent, his work was always executed with quickness and accuracy, and he was frequently encouraged in his duty by preferment and eulogy. In 1839 he had the charge of the detail survey of the city of Limerick, and the preparation of the plans on the 5-foot scale. The survey was executed entirely by chain triangulation, in a manner so superior as to elicit the marked approbation of his officers. On retiring from the corps he commenced life anew as a civil engineer, and obtained good employment in the profession in England. His success, however, did not keep pace with his wishes and exertions, but sailing for the West, he was not long unknown in Canada. Under his superintendence the western division of the Great Western Railway was executed. On its completion in 1854, and when his connection with the undertaking had ceased, he was presented by the employés of the company at a public dinner, with a gold watch of the value of 500 dollars, as a token of high respect for his professional knowledge, and for his zeal and amiable firmness in directing the works. He now holds, through his own unassisted efforts, an honourable position in society, is esteemed for his attainments in science and engineering, and his prosperity has placed him in circumstances of moderate wealth.

Corporal William M^r Lintock was a very clever artizan. An

ingenious machine was invented by him for ruling the lines of even shades on the copper, superseding its execution by hand engraving; and another for producing a finer, smoother, and more uniform impression of the characteristics of the maps. They are still in use at Southampton. The first, by a simple and beautiful process of mechanism, is when arranged, set in motion, and performs its delicate operations unaided, until the particular service assigned to it is accomplished. The other produces its advantages by an effective adaptation of the hydraulic principle and steam. Both inventions possess many excellences over the former modes of executing these fine and scrupulous details, and not only save much time and labour, but the chance of inaccuracy and irregularity in the performance. He is now profitably employed as an engineer by the Peninsular and Oriental Steam Navigation Company.

Sergeant James Beaton has given much satisfaction as an observer, and is at present in charge of the 2-foot theodolite. He is also well known for his successful daring in the building of structures for trigonometrical purposes. Since 1840 he has superintended the erection for these objects of at least fifty scaffoldings with stages, on the summits of towers or spires of churches, and in other prominent positions, in various parts of the British isles. Some of these structures have exhibited great skill, and the ingenious arrangement of the timbers, cordage, and fastenings, made the scaffolds with their platforms objects alike of curiosity and architectural merit. The celebrated stages at Calaiswold near Bishopwilton, and Arbury Hill near Daventry, were massive and imposing structures. The former was 78 feet high, and 300 trees from the estate of Sir Tatton Sykes were used in its construction: the latter was 80 feet high, and the timber employed in it took a waggon and four horses for six days to collect it on the site. The scaffolds and stages on the steeples of Thaxted and Danbury churches in Essex, were cleverly executed. The Thaxted one was a particularly difficult service, and accomplished at imminent personal risk. It was nevertheless a very artistic and beautiful

work, and of sufficient interest to receive delineation in a London journal. It was built in April, 1844. The scaffold and stage were more than 102 feet in height, and rose from the crown of the tower, which had an elevation of 100 feet from the ground. His most distinguished work was superintending, in 1848, the erection of the scaffolding and stage around and above the ball and cross of St. Paul's Cathedral, and which earned the reputation of being a wonderful specimen of skill and workmanship. The design for it was made by sergeant James Steel; but sergeant Beaton effected some important improvements in its details, which gave solidity and stability to the delicate fabric. His coolness, scrupulous care, and unflinching zeal in carrying on the work were astonishing, and during its progress he was visited by many architects, engineers, and professional men, who treated him with great courtesy, and eulogized his talent and courage. In the metropolitan sanitary survey sergeant Beaton took the trigonometrical observations at nine points of the district, the chief stations being on the cupola of the Colosseum, St. Luke's Chelsea, the Pagoda Tower at Kew Gardens, and the Wimbledon and Highgate churches. The stage at the Pagoda was very difficult of erection. The tower is 140 feet high, and the pole from its apex rises to an elevation of 20 feet. Above this pole in a very skilful manner was the stage constructed, which rested upon four 30-foot spars based upon the cupola. While the work was in progress frost set in, and the roof, smooth as a sheet of glass, rendered the movements of the workmen very perilous; but the sergeant, equal to the occasion, by means of a circle of sheeting secured at the foot of the uprights, and the strewing of gravel on the planks, effected the service with his accustomed success. At Wimbledon spire the scaffolding from the base to the top was 85 feet, and from its neatness had so beautiful an appearance, that a drawing of it was transferred to the pages of the 'Illustrated London News.' It was built during the prevalence of a strong gale, and to insure security against an increased pressure of wind on the superstructure, 700 yards of chain and 500 yards of rope were fixed to the base of the main posts, and

passed fourfold through the belfry windows, and made taut to the eight-bell frame by powerful tackling. The strength of the fabric was afterwards severely tested, for a violent storm came on, and whilst large trees were thrown down and others were snapped off above ground, the stage on the fragile spire of the church weathered the hurricane. At Highgate church he built a similar stage above a spire of 60 feet, rising from a tower of 70 feet: this spire was architecturally embellished with turrets, pinnacles, &c., and eight flying buttresses. A storm set in here also, which shook the houses in the vicinity of the church. At midnight the sergeant was awakened by the wind, and dressing himself hastened to the top of the steeple. Nothing daunted by the oscillations of the stage he secured the instrument, and reefing a part of the canvas of the observatory saved it from destruction. This incident is given to show the sergeant's spirit and devotion to the service. At Gloucester Cathedral he erected on the tower a neat scaffolding and double stage, to receive his observatory, which was made to peer over the delicate pinnacles of the edifice. The pinnacles rose 52 feet above the roof, while the height of the building from the ground to the top of the spires measured 226 feet. This service was carried out with his usual ability and care, and the damage done to the cathedral in the fixing, and afterwards in the removal of the heavy timbers and stones, cost to repair it only the small sum of 1*s.* 4*d.* Similar scaffolds and double stages were constructed by him on the towers of Tewkesbury Abbey and Worcester Cathedral. Since 1850 he has carried on trigonometrical observations with the 2-feet theodolite from the top of Nelson's Monument on Calton Hill, from the turret over the crown-room at Edinburgh Castle, and from numerous mountain stations in Scotland. At one period of his service he was employed in the triangulation of Lewis, and underwent incredible hardships in its prosecution. Indeed throughout his survey career of more than twenty-two years, his adventures and vicissitudes on mountain duty, in observing, in scaffold building, in travels by land and sea, exposed in camp to frost and snow, to violent winds, storms, and deluging tempests, belong

almost to the romance of science. This is true not only with respect to the arduous and trying services of sergeant Beaton, but to many others who, like him, have been allotted to the laborious duty of the great triangulation.

Colour-sergeant James Donelan was discharged in April, 1853, and received a gratuity and medal for his excellent services. From the year 1839 he was employed in charge of parties on mountains and at other stations, in making observations of angles and bearings, for the secondary and minor triangulation of Ireland. From December, 1841, to April, 1842, and from January, 1843, to late in 1852, he had the sole charge of Ramsden's three-foot theodolite, and made observations for primary triangles, some of whose sides were more than 100 miles in length. This class of observations previously had been performed by officers and mathematical assistants of great experience only, but the observations made by sergeant Donelan proved on calculation to be equal in accuracy to those of his predecessors. To his credit it must be recorded, that he was the first non-commissioned officer of the corps intrusted with the charge of a three-foot instrument. For more than twelve years he was encamped on remote mountain heights, or moving from one wild spot to another as the requirements of the service demanded. In this way he visited upwards of fifty trigonometrical stations in the British isles, many of which have become famous by the labours of General Roy, General Mudge, Captain Kater, and General Colby. Robust and physically adapted for laborious employment, he sustained with cheerfulness and evenness of temper and purpose, the arduous toils and difficulties of his duty, and the privations, discomforts, and atmospheric vicissitudes of a trying situation. His was necessarily a rugged life, but in all he acted like a true soldier, and was faithful and efficient alike as a sapper and an observer. Here it may be proper to mention that at Leith Hill, in Surrey, he received a visit from an eminent stranger, of whose position in society he was at the time unconscious. With the strict injunction that he was not to touch the instruments, or to interfere or speak while the observations were being conducted, the gentle-

man was admitted into the observatory. Sergeant Donelan having closed the series of the arc to the Whitehorse-hill heliostat, entered into conversation with the stranger, and after an unrestrained reciprocation of thought and opinion on professional matters, he was embarrassed to learn that the visitor was no other than Professor Airy, the Astronomer-Royal. The visit was a beneficial one to the sergeant, for the Professor, in a half-hour's stay, imparted to him much valuable information, and complimented him in a letter to Southampton for his care, industry, and ability. Among his latter military services he was engaged for some months in the irksome operation of re-finding the trigonometrical stations in Ireland. The duty was one of no common difficulty, but with his accustomed perseverance and precision, he succeeded in effecting it to the perfect satisfaction of his officers. He not only found the various sites, some of them almost hopelessly lost, but to render them easily accessible to future observers, described their characteristics and the physical features and bearings of the most remarkable objects in their vicinity. He is now employed as a civilian, observing with the 18-inch theodolite, at a salary of 7*s.* a-day, in addition to his pension of 2*s.* 0½*d.*

Sergeant Joseph Longland.—Has served sixteen years in the corps. Is proficient in the field duties of the survey, and bears the character of being a fine draughtsman. Coupled with his charge of the drawing and tracing at Mountjoy, he superintended the revision of the engravings for Ireland. For several years he took the meteorological observations, directed the reduction of them for publication, and not only proved himself to be an excellent and careful observer, but introduced improvements in the meteorological registry. At Southampton, under the executive, he superintended, with singular efficiency and correctness, the staff of draughtsmen, civil and military, employed at the Ordnance map office. The vast range of his information, his habit of close reflection and studious application, render him a trustworthy and successful assistant. Thrice he has appeared before the public as a poet. His works bear the titles of 'Othello Doomed,' 'Bernard Alvers,' and 'Tre-

phely.' The two first are richly imaginative, displaying a versatility of style, an originality and wildness of idea and incident, a gracefulness and sublimity of diction, that bid fair, as he expands in experience and familiarizes himself with the compass of his powers, to give him a high stand among the poets. His last production, however, does not come up to the expectations of his admirers. It is too vague, eccentric, and improbable to meet with favour. Undoubted evidence it bears of spirit, thought, care, and ambition, but it lacks the charm—the merit of his earlier works.

Sergeant Donald Geddes possessed varied ability both as a surveyor and a mechanic. He was also a clear-headed and suggestive clerk of works, and not without pretensions as an architectural draughtsman. When discharged in the summer of 1853, he was in subordinate charge of the electrotype apparatus and copper-plate printers at the Ordnance map office at Southampton, under Captain W. D. Gosset, R. E., in which, through his assiduity and intelligence, the process of producing the copper for engraving was carried out very successfully. In attending to this duty his attention had been much engaged in scientific investigations and chemical experiments, and his diligent application has made him intimately acquainted with the sciences of galvanism and electricity. Frequently on these subjects he has lectured at the Polytechnic Institution at Southampton to large audiences, and his addresses have been invariably reported in their entire length in the local papers. In January, 1852, he was honoured by a request to *open* the *session* of the institution with a lecture. This sergeant Geddes complied with. His subject was "the advantages of scientific knowledge," and it was received by a crowded assembly with enthusiasm. "The eloquence, ease of illustration, and fine talent of the lecturer, were surprising, and professors with a stream of initial titles to their names could not more have instructed and delighted their audiences at the royal and other metropolitan institutions than did sergeant Geddes."¹⁴ An incident occurred on this occasion which, from

¹⁴ 'Hampshire Advertiser,' January 17, 1852.

its remarkable character and effects, should not be omitted. The lecturer in alluding to the electric-telegraph, drew attention to the fact that friendly salutes had, by its agency, been fired between the coasts of England and France. "Let us only imagine," he continued, "that this wire were carried across the channel and attached to the cannons of Paris or Madrid; let us wish to salute them on some great occasion, and by the simple touch of our wires it is done!" Here the lecturer united his wires, and lo! three pieces of artillery were fired in the adjacent grounds, to the great astonishment of the audience; but though the experiment was successful, it was attended by one of those striking accidents which, instead of damping the interest of the assembly, assisted to increase its zest and to prolong its hearty applause. The distance that the guns were likely to be out of the road of doing harm was not accurately ascertained, and when the explosion took place the crash that ensued embraced the destruction of more than 100 panes of glass in the Polytechnic building. At the invitation of Mr. Andrews, the Mayor of Southampton, he afterwards delivered a lecture at St. John's House, Winchester, on voltaic and magnetic electricity. "The lecture, so interesting and yet so practical in its illustrations, accompanied by experiments so brilliant and successful, was listened to with the most earnest and intelligent attention."¹⁵ Mr. Andrews and Miss Smith—the heroine of the 'Amazon'—were present; and sergeant Geddes, during his sojourn at Winchester, was the honoured guest of the mayor, and favoured with the amiable and intelligent company of the accomplished lady. On several occasions sergeant Geddes has contributed to the columns of the 'Hampshire Advertiser' original and popularly-written articles on art and science. He is now clerk of works in the superintendence of the new gaol at Southampton, at a high salary.

Sergeant-major James Steel.—From the first he had a taste for the investigation of abstruse questions of science and philosophy, and his strong mind and perseverance, his power of appli-

¹⁵ 'Hampshire Chronicle,' March 13, 1852.

cation and fulness of resource, have made him acquainted with a fund of knowledge and information not commonly possessed by men in his sphere of life. As a mathematician he holds a fair reputation for proficiency and accuracy, but it is chiefly with the work of the triangulation and astronomy he has most distinguished himself. His early service was passed on severe hill duty. Ben Auler and Creach Ben were his first mountain stations. There he experienced a round of the varied hardships and dangers peculiar to a *trig* camp.¹⁶ Possessing a buoyant temper and a hardy constitution he for many years bore with happy composure all the stern trials and changes to which the service exposed him, and carried on his duties with unrelaxed ardour and success. At Creach Ben he learnt the use of the instrument, and succeeded Lieutenant Hamley, R.E., in its charge in 1841. He is the first non-commissioned officer of the corps who used one of the larger instruments. In prosecuting his new trust, his travels embraced all parts of the British isles. Now he would have his station on the mountain top, now on some craggy peak, and anon staged on the tower of some majestic castle or cathedral. This again he would leave for service on some stormy coast, or to perch his observatory on the slender weather-worn spire of some quiet village or city church. At Boston he obtained the greatest number of points and angles that had *then* ever been observed at any one station. At Norwich cathedral his observatory rested on a scaffolding 315 feet from the floor of the building—nearly the height of St. Paul's, but without the advantages of a dome at the base, to diminish the apparent distance of the observer from the ground. Here he used to creep into the "nest" through a hole in its floor. Some of the men were weeks before they could reach the top, while it was the duty of sergeant Steel and others to ascend it, and carry on the work in the most tempestuous weather and in the darkest nights. The oscillations of the structure were frequently very violent, but the observer, cool and fearless, continued to complete his arcs and to record

¹⁶ See illustration of the encampment at Creach Ben, 'Aide Memoire,' iii. p. 614.

the movements of the stars. In one of the storms which broke over Norwich an architect paid the sergeant a visit, but the vibration of the "nest" appeared so alarming to him, that through his representation a peremptory order was given to abandon the station, by removing the instrument and scaffolding from the spire. At Beachey Head the sergeant spent a winter season, where he was exposed to cold the bitterest he had ever experienced. This was in March, 1845, and at midnight, when the temperature was 25° below the freezing-point, he observed the pole stars protected only by the canvas sides of his frail observatory. In moving from place to place he acquired much skill and facility in the construction of scaffolding and stages, and some of these fabrics, from his own designs, have only perhaps been excelled by the interesting works of sergeant Beaton. Soon after this, sergeant Steel, instructed by his officers in the use of the transit and zenith sector instruments, was employed during periods of five years in carrying on a series of astronomical observations with Airy's zenith sector for the determination of the latitude of various trigonometrical stations used in the Ordnance survey of the British isles. Out of the twenty-six sector stations he visited seventeen, at fifteen of which he took the whole of the observations with the exception of a few at Balta, and about one-half at Southampton, which were made by corporal William Jenkins. The record of his observations, comprising about 700 quarto pages of closely-printed matter, attest both his industry under difficulties, and his talents. In this honourable service he displayed a quickness of perception, an accuracy in the manipulation of his instrument, and a skill and dexterity in the taking and registration of his observations, that place him in an enviable light even among scientific men. The most important work with which the name of sergeant Steel is *popularly* associated is the triangulation of London for the Sewers' Commissioners. He it was who designed the beautiful scaffolding around and above the ball and cross of St. Paul's, and who for four months carried on his duties from the observatory, cradled above the cross, with so much spirit and zeal, notwithstanding at times

its alarming oscillations. In that period he made about 8,000 observations, and on the completion of the service superintended the removal of the scaffolding, which was found to be an operation even more difficult and hazardous than its erection. Another important work superintended by him, was the re-measurement of the base line on Salisbury Plain by means of the compensation-apparatus, which he conducted with his accustomed fidelity. In this delicate and peculiar duty his readiness of invention and perseverance enabled him to master, with complete success, the various obstacles he met with in its progress. So important a charge as this was never before intrusted to the responsibility of a non-commissioned officer, for heretofore the base lines were measured only by general officers of great scientific merit and experience. That on Salisbury Plain was executed by General Mudge in 1794, and its remeasurement was, in its operation and its results, fully equal, in point of skill and correctness of execution, to any of its predecessors. Sergeant Steel's services and attainments have always been of the highest class for usefulness and integrity, and his attention to the public economy was marked by a penetrative species of calculation, which made him more than a match for the griping cupidity and cunning stratagems of such contractors as it was occasionally his duty to engage. Under the years 1848, 1849, and 1850, the valuable services of this non-commissioned officer are more particularly alluded to in connection with the special services upon which he was then employed. It is only a poor act of justice here to mention that in this instance, as in all others in which non-commissioned officers and men have signalled themselves, the corps is deeply indebted to the Royal Engineers for information, direction, opportunity, patient instruction, and an interest in the development of individual character and talent; so that, for nearly a quarter of a century, the officers have assigned to them the performance of many important services, which from the accuracy and integrity of their accomplishments have greatly enhanced the corps in the confidence of their officers and in public esteem. Sergeant Steel is now the chief non-commissioned

officer of the corps on the survey, and is stationed at Southampton.

Colour-Sergeant William Campbell.—Joined the corps in 1829, and early distinguished himself by his attainments. This led to his selection, when quite a junior non-commissioned officer, to give instruction to the inspectors of national schools in Ireland in surveying and levelling. These gentlemen were appointed to watch over the schools in the twenty-five educational districts into which Ireland was divided, to carry out the spirit and intentions of Lord Stanley's plan for Irish education. Sergeant Campbell spent two months in training the superintendents, during which time he was brought into contact with noblemen and distinguished personages, all of whom uniformly treated him with marked courtesy. On completing the service he was rewarded in 1838 by the commissioners of education, of whom the Duke of Leinster was the chief, with a handsome case of drawing-instruments. His pupils also, in testimony of their esteem for his attention and ability, presented him with a purse of ten sovereigns, accompanied by a flattering address. When removed to the survey of England, his experience and the wide range of his information qualifying him for more extended usefulness, he was appointed, under the executive officer at Southampton, to fill the second subordinate post of importance on the duty. There he had charge of the correspondence, accounts and returns of all parties employed in the principal triangulation, and was responsible for all the money received for their payment. To show the greatness of this trust, it will be sufficient to notice that in two years no less than 12,300*l.* passed through his hands. He was also in charge of the calculation and preparation of the initial spirit-levelling, showing the relative altitude of land, which forms the basis of the whole of the contouring and vertical survey of Great Britain and Ireland. The importance of this duty, and the fidelity with which it was executed, gave him a high stand in the estimation of his officers for intelligence and resource. The special survey and mapping of Southampton for sanitary purposes was completed under his superintendence, with Captain Yolland as director.

He also had charge of the preparation of the 5-foot plans connected with the London Block Survey, and of the 10 and 12-foot plans of seventeen other towns, surveyed for local boards of health. In conducting the survey of Southampton, he became popular with the citizens, and was commended by the corporation. By some of the municipal authorities he was called upon to suggest the best means of supplying the town of Southampton with water. With the sanction of his commanding officer he made a minute examination of the sources from which the town could be provided, and furnished his opinion in a lucid and spirited report on the propriety of selecting the Otterbourne Spring.¹⁷ Twice sergeant Campbell was examined on his project by a committee of the House of Commons; 'but the bill was eventually lost, not from his being unable to afford proof of its practicability and preference of selection to other springs, but from want of zeal and unanimity on the part of the corporation to prosecute the scheme. When the Society of Associated Engineers was formed, several condemnatory letters and articles appeared in various public journals prejudicial to the Ordnance system of employing officers of engineers and soldiers of the royal sappers and miners to execute the government surveys; and the 'Builder' was indefatigable in promulgating the statements. Sergeant Campbell undertook a defence of the Ordnance system; and fortified as he was by facts and accurate results, a thorough acquaintance with the effective working of the survey machinery, and a facility of expressing his views with force and clearness, his four well-known letters to the 'Builder' in 1849, tended in great measure to terminate the controversy, and to render the operations of the associated society innocuous to the corps. When an alteration in the division of labour took place at Southampton, which was rendered necessary by a change in the executive and a regard to the ultimate wants of the service, colour-sergeant Campbell felt he was in a position to leave the corps, and he was accordingly pensioned at 1s. 11½d. a day in July 1852, after serving on the national surveys for more

¹⁷ The full report is given in the 'Hampshire Independent,' December 8, 1849

than twenty-two years, and reaping its highest honours and rewards. His regimental pay and allowances were 7*s.* 3*d.* a day, with quarters, &c. ; and since his retirement he has been awarded, through the influence of Colonel Hall, an annuity of 10*l.* a year, and a silver medal for "meritorious service" in the corps. He now fills the office of cashier to the Peninsular and Oriental Steam Navigation Company, at a salary of 210*l.* a year.

Quartermaster William Young.—This rank was conferred upon Mr. Young in April 1853, as a reward for his talents and pre-eminently useful services. He joined the corps from the Hibernian school in July 1825, and soon, by study and application, became a well-informed mathematician. In 1830 Captain Henderson confided to him the calculations of the secondary and minor triangulation and trigonometrical altitudes of one of the districts in Ireland, in which, from his quickness, mental vigour, and extraordinary power of memory with reference to the logarithms of numbers, and the results of various calculations, his services were found, even at this early period, to be exceedingly advantageous. Promotion, however, being slow, it was not until 1838 he became a *full* non-commissioned officer ; and soon afterwards, he succeeded a civil gentleman of experience and ability in conducting, under the direction of his officers, the computing department for the survey of Ireland. In that country his duties were always onerous and responsible ; and the care, rapidity, and correctness with which they were executed, marked him out for higher employment in England. At Southampton he was intrusted with duties never before performed by a non-commissioned officer. Next to his officers he held the most important post on the survey, and fulfilled its requirements with no common ardour, integrity, and accuracy. For thirteen years he superintended a large force of computers and others, employed in carrying out the various calculations for the principal, secondary, and minor triangulation, the preparation of diagrams, the calculations of latitudes, longitudes, and meridional bearings, also the computation of distances and positions for the hydrographical office, to enable the Admiralty to project

the nautical surveys of the coast of the United Kingdom. With these scientific duties was connected the computation of trigonometrical and meridional and parallel distances for the surveys and large plans of towns. In 1844, when the Admiralty sanctioned Mr. Airy's project for the chronometrical measurement of an arc of parallel between Greenwich and Valentia Island, the professor was requested to alter his formulæ, to enable the calculations to be carried out more correctly. He accordingly supplied new formulæ, which being submitted to the most rigid tests, it was found that not only "none of the approximate processes given by the various writers on geodesy were sufficiently exact to reproduce the original assumed latitude, longitude and bearing, on carrying the calculations to the point at which they commenced," but that those of the royal astronomer's also failed to accomplish the object, "until it was found that the normal, or radius of curvature perpendicular to the meridian for the latitude of the given station, must be used in that of the determination of the second station, and the normal for the latitude of the second in the determination of that of the third, and so on, instead of using any *approximate radius*." This was ascertained by sergeant-major Young, "after repeated attempts had been made, without success, to alter or modify the various approximate processes which had been tried, so as to cause them to reproduce the assumed data, on continuing the computations to the original point; and it was then also discovered by him, that in addition to obtaining accurate results, the calculations might be materially abridged by using the normal, as it then became unnecessary to convert the difference of longitude on the assumed or fictitious sphere used in the calculations, to the corresponding difference on the spheroid."¹⁸ The reversal of the steps of these improved formulæ also gave the means of finding accurately, when the latitudes and longitudes of any two points are known, the distances between them and their reciprocal bearings. In publishing the work called 'Lough Foyle Base,' Captain Yolland acknowledged the services rendered in its progress by sergeant-major Young for various improvements in the

¹⁸ 'Lough Foyle Base,' by Captain Yolland, R.E., pp. 147-150.

calculations, and for the rigid manner in which they were prepared. It was moreover added, that to his quickness, accuracy, and skill in mathematical calculations, the survey is much indebted.¹⁹ He also afforded material aid, being Captain Yol-land's principal assistant, in the reduction and preparation for publication of the astronomical observations with the zenith sector for the determination of the latitudes of twenty-six different trigonometrical stations used in the Ordnance Survey. The published work comprises 1009 quarto pages of closely printed tabulated matter, displaying an array of results that must have cost both chief and assistant, a great sacrifice of mental energy and unwearied application to make the necessary calculations and deductions. At present Mr. Young is superintending, under an officer of engineers, the compilation and calculations for the publication of the grand triangulation of the United Kingdom, and the arcs of the meridian connected with it. In addition to these scientific duties, he has had charge of an official correspondence, and the management of large public accounts, the magnitude of which may be judged by the fact that in four years alone more than 100,000*l.* passed through his hands—50,000*l.* at least in personal payments, and the remainder in issues, through him, to other persons rendering their accounts to him for examination. This brief abstract affords sufficient evidence of the extent and responsibility of his duties, which, Colonel Hall reported, "could only have been performed, in the highly efficient manner in which they had been, by the possession on his part of great mathematical knowledge and aptitude for applied sciences." In some respect to compensate him for his invaluable services, he had, when a non-commissioned officer, been awarded the highest military rewards and allowances that the regulations permitted: viz., 4*s.* a day and an annuity of 10*l.* a year and a silver medal. These, with his sergeant-major's pay, made his annual allowances reach about 170*l.* a year, exclusive of his regimental advantages of excellent quarters, fuel, and clothing. Even this, the ultimate stretch of military reward, was wholly incommensurate with his acquire-

¹⁹ 'Lough Foyle Base,' Pref., xii.

ments and deserts; and to retain his services in the department, it became necessary that a special course should be taken to better his station in the corps. This was successful; and by the cordial and generous advocacy of Sir John Burgoyne, a commission was obtained for him to the rank of Quartermaster, by which he is placed, in a pecuniary view, in a position above the chief civil gentlemen on the survey, and on a par nearly with a second captain of royal engineers. It is not a little curious to add, that throughout his career, he was the first non-commissioned officer on all occasions selected to receive the advantage of all the additional honours and rewards conferred on the survey companies, for he was the first who received the 4s. a day survey pay, the first appointed sergeant-major, the first medallist, the first annuitant, and the first quartermaster.

Of the general merits and services of the survey companies, both General Colby and Colonel Hall, R.E., have spoken in high terms. In September 1846, the former officer, who for twenty-two years had commanded them, called attention to their peculiar habits of order, intelligence, integrity, and zeal for the public service. Had it not been for these qualifications, the great reduction in the number of officers from forty-five to nine must have been ruinous to the survey. "In fact," adds the General, "the royal sappers and miners on the survey are intrusted with the charge of difficult and important works without the advantage which other soldiers have, of being under the control of officers who have ample time to direct them in all cases requiring knowledge and consideration." Colonel Hall's testimony is an echo of the General's matured opinion. He speaks of the non-commissioned officers particularly, as being men of very superior attainments, and highly valuable to the Ordnance survey, and that when discharged, they constantly receive employments in situations of considerable trust and importance at high salaries, which they fill with credit and success. In August 1854, Colonel Hall ceased his connection with the survey, and was succeeded by Major, now Lieutenant-Colonel James, R. E. In his parting address he

warmly eulogized, in general terms, both civil and military, for the services they had rendered to the national survey, and alluded with modest pride to a few of the advantages he had obtained for those who had so faithfully served under him. "For the military," he wrote, "I have had the pleasure of procuring three important appointments: viz., a quartermaster with a high rate of working pay in addition to his regimental pay; a permanent sergeant-major, and a permanent quartermaster sergeant. These are prizes two years ago unknown in the survey companies; which, whilst tending to raise the tone of the sappers generally, should act as inducements to young men to strive to distinguish themselves for early promotion, and for meriting further indulgences."

APPENDIX.

APPENDIX.

APPENDIX I.

WARRANT FOR FORMATION OF THE FIRST COMPANY OF THE CORPS.

GEORGE R.

WHEREAS it hath been represented by the Governor, Lieutenant-Governor, and Chief Engineer of our garrison and fortress of Gibraltar, that many advantages would arise to our service if the fortifications, buildings, and repairs in that place, which are under the department of the Ordnance, were performed and carried on for the future by a military company of artificers, and that besides a saving of expense, the said company, by being subject to military command and discipline, would be more orderly and regular in their behaviour than has been hitherto experienced in the hired artificers employed there: Our will and pleasure therefore is that a company of artificers be forthwith raised, formed, and from time to time recruited with such soldiers serving in any of our regiments doing duty at Gibraltar, as may be fit for that purpose, being volunteers, and having the consent of the Colonels or Field Officers commanding such regiments respectively, or with any other men properly qualified, who shall have been bred to the trades of stonecutters, masons, miners, lime-burners, carpenters, smiths, wheelers, or gardeners, and who shall be duly enlisted in the said company, which shall not exceed the number of sixty-eight, non-commissioned officers and drummers included, with the respective pays mentioned in the establishment hereunto annexed. Our will and pleasure also is, that as soon as the said Company is raised and completed, you do cause them to be employed in performing and carrying on the fortifications, buildings, and repairs at Gibraltar, and to be instructed and paid, from time to time, by the paymaster of the Ordnance there, upon the same footing as the rest of our troops in that garrison are paid. And you are to cause such of the artificers hired in England, and now employed on the works at Gibraltar, as shall not enlist in the said company, to be sent back to England as soon as the nature of the service will admit. Our further will and pleasure is, that the said company shall be under the command and direction of the chief engineer of the said garrison for the time being,

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who is hereby appointed captain of the said company, and of such engineer or engineers serving at Gibraltar, as he shall find necessary for his assistance in the command of the said company. And we do hereby authorize you to pay, or cause to be paid, unto the non-commissioned officers and private men composing the said company, such allowance per diem for working money as you shall think fit, not exceeding two reals per diem each for the days they are actually employed on the fortifications, works, and repairs, over and above their established pay; the expense of the whole to be inserted in your estimates, and to be presented to Parliament.

Lastly, we do hereby require the Governor, Lieutenant-Governor, or Officer, commanding in our said Garrison now and for the time being, to be aiding and assisting to the utmost of their power in carrying these our orders into execution; and for so doing, this shall be as well to you, as to them, and to all others concerned, a sufficient warrant.

Given at our Court of St. James', the 6th day of March, 1772, in the 12th year of our Reign.

By His Majesty's command,
(Signed) ROCHFORD.

To our Trusty and well-beloved Councillor Henry Seymour Conway, Lieutenant-General of our Ordnance, and to the rest of the principal Officers of the same, and to the Master-General, Lieutenant-General, and the principal Officers of our Ordnance for the time being.

ESTABLISHMENT of a MILITARY COMPANY of ARTIFICERS to serve in the GARRISON and FORTRESS of GIBRALTAR.

	Per Diem.			Per Annum.		
	£.	s.	d.	£.	s.	d.
<i>Captain, Chief Engineer of the garrison for the time being.</i>						
1 sergeant, and as adjutant	0	3	0	54	15	0
3 sergeants, 1s. 6d. per diem each	0	4	6	82	2	6
3 corporals, 1s. 2d. per diem each	0	3	6	63	17	6
60 privates or working men, 10d. per diem each .	2	10	0	912	10	0
1 drummer	0	0	10	15	4	2
68 clothing, 2d. each per diem	0	11	4	206	16	8
Total	£3	13	2	1,335	5	10

APPENDIX II.

MASTERS-GENERAL of the ORDNANCE in command of the Corps, since its formation in the year 1772.

JOHN, MARQUIS of GRANBY	1 July, 1763.
GEORGE, VISCOUNT TOWNSHEND	1 Oct., 1772.
CHARLES, DUKE of RICHMOND, K.G.	1 Jan., 1782.
GEORGE, VISCOUNT TOWNSHEND	1 April, 1783.
CHARLES, DUKE of RICHMOND, K.G.	1 Jan., 1784.
CHARLES, MARQUIS CORNWALLIS, K.G.	13 Feb., 1795.
JOHN, EARL of CHATHAM, K.G.	16 June, 1801.
FRANCIS, EARL of MOIRA	14 Feb., 1806.
JOHN, EARL of CHATHAM, K.G.	4 April, 1807.
HENRY, EARL of MULGRAVE	5 May, 1810.
ARTHUR, DUKE of WELLINGTON, K.G., G.C.B., G.C.H.	1 Jan., 1819.
HENRY, MARQUIS of ANGLESEY, K.G., G.C.B., G.C.H.	1 April, 1827.
WILLIAM CARR, VISCOUNT BERESFORD, G.C.B., G.C.H.	28 April, 1828.
SIR JAMES KEMPT, G.C.B., G.C.H.	30 Nov., 1830.
SIR GEORGE MURRAY, G.C.B., G.C.H.	18 Dec., 1834.
RICHARD HUSSEY, LORD VIVIAN, G.C.B., G.C.H.	4 May, 1835.
SIR GEORGE MURRAY, G.C.B., G.C.H.	8 Sept., 1841.
HENRY, MARQUIS of ANGLESEY, K.G., G.C.B., G.C.H.	8 July, 1846.
HENRY, VISCOUNT HARDINGE, G.C.B.	8 Mar., 1852.
FITZROY, LORD RAGLAN, G.C.B.	30 Sept., 1852.

CHIEF ENGINEERS and INSPECTORS-GENERAL of FORTIFICATIONS, second in command of the Corps, from 1787. (From 1772 to 1788 the officers in command of companies corresponded direct with the Master-General and Board.)

General SIR WILLIAM GREEN, BART.	15 Nov., 1786.
,, ROBERT MORSE	1 May, 1802.
,, GOTHER MANN	23 July, 1811.
Major-General SIR ALEXANDER BRYCE, C.B., K.C.H.	28 Oct., 1829.
,, ROBERT PILKINGTON	5 Oct., 1832.
Lieutenant-General SIR FREDERICK MULCASTER, K.C.H.	July, 1834.
,, SIR JOHN FOX BURGOYNE, G.C.B.	July, 1845.

LIEUTENANT-GENERAL of the ORDNANCE.

General SIR HEW D. ROSS, K.C.B., during the absence of LORD RAGLAN in Turkey	2 May, 1854.
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APPENDIX III.

ADJUTANTS and BRIGADE-MAJORS of the CORPS at HEAD-QUARTERS,
from 1795.

Lieutenant JOHN ROWLEY	Adjutant	15 May, 1795.
Captain JOHN THOMAS JONES	„	1 Jan., 1807.
„ GILBERT BUCHANAN	„	1 July, 1809.
„ RICE JONES	„ afterwards } Brigade-Major	1 Feb., 1812.
„ FRANK STANWAY	Brigade-Major	8 June, 1830.
„ EDWARD MATSON	„	14 Feb., 1831.
„ HENRY SANDHAM	„	24 May, 1841.
„ JOHN WALPOLE	„	1 June, 1848.
„ FREDERICK AUGUSTUS YORKE	„	17 Feb., 1854.

ACTING ADJUTANTS at WOOLWICH to assist the BRIGADE-MAJOR.

Lieutenant ROBERT DASHWOOD	9 Nov., 1835.
„ FREDERIC AUGUSTUS YORKE	4 Nov., 1839.
„ THEODOSIUS WEBB	1 Aug., 1844.
„ GEORGE ROSS	16 July, 1846.
„ FITZROY SOMERSET	1 April, 1852.
„ FRANCIS EDWARD COX	29 May, 1854.

DIRECTORS ROYAL ENGINEER ESTABLISHMENT at CHATHAM from its for-
mation in 1812.

Major CHARLES WILLIAM PASLEY	23 April, 1812.
Colonel SIR FREDERIC SMITH, K.H.	1 Jan., 1842.
„ HARRY D. JONES	1 May, 1851.
„ HENRY SANDHAM	Feb. 1855.

ADJUTANTS of the CORPS at CHATHAM.

Second-Captain JOHN M. F. SMITH	1 Dec., 1812.*
„ RICHARD ZACHARY MUDGE	21 Mar., 1815.
„ WILLIAM REID	13 Mar., 1816.
„ HARRY DAVID JONES	22 April, 1824.
„ EDWARD MATSON	14 Jan., 1826.
„ JOSHUA JEBB	14 Feb., 1831.
„ HENRY SANDHAM	1 Aug., 1837.
„ MONTGOMERY WILLIAMS	24 May, 1841.
„ ST. GEORGE V. WHITMORE	1 May, 1843.
„ JAMES LYNN	18 June, 1846.
„ CHARLES FANSHAWE	26 Jan., 1847.
„ ST. GEORGE ORD	1 Jan., 1852.
„ FITZROY SOMERSET	17 Feb., 1854.

* Appointed Assistant-Director, 16 March, 1815.

APPENDIX IV.

- SUB-LIEUTENANTS.
- Date of Appointment, 1806.
- Dec. 1. JOHN PALMER, died at Chatham March 9, 1814, aged 77.
- „ JAMES SMITH, died at Portsmouth October 10, 1828, aged 84.
- „ WILLIAM BROWNE, died at Devonport February 21, 1833, aged 85.
- „ ANTHONY HAIG, died at St. Helier's, Jersey, January 9, 1836, aged 88.
- „ JOHN EAVES, died in 1851, aged 89 years.
- 1807.
- June 1. DAVID FALCONER, died at Elgin May 20, 1833, aged 62.
- Nov. 12. ROBERT DAVIE, was commissioned into the corps from the rank of quartermaster-sergeant in the royal artillery, in which he had enlisted in April, 1778. Served at the siege of Cadix and battle of Barrosa. Was a few years on the recruiting service in Ireland, and enlisted upwards of 1,200 recruits for the corps. Died at Woolwich March 22, 1830, and the humble stone which marks the spot where his remains lie, alludes, with excusable particularity, to the fact of his success on the recruiting service.
- „ GEORGE ROBINSON, died at Carlisle October 8, 1821.
- 1809.
- May 22. CHARLES MILLAR, died at Devonport March 10, 1832.
- 1811.
- June 1. THOMAS LONGSHAW, died September 29, 1825.
- „ ALEXANDER MUNRO, died at Stepney January 19, 1834.
- „ ALEXANDER ROSS, died at Nairn February 7, 1826.
- „ JOHN DUNBAR, died at Guernsey March 23, 1812.
- „ JOHN SMITH, was much employed on the recruiting service. In 1812, when the disturbances took place at Manchester, General Dirom ordered the recruiting parties of artillery and sappers to be placed under his orders, with six field-pieces from Lord Grey's, to assist in keeping the malcontents in order. His conduct was much praised on the occasion, and General Dirom made a report of it to the Commander-in-Chief.
- „ PATRICK WHELAN, died at Kildare May 21, 1825.
- „ ROBERT GIBB, served at Ciudad Rodrigo and Badajoz, also in the operations in East Catalonia, including the siege of Tarragona, and was afterwards at Genoa and Gibraltar. Died at Lochee, September 4, 1828.
- July 1. DESKFORP CHARLES, from sergeant-major royal artillery, in which he had served nearly twenty-one years, and was present at Dunkirk and Nieuport in 1793, and the action of May 18, 1794. Died at Gillingham December 7, 1847, aged 80.
- „ CHARLES BOOTH, died at Freinada March 4, 1813.
- „ ALEXANDER W. WALLACE, from royal artillery, in which he had served fifteen years, and was in the West Indies from 1796 to 1802. In the sappers he was wounded at Badajoz. He was also at San Sebastian, Bidassoa, Nivelles, bridge on the Adour, and Bayonne. Five years also he served at St. Helena while Napoleon was an exile.

Date of
Appointment.

- July 1. **STEWART CALDER**, from royal artillery. Was present at the siege of Cadiz and the actions in the Pyrenees, Bidassoa, Nivelle, Nive, Orthes, Toulouse, and Algiers, where he was wounded. Died at Carlisle October 16, 1822.
- 1812.
- Mar. 16. **RICHARD TURNER**, served in the Peninsula, including Vittoria and San Sebastian, also at Waterloo. Died at Gibraltar July 16, 1825.
- April 8. **JOHN SPARKS**, served eighteen years in the royal artillery, during which time he was present at Maida, Mount Leon, Scylla Castle (wounded), storming of Alexandria, and wounded at the siege of Rosetta; was also at the bombardment of Scylla in 1808, and capture of Ischia and Procida in 1809. In the sappers he served in the Netherlands and France and at Bermuda. He had two sons, John and Edward, educated at Sandhurst, who received commissions in the army, first as ensigns and afterwards as lieutenants. The former joined the 5th foot, from which he exchanged into the 95th, and afterwards selling out, obtained a majority in the Canadian militia during the Papineau rebellion. He perished in October, 1843, in an attempt to reach the shore from a vessel driven in a storm on the coast near Blackpool. The latter served an honourable career in Scinde, &c., in the 2nd foot, and with a young lieutenant and a military surgeon was, in 1839, while out shooting, burnt to death by the accidental firing of the jungle.
- July 1. **WILLIAM ROBERTSON**, served in Holland in 1799, Hanover in 1805.
- Dec. 1. **CHARLES GRATTON**, commissioned from 3rd foot-guards for his bravery at Burgos. Served in the actions of the 8th and 19th September, and 2nd and 6th October, 1799, in Holland. At the last he was wounded. Also in Hanover; at the passage of the Douro, Talavera, Busaco, Fuentes d'Onoro, Ciudad Rodrigo, Salamanca, and Burgos. In the sappers he was at San Sebastian, Pampeluna, passage of the Adour, and siege of Bayonne, and also in the Netherlands and France. Died at Deptford July 4, 1848.
- [The above officers, with the exception of Lieutenants Palmer and Booth, retired from the corps on full-pay March 1, 1817.]
- 1813.
- Feb. 1. **HUGH BAILLIE M'KENZIE**, enlisted into the corps January 17, 1809, was sergeant June 1, 1811, and from that rank received his commission. Talented, energetic, and soldierlike, he filled for a time the office of Town Major at Bermuda. After retiring from the corps on full-pay in June, 1817, he held for many years the rank of paymaster in the 77th regiment, and subsequently in the 70th, from which he retired on half-pay in March, 1853, and died June 25, 1854.
- Mar. 1. **JAMES A. STEPHENSON**, enlisted June 6, 1809; served in the war in Canada; retired on full-pay December 1, 1817, and died at Niagara June 11, 1828.
- April 1. **WILLIAM STRATTON**, from royal artillery, in which he had served at Valenciennes, Dunkirk, Lincelles, Lannoi, Cateau, Camp of Cesar, Tournai, and the actions of the 17th, 18th, and 22nd May, 1794, near Lille, also at Nimeguen, where he was wounded. In Turkey he was at Salahieh, Baalbec, and Grand Cairo. After joining the sappers he was at San Sebastian, Nivelle, Nive, bridge on the Adour, Bayonne, and storming of Peronne, where he was wounded severely, and for which he received six months' pay. Retired on full-pay March 1, 1817, and died at Devonport September 27, 1851.

Date of
Appointment.

- July 1. **THOMAS ADAMSON**, enlisted in May, 1796, as a drummer, was commissioned from the rank of sergeant, and killed at the storming of Bergen-op-Zoom March 8, 1814.
- „ **WILLIAM KNAPP**, commissioned from a militia regiment, in which he held the rank of lieutenant, and died at Tournay June 17, 1815.
- 1814.
- Jan. 14. **EDWARD SANDERS**, commissioned from the Cornish miners, in which he was the sergeant-major; served in the Netherlands and France. After retiring on the 1st March, 1817, on half-pay, he went to France and engaged largely in the coach trade. During the revolution which dethroned Charles X. the vehicles of Mr. Sanders were broken up for barricades, and his horses plundered for the service of the insurgents. His stock in trade was worth about 8,000*l.*, but the wholesale destruction of his property by the rebels, ruined him. Subsequently he earned a scanty living by translating for a printer at Boulogne French works into English, and died in almost abject circumstances in 1851.
- Mar. 21. **PATRICK JOHNSTON**, from royal artillery, in which he served eighteen years. Was in the actions at Antrim and Ballynahinch in 1798; also at Roleia, Vimiero, Madrid, Benevento, Astorga, Corunna, two sieges of Badajoz (wounded), Salamanca, Burgos, Vittoria, and San Sebastian. In the sappers he received the thanks of Sir James Carmichael Smyth for bringing up his company by a forced march, under peculiar circumstances, from Antwerp to Waterloo on the 18th June, 1815. Retired on half-pay March 1, 1817, and died at Stirling Castle, September 7, 1833.
- „ **JAMES ADAM**, from royal artillery; while in that regiment he served with the Turkish army at Salahieh, Baalbec, Elhanka, and Grand Cairo; he was also present at Walcheren. In the sappers he was at the bombardment of the French fleet at Antwerp in 1814, and served subsequently in Belgium and France. Retired on half-pay March 1, 1817, and died at Barrie, Canada West, January 20, 1845.
- 1815.
- Mar. 25. **JOHN ARMSTRONG**, enlisted July 7, 1806, and served at Copenhagen and Walcheren; was commissioned from the rank of colour-sergeant on the recommendation of Colonel Pasley. Retired on half-pay March 1, 1817. In April, 1819, he *enlisted* into the 2nd dragoons, but his previous rank having been discovered while he was serving as a lance-corporal, he was discharged in August, 1823. Died at Cork December 1, 1831.
- April 1. **JOHN HOYLAND**, from royal artillery, was present in the actions of Aboukir, siege of Aboukir Castle, and battle of Alexandria. Retired on half-pay, March 1, 1817.
- „ 22. **SAMUEL McLEAN**, from royal artillery. Was present at the battle of Corunna, and retired on half-pay March 1, 1817.
- Oct. 2. **MICHAEL KNOWLES**, from royal artillery. Served at Flushing, two sieges of Tarragona, and at Fort St. Philip. Retired on half-pay March 1, 1817.
- Nov. 1. **WILLIAM STEVENS**, joined as a sergeant from the Royal Cornwall miners. Served at the bombardment of the French fleet at Antwerp and the storming of Bergen-op-Zoom, in 1814. Was promoted to be colour-sergeant for his gallantry at Merxam, in erecting a magazine under a spirited fire from the enemy. Retired on half-pay March 1, 1817, and died at Penzance November 21, 1851.

Date of
Appointment.
1814.

QUARTERMASTERS.

Feb. 1. **JAMES GALLOWAY.** He discharged the duties of his appointment with singular correctness and efficiency to the end of his days, and died at Belle-vue House, Shooter's Hill, November 9, 1835, aged 65 years. His only son is the senior colonel of the 70th regiment.

1835.

Nov. 9. **JAMES HILTON,** retired on full pay January 13, 1848.

1848.

Jan. 14. **JENKIN JONES .** }

1853.

April 1. **GEORGE ALLAN .** }

„

WILLIAM YOUNG }

Still serving in the corps.

COMMISSIONED INTO OTHER CORPS.

1796.

May 1. **JOHN JOHNSTON,** enlisted March 13, 1788, and attached to the Portsmouth company. Was commissioned in the 29th foot as ensign.

Oct.

GEORGE ROSS, enlisted July 31, 1788, and attached to the Gosport company. Was appointed lieutenant in the Carnarvon militia.

1799.

May 22. **MATTHEW SINGLETON,** enlisted into the corps as sergeant-major, September 10, 1798, and promoted to the 46th regiment as quartermaster.

1828.

Jan. 24. **THOMAS TOWNSHEND,** commissioned as second lieutenant and adjutant of the second battalion 60th regiment. Ultimately he received a captaincy in the same regiment. A few years later he sold out, and is now a barrackmaster in the Ordnance department at Gibraltar.

1851.

Sept. 23. **EDWARD HILL** possessed very creditable attainments. His duties, either as a clerk or as an overseer, were always executed with diligence and efficiency. Sir William Reid, under whom he was employed at Woolwich, praised him for his exertions and services. Ambitious and enterprising, he accepted the adjutancy of the Gold-Coast corps, and filled, in addition to his regimental offices, the appointments of colonial engineer, and clerk of works in the royal engineer department. In three or four expeditions against neighbouring chiefs, his military acquirements were found of great advantage in directing the formation of camps and the construction of roads and bridges. Once he commanded, at Mansu, a body of 12,000 fighting men, gathered from the native tribes in alliance with the British Governor; and, a little later, he had under his orders four field-pieces and an army of 21,000 men, 18,000 of whom bore arms. His head-quarters were at Yancoomassie, and his force—distributed as far as Douguah, with divisions intermediately at Wartett and Donasi—carried out, under his personal orders, the field services necessary to render the movements of the contingents unchecked and successful. The army, intended to bring the king of Ashantee to terms, had the effect of inducing that powerful chief to accept, without a blow, the ultimatum of the Governor. Early in the next year Adjutant Hill was detached to Accra, to defend the Christian-burg castle against an armed body of natives who menaced it. With his usual spirit and bravery he set about the work, and

Date of
Appointment.

met his fate on February 22, 1854 (a few days after he was commissioned to be lieutenant), by the explosion of a small powder magazine while he was in the act of firing a gun upon the enemy. His employment in the colony was noticed in honourable terms in 'The Globe' for January, 1853. "Yesterday," wrote Colonel Hill, the Governor, "the service lost a gallant, zealous, and most energetic and useful officer, by the demise of my valued adjutant, to whose memory much praise is due for the very efficient manner he ever performed his onerous duties in this trying climate, and to whom myself and the service are much indebted for his valuable and faithful services." His widow, through the feeling appeal of Colonel Hill, received the Queen's Bounty of 60*l.* a-year; and from the Compassionate Fund, an allowance of 40*l.* a-year for her three infant children.

1854.
Oct. 6. **JOHN JOSEPH GRINLINTON**, commissioned as ensign in the 65th regiment, and afterwards removed to the 4th King's Own, with a view to render his sound practical intelligence and experience available in the Crimea. During his short career as an officer he has won golden opinions from his own circle and his commanding officers. Indeed it would seem that his connexion with the ranks has rather helped to increase than diminish his success, and the appreciation evinced for his exertions and efficiency. On his transfer to the 4th foot, his commanding officer officially stated, that his removal would be a loss to the 65th depôt. In less than six months after doffing the uniform of a non-commissioned officer, he received promotion as lieutenant, March, 1855; and in allusion to this rise, his former commanding officer, in a congratulatory letter, made this gratifying observation: "I frankly tell you that you carry under your head-piece the makings of a good officer."

APPENDIX V.

SERGEANT-MAJORS.

1772.
May 22. **THOMAS BRIDGES**, enlisted into the 30th regiment in 1751, from which he was transferred to the corps at Gibraltar as sergeant-major. During the siege he was reduced to the rank of private, and discharged October 10, 1781.
1781.
Sept. 29. **HENRY INCE**, was born in 1737. In 1754 he enlisted into the 2nd foot, from which he joined the corps on June 26, 1772. For his distinguished conduct at the siege of Gibraltar, he received the rank of sergeant-major. He was the projector of the celebrated galleries at the Rock. In 1791 he was discharged, but continued in the department as overseer of works. On February 2, 1796, he was commissioned as Ensign in the Royal Garrison Battalion, and on March 24, 1801, Lieutenant. In 1802 the regiment to which he belonged was disbanded. Some time afterwards he left the Rock, and died at Penzance in June, 1809, at the age of 72.

- Date of
Appointment.
1787.
- Oct. JOHN DREW, joined at Woolwich as sergeant-major from royal artillery. He was the first soldier that entered the English corps of military artificers. On May 1, 1795, he was commissioned to be Second-Lieutenant in the invalid artillery, from which he retired in March 1819, and died at Woolwich, November 9, 1830. One of his daughters married the late Mr. Byham, secretary to the honourable board of Ordnance, and one of his grand-daughters married the Prince de Castelcicala, the late minister plenipotentiary for Sicily.
- Nov. 1. JOHN SIPPLE, a native of Hesse-Cassel, born in 1740, joined from the royal artillery and was attached to the Portsmouth company. In June, 1791, he was transferred to the invalid artillery.
- " 4. CHARLES PALMER, from royal artillery as sergeant-major; was attached to the Chatham company, and commissioned as Sub-Lieutenant December 1, 1806.
- " 19. ALEXANDER SPENCE, was born in 1726, and enlisted into the 20th foot January 16, 1756. After a service of nineteen years in that regiment, and fourteen as sergeant in the North Hants' militia, he joined the corps as sergeant-major at the age of 61 years. After a further service of twenty-one years in the Gosport company, he committed suicide January 11, 1809, aged 83.
- " JOHN HOPKINS, joined the Plymouth company as sergeant-major, and died there March 1, 1788.
- 1788.
- Mar. 2. WILLIAM BROWNE, enlisted into the royal artillery in 1770, in which he became a sergeant-major in 1783. With that rank he joined the Plymouth company, and was commissioned as Sub-Lieutenant December 1, 1806.
- " ANTHONY HAIG, enlisted as a matross, in 1770, into the royal artillery. Served in Canada from May, 1773, to November, 1787, and was at the siege of Quebec, where he was wounded, and favourably mentioned for his gallant conduct in general orders by Lord Dorchester. In 1788 he joined the Guernsey half company, and in 1795 was highly complimented by General Small for his efficient services in training and drilling the royal Guernsey cavalry. On December 1, 1806, he was commissioned to be Sub-Lieutenant.
- 1791.
- June 1. JAMES SMITH, after a service of twenty-four years was transferred from the royal artillery, as sergeant-major, and attached to the Portsmouth company, in which he was made Sub-Lieutenant December 1, 1806.
- Nov. CHARLES MILLAR, enlisted in March, 1778, in the royal artillery, and served at the siege of Gibraltar. Was transferred to the corps, as a corporal, in July, 1788, and became sergeant-major of the Jersey half company. In October, 1797, he was discharged and appointed overseer in the department at Jersey, in which situation he continued until May 1809, when he was made a Sub-Lieutenant.
- " JOSEPH CHAMBERS, in September, 1770, he enlisted into the 2nd foot, from which he was removed into the corps on September 21, 1772, and served at the siege of Gibraltar. In December, 1796, he was discharged and ended his days in a lunatic asylum.

Date of
Appointment.

1793.

Nov. **JOHN FINLAY**, enlisted July, 1788, and accompanied the expedition to Holland as sergeant-major. On December 24, 1794, he was reduced to a private, and on his return from Flanders was sent to the West Indies, and died April 20, 1797, on board the 'Orpheus' transport.

1794.

Jan. 1. **MATTHEW HOEY**, served seven years in the royal marines. Enlisted in the corps April 28, 1788, and sailing, late in 1793, with the expedition to the West Indies, was present in almost every action and capture which took place there up to the year of his decease, which occurred at Barbadoes on July 14, 1810.

1795.

Jan. **ANDREW GRAY**, in 1793 accompanied the expedition to Holland, and served in the campaigns of the Duke of York until 1795. He succeeded to the sergeant-majorcy of the Flanders' company on the reduction of John Finlay, and was promoted on November 19, 1801, to the corps of surveyors and draughtsmen.

May 11.

THOMAS FORTUNE, enlisted as a matross, in July, 1761, in the royal artillery, and was discharged and pensioned from that regiment in October 1783. On May 1, 1795, he enlisted into the royal military artificers, at the age of 52, and died at Canterbury August 10, 1799. Was known as the author of a small work called "The Artillerist's Companion," published by Egerton in 1786.

1796.

Dec. 1. **JOSEPH MAKIN**, joined the royal artillery December 30, 1768; from the second battalion of which, he was transferred to the corps at Gibraltar May 21, 1774, and served at the siege of that fortress. In July, 1804, he was superannuated.

1799.

May 15. **JOHN EAVES**, was a native of Bremen, in Hanover, and enlisted October 15, 1773, as a drummer in the royal artillery. His promotions were, first gunner, August 1, 1779; bombardier, August 1, 1781; corporal, July 1, 1791; and sergeant, November 1, 1793. His active services were at Gorce, from 1779 to 1781; Gibraltar, July 1783, to November 1785; West Indies, from December 1785, to May 1790; and the campaigns in Holland, from February 1793, to May 1795. He joined the corps as sergeant-major, and from his fine soldier-like appearance, experience, and knowledge of drill, was retained for duty at Woolwich; and, sometimes, during the absence of the adjutant, carried on the duties of the chief executive of the corps. Became sub-lieutenant December 2, 1806.

1800.

May 2. **JAMES SHIRRES**, served many years at Gibraltar. Was a skilful mechanic and modeller, and promoted to be sergeant-major of the Minorca company. On December 31, 1804, he was discharged and appointed overseer of works in the royal engineer department at Plymouth.

1802.

April. **MATTHEW PRIDEAUX**, appointed to the half company at Guernsey, where he died Nov. 6, 1803.

1803.

Mar. 1 **EDWARD WATSON**, enlisted in the artillery as a matross January 28, 1775, and joined the corps at Woolwich March 1, 1792. Was a very ingenious artificer and an experienced foreman. In

Date of
Appointment.

- 1799 he accompanied the expedition to Turkey, and served with the Grand Vizier's army until 1802. In consequence of his services with the mission he was appointed sergeant-major of the Woolwich company, and discharged on December 1, 1810.
- Nov. 1. **DAVID FALCONER**, became sub-lieutenant in June, 1807. The whole of his service was passed at Gibraltar.
- 1804.
- Oct. 5. **JOHN LEVICK**, joined as an artificer from the artillery in April, 1791. Was sergeant-major of the company at Spike Island, where he died April 22, 1805.
- 1806.
- Oct. 3. **WILLIAM BISHOP**, joined the corps as a sergeant from the artillery in October, 1805, when he was attached to the Spike-Island company, from which he was pensioned at 2s. 1d. a-day, on December 31, 1814.
- 1807.
- Jan. 1. **ROBERT WAKEMAN**, enlisted into the corps April 2, 1789, and on May 1, 1789, was promoted to be sergeant. Four years he served as sergeant-major of the company at Plymouth, and died there April 15, 1811.
- „ 12. **JOHN CUTTERIDGE** had been two years in the 46th regiment, and enlisted into the royal military artificers, January 8, 1807. Many years of his service were spent at Cambridge in recruiting for the corps. In March, 1821, he was appointed quartermaster-serjeant, and in February, 1824, pensioned at 3s. 6d. a-day.
- Mar. 2. **GEORGE ROBINSON**, from the artillery as sergeant-major, and commissioned as sub-lieutenant November, 1807.
- July 1. **THOMAS LONGSHAW**, enlisted July 19, 1793. For many years he served in Halifax, Nova Scotia, and was an able mechanic and assiduous foreman. He became a sub-lieutenant in June, 1811.
- Aug. 1. **ALEXANDER MUNRO**, was five years in the royal artillery, and transferred to the corps August 1, 1803. In January, 1805, he was promoted to be corporal, and in June, 1806, to be sergeant. He was a man of considerable ingenuity and talent, and for his services and useful inventions was made sergeant-major. On the formation of the establishment for field instruction at Chatham he was removed there to assist the director, and was commissioned as sub-lieutenant in June, 1811.
- Aug. 1. **JOSEPH FORBES**, enlisted in the corps August 3, 1797, was promoted to be corporal March 1, 1803, and sergeant March 1, 1805. Being a skilful mason, his efficiency on the works frequently gained for him the praise of his officers. From sergeant-major of the Dover company he was selected, on account of his attainments, to accompany the expedition to Walcheren, and, after serving at the siege of Flushing, died at Middleburgh, September 17, 1809.
- Oct. 1. **RICHARD TURNER**, enlisted November 17, 1798, and gained the rank of sergeant in February, 1806. Most of his service was spent at Gibraltar. Became sub-lieutenant in March, 1812.
- 1808.
- Jan. 1. **JAMES GALLOWAY**, joined from royal artillery. The excellence of his conduct, and his imposing soldier-like appearance, won him the appointment of regimental sergeant-major. His efficiency in the office was quite a feature in his day; and in the absence of the adjutant he carried on the official business of the corps

Date of
Appointment.

- by corresponding with the commanding officers at the different stations. He was promoted to be quartermaster February 1, 1814.
- Dec. 1. **JOHN BLACK**, enlisted July 24, 1790. Was sergeant-major to the Guernsey half company. At the close of the war was appointed quartermaster-sergeant.
- 1809.
- April 3. **ALEXANDER ROSS**, enlisted January 7, 1789. Was both a carpenter and mason, and a valuable foreman. Was removed from Guernsey to be sergeant-major to the Portsmouth company, and commissioned in June, 1811, as sub-lieutenant.
- July 10. **JOHN SMITH**, from royal artillery, as corporal, December 31, 1807, in which he had served ten years, and was wounded in action near the Seven Churches, county of Wicklow, in June, 1798. After his promotion to be sergeant-major, he was attached to the Walcheren expedition, and was present at the siege of Flushing. In June, 1811, he was made a sub-lieutenant.
- 1811.
- Jan. 1. **JOHN DUNBAR**, enlisted March 23, 1793, and in June, 1811, was commissioned as sub-lieutenant.
- „ **PATRICK WHELAN**, joined from the 68th foot in June, 1803, as a corporal, and, serving many years with the corps in the West Indies, was present in many actions and captures. In June, 1811, he became a sub-lieutenant.
- „ **ROBERT GIBB**, enlisted March 1, 1804, and in June, 1811, received a sub-lieutenancy.
- June 1. **GEORGE POE**, enlisted December 1, 1791. Served most of his time on the works at Portsmouth. Was present at Oporto and Talavera in 1809. On his return from the Peninsula was promoted to be sergeant-major. In February, 1819, he was pensioned at 2s. 3d. a-day, and died at Woolwich, in December, 1848.
- 1812.
- May 1. **THOMAS HOUNSLOW**, served at Flushing, Cadiz, and Barrosa. For his efficiency and zeal, Colonel Ford, royal engineers, presented him with an elegant sword. Pensioned at 2s. a-day, in March, 1817, he went to Canada, and obtained the appointment of foreman in the royal engineer department. About 1848 he died in London. A son of his, during the Papineau rebellion in Canada, was lieutenant and adjutant in the Beauharnois Loyal Volunteers. He did good service during the outbreak, and was taken prisoner by the rebels in November, 1848. He is now clerk of works in the royal engineer department at the Mauritius.
- 1815.
- Apr. 1. **JOHN CRAIG**, died at Woolwich September 15, 1815.
- Oct. 23. **JAMES DOUGLAS**, enlisted September 1, 1806. Was second-corporal, September 2, 1810; corporal, February 1, 1811; sergeant, August 1, 1812. Served at Roleia, Vimiera, Torres Vedras, Ciudad Rodrigo, Badajoz, Vittoria, San Sebastian, Bidassoa, Nivelle, Nive, Orthes, Toulouse, and Waterloo, besides in numerous lesser affairs. He was an excellent artificer and a brave soldier. In moments of danger his presence of mind and facility of resource and invention made his services valuable. He died at Woolwich November 9, 1827.
- 1821.
- Mar. 1. **THOMAS TOWNSEND**, enlisted May 6, 1812. Was second-corporal, February 1, 1813; corporal, December 9, 1813; sergeant,

Date of
Appointment.

August 12, 1814; and colour-sergeant, April 1, 1816. Served a station at Gibraltar. Was a very fine soldier and a successful drill-master. For seven years he was the regimental sergeant-major at Chatham, and was commissioned as second lieutenant and adjutant in the 60th rifles in January, 1828.

1827.

Nov. 10. **JAMES HILTON**, served with credit in Holland in 1813 and 1814, and in the Netherlands and France to 1818. Was sergeant-major of the corps in France, and afterwards at Woolwich. Became quartermaster in 1835.

1828.

Feb. 1. **JENKIN JONES**, served a station at Barbadoes, and many years at the royal engineer establishment at Chatham. Was always an indefatigable and enterprising non-commissioned officer, and no man in the corps, perhaps, has been subjected to, and escaped without hurt, so many dangers. The innumerable experiments in mining, blasting, sapping, and the varied applications of gunpowder at the establishment in which he was engaged, were frequently not only attended with great hazard but accident. His particular services have been mentioned in the memoir. In 1848 he was appointed quartermaster to the corps.

1835.

Nov. 10. **JAMES FORBES**, mentioned in the Memoir. Retired from the corps on a pension of 2s. 4d. a-day, in April, 1843, having received an appointment on the Trent and Mersey Canal.

1843.

Apr. 12. **GEORGE ALLAN**, served a station at Gibraltar. Was a very successful drillmaster. His promotion as sergeant-major took him to Chatham, where his exertions and experience were of advantage in the practical education of the men in the field duties of the corps. As a reward for his services he received the commission of quartermaster to the royal engineer establishment.

1848.

Feb. 1. **MICHAEL BRADFORD**, serving at Woolwich.

1853.

Apr. 1. **WILLIAM READ**, serving at Chatham.

1854.

Aug. 1. **JOHN J. GRINLINTON**, in the space of ten years became sergeant-major of the survey companies. Well educated, clear-headed, and accurate, he was intrusted with duties of great responsibility. For several years he annually disbursed about £24,000 on the public service; and such was his physical activity and mental strength, that no amount of labour seemed to tire or weaken his energies. In the absence of his officers on particular duty, he acted with intelligence, decision, and firmness in emergencies and difficult cases. It was these capabilities, coupled with his gentlemanly manners, address, and deportment, that induced Colonel Hall, the superintendent of the ordnance survey, to bring forward his merits, to obtain for him a commission in the line. In this he succeeded. The Colonel stated, in his official recommendation of sergeant-major Grinlinton, that his ability could be turned to good account in a regiment by instructing young officers in the mode of sketching ground, describing localities and positions, and in various other staff duties essential for the movements of an army across a country. Being a good surveyor and draughts-

Date of
Appointment.

man, and possessed of the peculiar attainments to render him successful in services of reconnaissance, he was regarded as specially adapted for a post in the Quartermaster-General or Adjutant-General's department of the army. In October, 1854, he was commissioned as ensign in the 65th regiment; and a few officers, under whom he had served, presented him with a purse of forty sovereigns, accompanied by a letter full of expressions of eulogy and esteem.

Oct. 6. **JAMES STEEL**, serving on the ordnance survey at Southampton.

QUARTERMASTER-SERGEANTS.

1811.
June 1. **FRANCIS ALLEN**, enlisted July 6, 1793. Was present at the siege of Flushing. Most of his time was spent at Chatham; and, after a service of forty years, he was pensioned at 2s. 8½d. in October, 1833. He has two sons in the royal engineer department—one a clerk of works in the London district, and the other a foreman of works.
- „
1814. **GEORGE HARDIE**, after thirty years' service was discharged in March, 1817.
- July 1. **JOSEPH PAUL**, gained his several steps of promotion with great rapidity, and died after seven years' service, at Truro, in May, 1815.
- June 1. **GEORGE HAY**, served thirteen years in the corps, and died at Woolwich, in November, 1820.
- „
1821. **JOHN BLACK**, after a service of twenty-eight years was discharged in February, 1819, and died some years after at Chatham.
- Mar. 1. **JOHN CUTTERIDGE**, on his removal from the recruiting service at Cambridge was found to be about 900*l.* in debt. Aberration of mind followed the discovery, and he was pensioned in February, 1824, at 3s. 6*d.* a-day.
1824.
Mar. 1. **WILLIAM PARKER**, was a man of varied information and a clever clerk. After twenty-five years' service he was discharged in September, 1829.
1829.
Oct. 1. **BRITTON FRANCIS**, was an able clerk, served many years at Gibraltar, and received much credit for his abilities and efficiency. Six years he filled the office of quartermaster-sergeant at Woolwich, and was discharged in October, 1835. He died at Newport, in 1851.
1835.
Oct. 14. **JOHN BENNETT** was discharged in January, 1843, after twenty-eight year's service, and received a lucrative appointment under the surveyor-general of prisons. He died at Dartmoor prison, February 23, 1853, where he held the office of steward, at a high salary.
1841.
Aug. 1. **THOMAS FRASER**, was discharged in July, 1849, and retired as a farmer to Kinlochunagan, Inverness.
1843.
Jan. 11. **ROBERT SHORTER**, was discharged in January, 1850, and is now a yeoman of the Queen's guard.
1849.
July 11. **WILLIAM RALPH**, served at the Cape of Good Hope and Gibraltar for fourteen years. Was an active and intelligent non-commissioned officer. He was removed from Gibraltar, where he held the office of acting sergeant-major, to Chatham, on promotion, and was presented by the non-commissioned officers of the corps at that fortress with a silver snuff-box, as a tribute of esteem for his character and impartiality.

Date of
Appointment.

1850.
Jan. 9. **THOMAS CONNOLLY**, serving at Woolwich.
1854.
May 16. **SAMUEL MARCH**, serving at Chatham.
Oct. 6. **JAMES SIMPSON**, at Southampton, on the ordnance survey.

BUGLE-MAJORS.

1811.
June 1. **JAMES BAILEY**, enlisted Aug. 1, 1797. Served in Holland in 1799. Was first drum-major, and a few years afterwards was appointed bugle-major. In July, 1835, he was discharged, and died at Guernsey, about 1849.
1835.
July 8. **DAVID YOULE**, serving at Woolwich.

APPENDIX VI.

ANNUITIES and MEDALS to STAFF-SERGEANTS and SERGEANTS for distinguished or meritorious Services.

		Annuities.	
1846.	Jan. 1. Sergeant-major JENKIN JONES	£. 20	}
"	Quartermaster-sergeant ROBERT SHORTER . . .	10	
"	Colour-sergeant JAMES YOUNG	10	
"	Colour-sergeant WM. BLACK . . .	10	
1848.	Jan. 14. Colour-sergeant WM. YOUNG . . .	10	}

Was distinguished in the discharge of his duties in the West Indies, and at Chatham and Woolwich. Relinquished the annuity on being commissioned to the rank of quartermaster in the corps.

For zealous and efficient services both at home and abroad. Was fourteen years at Corfu.

For distinguished conduct in action with the Boers at Natal, and for highly efficient services and coolness in the defence of the position during its protracted siege by the Boers.

For devoted services at Corfu, Gibraltar, and Halifax, N.S.; and particularly so on the Euphrates expedition and in the Syrian campaign. Was present at the taking of Beirout and Acre.

For valuable services in connexion with the varied calculations pursued on the ordnance survey. Relinquished the annuity on being commissioned to the rank of quartermaster.

		Annuities.	
		£.	
1848.	Sergeant THOMAS CONNOLLY .	10	}
1853.	Colour-sergeant WM. CAMPBELL	10	
„	Bugle-major DAVID YOULE .	10	

For service in the brigade-major's office at head-quarters.
 For distinguished services in prosecuting the ordnance surveys of Great Britain and Ireland.
 For long service, well-directed zeal in the discharge of his duties, and proficiency in conducting the band.

APPENDIX VII.

REWARDS to NON-COMMISSIONED OFFICERS and SOLDIERS of the CORPS, from public or private sources, for particularly commendable services.

- 1831 Second-corporal HENRY SCRAFIELD. From Royal Humane Society. A reward of 2*l.* for endeavouring to rescue from drowning, five boys who had fallen into the Mulgrave Reservoir at Woolwich. For his spirited and humane conduct on this occasion, he was also promoted to be second-corporal.
- 1833 Sergeant JAMES FORBES. From the Governor, Royal Military College, Sandhurst. A case of mathematical drawing instruments, "for his intelligence, zeal, and good conduct, in charge of the detachment employed in the field-work instruction at the college for four years."
- 1835 Private JOHN DOWN. From his officers at Chatham. A hold-all, containing a silver knife, fork and spoon, and useful toilet articles, with an appropriate inscription on a silver plate, "for his gallant conduct in rescuing a comrade, private Thomas Adams, from drowning."
- 1835 Sergeant-major JAMES HILTON. From the officers of royal engineers at Woolwich. A purse of 20 sovereigns, and a regimental sword, suitably inscribed, on his promotion to the rank of quartermaster, as a token of their esteem for his services.
- 1837 Sergeant HUGH LANTON. From the Governor of the Royal Military College, Sandhurst. A case of mathematical drawing instruments, "for the intelligence, zeal, and uniform good conduct evinced by him in charge of the detachment employed in field-work instruction at the college."
- 1838 Sergeant-major JENKIN JONES. By the sergeants of Chatham garrison. A silver tankard, "in testimony of their gratitude for the undeviating attention evinced by him while superintending the formation of a military swimming-bath."
- 1838 Second-corporal WILLIAM CAMPBELL. By the Commissioners of Education in Ireland. A case of mathematical drawing instruments, "in testimony of the intelligence and ability he displayed in teaching surveying and levelling to the inspectors of national schools."
- 1838 Corporals WILLIAM SPRY and WILLIAM RICHARDSON. Gold medals from Sultan Mahmound II. for service in Constantinople from 1836 to 1838.

- 1841 Private HENRY ENTWISTLE. From the Royal Humane Society. A silver medallion and vellum certificate for courage and humanity, during the pontoon practice on the 30th August, 1841, in plunging into the river Medway, near Rochester bridge, and at imminent personal risk, rescuing from drowning private Samuel Turner, of the corps, who had accidentally fallen overboard, and was unable to swim. Became a sergeant, and died before Sebastopol, 29th November, 1854.
- 1842 Sergeant-major JENKIN JONES. By the Corporation of the Trinity House. A gold snuff-box "to commemorate the assistance he rendered in the destruction of two wrecks in Sea Reach, by submarine explosions."
- 1843 Corporal JAMES HENRY DREW. By the Society of Teetotallers. A silver medallion with gold lozenge-shaped coat-of-arms in centre, "as a token of respect for his talented lecture on the principles of total abstinence and Rechabatism, as well as for valuable services as local secretary at Chatham in promoting the cause." Died from wounds received at the siege of Sebastopol, 22nd November, 1854.
- 1845 Private PATRICK J. HOGAN. From H.R.H. Prince Albert. A present of 5*l.* in admiration of his talents as an artist, as displayed in a beautiful etching of the Victoria Oak, in the Green Park at Windsor. He had previously received the high honour of an audience with the Prince Consort on his presenting to H.R.H. an etching of the Adelaide Oak in the Home Park.
- 1845 Privates PATRICK J. HOGAN and CHARLES HOLLAND. From H.R.H. Prince Albert. Each a case of mathematical drawing instruments, "as a mark of his approbation for merit in the execution of a survey and drawing of Windsor and its vicinity."
- 1847 Corporal JOHN RAE. From the Governor of the Royal Military College, Sandhurst. A case of mathematical drawing instruments, "for intelligence, zeal, and uniform good conduct in charge of the detachment employed in field-work instruction at the college." Is now staff-sergeant at the college.
- 1847 Sergeant JAMES MUTCH. By the members of the Woolwich Literary and Scientific Institution. A silver snuff-box "for his valuable and successful services as secretary to the Institution." This non-commissioned officer is a clerk in the Brigade-Major's office at Woolwich, and his attainments, which are varied, are of a character to make his services very efficient and satisfactory. Having studied in King's College, Aberdeen, where he graduated M.A., he has a fair knowledge of Greek and Latin, and is well grounded in mathematics. For many years, apart from his military duties, he held the office of secretary to the Woolwich Institution; and to his perseverance and untiring advocacy, it was mainly indebted for its continuing so long in existence. When it passed from under his superintendence into other hands, it gradually lost energy and vitality, and, in time, uniting itself to a local speculation, fell to pieces with the insolvency of its new alliance. It should also be mentioned, to his credit, that sergeant Mutch had the honour of originating in Woolwich the movement in favour of the Great Exhibition. By consulting a few leading men, the project received the countenance it merited, and eventually, a meeting to extend the object, the largest demonstration ever known in Woolwich, was held in the riding-school, under the auspices of Lieutenant-General Sir Thomas Downman, who presided on the occasion.

- 1817 Private **JAMES PEAT**. Bronze medallion, from the Royal Humane Society, for prompt and intrepid conduct in assisting to rescue from drowning, two gunners of the royal artillery, who had sunk while bathing in St. Mary's Creek. Private Peat was pontooning at the time.
- 1849 Privates **WILLIAM THOMAS**, **DANIEL JONES**, and **JAMES CRAY**. Bronze medallion each, from the Royal Humane Society, "for their noble courage and humanity in endeavouring to rescue from drowning their comrade, private Joseph Cox, who had fallen into the river Medway, on the 26th April, 1849." The first private, on a previous occasion, had jumped into the Medway after a civilian, and brought the body ashore too late for resuscitation.
- 1851 Colour-sergeant **JOHN CARLIN**. Gold pen and engineering pencil-case, from Lord Frederic Fitzclarence, "for showing himself exceedingly clever in calculations of a rather puzzling nature, and being a most zealous, active, and painstaking non-commissioned officer."
- 1852 Sergeant **HENRY QUODLING**. By a number of civilians at York. A case of professional instruments, "as a token of their affectionate regard on his leaving England for Van Diemen's Land." It was presented to him at a dinner provided by the subscribers; "and it must," writes the 'Yorkshire Gazette' of June 12, 1852, "be highly gratifying to the members of the corps connected with the ordnance survey in the city, to find that their general conduct has been such, as to win for them the respect of the citizens of York."
- 1854 Sergeant **BENJAMIN CASTLEDINE**. From the Governor of the Royal Military College, Sandhurst. A case of mathematical drawing instruments, "for intelligence, zeal, and uniform good conduct in charge of the detachment employed in the field-work instruction at the college."

APPENDIX VIII

REWARDS to NON-COMMISSIONED OFFICERS and MEN of the CORPS, for Services at the Great Exhibition of 1851 under the Royal Commissioners.

Each man received a bronze medal, a certificate signed by Prince Albert, and a present, according to the value stated against the respective classes.

1ST CLASS.

Presents value 10*l.* each.—No. 13.

Colour-sergeant THOMAS HARDING	Acting sergeant-major, and general superintendent.	} Gold watch each.
Ditto . . . NOAH DEARY	In charge, foreign side.	
Sergeant . . . WILLIAM JAMIESON	In charge, British side.	
Corporal . . . ARCHIBALD GARDNER	Clerk and draftsman	} Silver watch, box of instruments, and writing-case.

Second-corporal	WILLIAM DICKSON . . .	Clerk and draftsman	} Gold watch each.
Ditto . . .	JOHN VERCOE . . .	Clerk, charge of stationery, &c.	
Ditto . . .	WEST T. BIRMINGHAM	Clerk and draftsman	} Box of instruments and colours, and writing-case.
Lance-corporal	JAMES MACK . . .	Clerk and draftsman	
Ditto . . .	JOSEPH BARROW . . .	Testing fitments, draftsman, &c.	} Silver watch and box of instruments.
Ditto . . .	ROBERT FLEMING. . .	Testing girders, columns, &c.	
Ditto . . .	RICHARD RICE LINDSAY	Clerk and draftsman	} Gold watch each.
Ditto . . .	JOHN PENDERED . . .	Clerk, autographer, &c.	
Private . . .	GEORGE CAMPBELL . . .	Clerk and draftsman	} Silver watch, box of instruments, & box of colours.

2ND CLASS.

Presents value 5*l.* each.—No 41.

Sergeant . . .	JAMES HENRY FRANCE . . .	} Box of instruments each.
Lance-corporal	JOHN FLUDE	
Private . . .	HENRY HUNT SMITH . . .	
Ditto . . .	JAMES WILLIAM NEWTON . . .	
Corporal . . .	JAMES STEIN	} Silver watch each.
Ditto . . .	GEORGE JARVIS	
Ditto . . .	THOMAS DUMVILL	
Ditto . . .	WILLIAM ROBINSON	
Ditto . . .	WILLIAM FRASER	
Ditto . . .	GEORGE MOORE	
Ditto . . .	JOHN MCQUILLAN	
Second-corporal	JOHN KENDRICK	
Ditto . . .	ROBERT SHEARS	
Ditto . . .	AARON CROUT	
Ditto . . .	WILLIAM KING	
Ditto . . .	GEORGE LENDRIM	
Ditto . . .	NICHOLAS MARSHALL	
Lance-corporal	THOMAS HANNS	
Ditto . . .	THOMAS WM. NOON	
Ditto . . .	CHARLES WM. FEAR	
Ditto . . .	NICHOLAS CLABBY	
Ditto . . .	MICHAEL KELLY	
Ditto . . .	HENRY JARVIS	
Ditto . . .	WILLIAM BARNARD	
Ditto . . .	THOMAS JANE	
Ditto . . .	GEORGE GALL	
Ditto . . .	JAMES MILES	
Ditto . . .	DAVID MITCHELL	
Ditto . . .	JAMES J. GEORGE	
Ditto . . .	THOMAS BAKER	
Ditto . . .	ROBERT DOW	
Ditto . . .	JOHN VENNER	

Lance-corporal	JAMES WRIGHT	} Silver watch each.
Ditto . . .	THOMAS PIKE	
Ditto . . .	CHARLES J. MORTIMER	
Ditto . . .	GEORGE PEARSON	
Ditto . . .	JOHN FERGUSON	
Ditto . . .	JOHN ROSE	
Private . . .	JAMES B. MURRAY	
Ditto . . .	ANDREW ANDERSON	
Ditto . . .	JOHN SMITH. . . .	}

3RD CLASS.

Presents value 3*l.* each.—No. 41.

Lance-corporal	WILLIAM TAYLOR	} Box of instruments each.
Ditto . . .	THOMAS BENNETT	
Sergeant . . .	JACOB CAVILL	} Silver watch each.
Ditto . . .	JOHN SPENCER	
Ditto . . .	THOMAS P. COOK	
Second-corporal	WILLIAM WILSON	
Lance-corporal	WILLIAM CHAMBERS	
Ditto . . .	WILLIAM STRACHAN	
Ditto . . .	WILLIAM THOMAS	
Ditto . . .	JAMES HART	
Ditto . . .	JOSEPH GARTSHORE	
Ditto . . .	WILLIAM JAMES	
Ditto . . .	JOHN ANCELL	
Ditto . . .	RICHARD J. LETTON	
Ditto . . .	JAMES CURGENVEN	
Ditto . . .	WILLIAM STEWART. . . .	
Private . . .	EDWARD GILL	
Ditto . . .	WILLIAM JOSE	
Ditto . . .	THOMAS HAY	
Ditto . . .	JOHN DOUST	
Ditto . . .	JAMES B. MILLER	
Ditto . . .	WILLIAM MADDICK	
Ditto . . .	WILLIAM WEBB	
Ditto . . .	JOHN RAE	
Ditto . . .	SERVETUS BISPHAM	
Ditto . . .	JAMES CRAIG	
Ditto . . .	ALEXANDER DUNLOP	
Ditto . . .	SAMUEL HARDING	
Ditto . . .	WILLIAM H. HAYMAN	
Ditto . . .	JAMES KELLY	
Ditto . . .	JOHN LIDFORD	
Ditto . . .	LEWIS MILLER	
Ditto . . .	JAMES McADAM	
Ditto . . .	CHARLES NOBBS	
Ditto . . .	THOMAS PATERSON	
Ditto . . .	GEORGE HARTLETT	
Ditto . . .	WILLIAM FERGUSON	
Ditto . . .	CHARLES REEVES	
Ditto . . .	THOMAS THOMAS	
Ditto . . .	LAWRENCE BOWERS	
Ditto . . .	ROBERT ROBERTSON	

4TH CLASS.

Presents value 1l. each.—No. 97.

Corporal . .	EDWARD TAYLOR	}	Box of instruments each.
Lance-corporal	FRANCIS IRWIN		
Ditto . .	WILLIAM SIMPSON		
Private . .	ALFRED ANDREWS		
Ditto . .	RICHARD BRIDGMAN		
Ditto . .	CHRISTOPHER BROWN		
Ditto . .	MARK DAY		
Ditto . .	GEORGE FRASER		
Ditto . .	GEORGE L. LAW		
Ditto . .	FARQUHAR McRAE		
Ditto . .	RICHARD NEWCOMB		
Ditto . .	JOHN PHEASANT		
Ditto . .	JOHN STEWART		
Ditto . .	WILLIAM TURNER		
Ditto . .	ALEXANDER COOK		
Ditto . .	WILLIAM CHAPMAN		
Ditto . .	GEORGE FARRAR		
Ditto . .	CHARLES BURTON		
Ditto . .	MATTHEW BOWLING		
Ditto . .	ALEXANDER DOUGLAS		
Ditto . .	MICHAEL KELLY	}	Case of instruments and pen-knife each.
Ditto . .	BENJAMIN MANN		
Ditto . .	ADAM McKECHNIE		
Ditto . .	JAMES PEACOCK		
Ditto . .	JOHN SMITH		
Ditto . .	ALFRED SPENCER		
Ditto . .	WILLIAM BILTON		
Bugler . .	EDWARD CHARLES DEAN		
Ditto . .	JOSEPH LYNDALE		
Private . .	THOMAS EVANS		
Ditto . .	EDWARD L. GWYTHER		
Corporal . .	WILLIAM HUTCHENS	}	Writing-case each.
Ditto . .	WILLIAM THREIPLAND		
Second-corporal	WILLIAM WAKEFIELD		
Ditto . .	WILLIAM MILLAR		
Ditto . .	JOHN COSH		
Private . .	JAMES HOLTON		
Ditto . .	JAMES McNICHOLL		
Ditto . .	GEORGE LOW		
Ditto . .	GEORGE ANDERSON		
Ditto . .	CHARLES SYMON		
Ditto . .	DAVID LINDSAY		
Ditto . .	SAMUEL COLES		
Ditto . .	CHARLES H. CRONK		
Ditto . .	PETER COLLINGS		
Ditto . .	ROBERT DIXON		
Ditto . .	JAMES INKPEN		
Ditto . .	GEORGE JAMES		
Ditto . .	THOMAS JONES		
Ditto . .	ROBERT PARKER		
Ditto . .	MICHAEL PARK		
Ditto . .	WILLIAM H. REEVES		
Ditto . .	GEORGE STEWART		
Ditto . .	SETH SCOTTOW		
Ditto . .	JOHN SUMMERS		

Private . . .	JOHN STEPHENS	}	Writing-case each.
Ditto . . .	JOHN BRATON		
Ditto . . .	THOMAS BOOLER		
Ditto . . .	ARTHUR GWIN		
Ditto . . .	THOMAS HARVEY		
Ditto . . .	JAMES OSBORNE		
Ditto . . .	SAMUEL ORR		
Ditto . . .	WILLIAM THOMAS		
Ditto . . .	NICHOLAS BOWERS		
Ditto . . .	WALTER TRAVENAR		
Ditto . . .	WILLIAM DICKENSON		
Ditto . . .	JOHN WILSON		
Ditto . . .	JOHN WHYTE		
Ditto . . .	JOHN STEWART ROWLEY		
Ditto . . .	JOHN GOGAN		
Ditto . . .	JOHN HENDERSON		
Ditto . . .	WILLIAM BROWN		
Ditto . . .	JOHN BANDEY		
Ditto . . .	JOHN H. BILES		
Ditto . . .	WILLIAM FROST		
Ditto . . .	CHARLES HAYMAN		
Ditto . . .	FREDERICK HAZARD		
Ditto . . .	JOHN HENDERSON (2nd)		
Ditto . . .	DAVID LLOYD		
Ditto . . .	ROBERT LENNOX		
Ditto . . .	EDWARD MITCHELL		
Ditto . . .	JOHN MCGOWAN		
Ditto . . .	WILLIAM PHILPIN		
Ditto . . .	RICHARD POTTER		
Ditto . . .	WILLIAM THOMPSON		
Ditto . . .	JOHN THOMPSON		
Ditto . . .	WILLIAM H. TOWNSEND		
Ditto . . .	JAMES THOMPSON		
Ditto . . .	WILLIAM CROWDY		
Ditto . . .	WILLIAM DOWLING		
Ditto . . .	SAMUEL MORGAN		
Ditto . . .	ALEXANDER MCINTOSH		
Ditto . . .	JAMES REYNOLDS		
Ditto . . .	JOHN STICKLAND		
Bugler . . .	JOHN WARNER	}	Pocket-compass.
Ditto . . .	JOHN WAYCOTT		
Private . . .	JOHN CUMMINGS		

5TH CLASS.

Presents value 10s. each.—No. 14.

Corporal . . .	THOMAS PARKER	}	Case of instruments each.
Ditto . . .	RICHARD P. JONES		
Ditto . . .	JAMES B. WALKER		
Second-corporal	JOHN DONALDSON		
Private . . .	CHARLES PERRY		
Ditto . . .	EDWIN PROWSE		
Ditto . . .	RICHARD DAVIS		
Ditto . . .	WILLIAM HAWKINS		
Ditto . . .	WILLIAM HOLLAND		
Ditto . . .	JAMES RAMSEY		
Ditto . . .	JOHN WILLIAMSON		

Private . . .	JOHN CAMERON	Writing-case.
Ditto . . .	JOHN LANGFIELD	} Penknife each.
Ditto . . .	THOMAS RIDDLE	

The four last classes attended to the general duties of the exhibition, both during the preliminary arrangements and during the exhibition. Many were classmen; several were clerks and draftsmen; a detachment attended to the fire arrangements; a few to the ventilation and registration of the thermometers; one was a modeller and in charge of carpenters; and one or two were attached to the photographic department. See also year 1851 of the Memoir.

APPENDIX.

APPENDIX IX.—CASUALTIES.

INCREASE.										DECREASE.															
Year.	Strength.					Additions by					Deaths.	By dis- bilty.	By pun- chase.	Free by reduc- tion of in- sufficiency, &c.	On modified pension.	Limited ser- vice expired.	For miscon- duct.	Transported.	Desertions.	Transfers to other re- giments, and de- tached.	Total Decrease.	Total Strength.	Waiting to complete.	Establishment. ¹	Year.
	1831	1842	1843	1844	1845	Recruits.	Transfers.	Deserters re- joined.	Total Increase.	1831																1842	1843	1844	1845
1st Jan.	1831	1842	39	4	2	45	1387	41	19	2	1	..	..	..	..	..	..	..	..	..	75	1312	34	1846	1831
	1832	1312	35	..	1	36	1348	31	35	5	84	..	..	..	..	..	..	..	..	..	169	1179	5	1184	1832
	1833	1179	36	1	1	38	1217	25	60	2	24	..	..	..	..	..	..	..	..	..	115	1102 ²	..	1067	1833
	1834	1067	12	3	..	15	1117	27	57	1	19	..	..	..	..	..	..	..	..	..	106	1011	56	1067	1834
	1835	1011	65	1	..	66	1077	27	47	3	5	..	..	..	..	..	..	..	..	..	92	985	82	1067	1835
	1836	985	90	2	..	92	1077	20	29	5	5	..	..	..	..	..	..	..	..	..	73	1004	63	1067	1836
	1837	1004	91	2	1	94	1098	21	33	11	5	..	..	..	..	..	..	..	..	..	82	1016	29	1045	1837
	1838	1016	60	20	1	81	1097	21	22	5	7	..	..	..	..	..	..	..	..	..	69	1028	65	1093	1838
	1839	1028	166	6	3	175	1203	21	25	10	8	..	..	..	..	..	..	..	..	..	77	1126	71	1197	1839
	1840	1126	134	6	3	143	1269	25	37	19	..	..	..	..	..	..	..	..	..	..	100	1169	36	1205	1840
1st April	1841	1169	90	4	5	213	1382	19	24	11	1	..	..	..	..	..	..	..	..	8	72	1310 ³	..	1287	1841
	1842	1310	52	5	3	60	1370	20	31	10	..	..	..	..	..	..	..	..	..	10	74	1296 ⁴	..	1287	1842
	1843	1296	68	3	6	77	1373	44	39	9	3	1	..	..	..	..	..	..	..	2	86	1380	7	1287	1843
	1844	1260	102	3	1	106	1366	27	42	5	4	..	..	..	..	..	..	..	..	2	113	1260	27	1287	1844
	1845	1280	134	5	1	140	1420	16	48	20	11	2	..	..	..	..	..	..	..	7	109	1311 ⁵	..	1287	1845
	1846	1311	349	13	4	366	1677	21	56	25	..	..	..	..	..	..	..	..	..	15	122	1555	42	1597	1846
	1847	1555	356	22	13	391	1946	22	65	16	32	..	..	..	..	..	..	..	..	31	178	1768	29	1797	1847
	1848	1768	333	37	10	380	2148	26	77	24	5	2	..	..	..	..	..	..	..	6	169	1979	203	2182	1848
	1849	1979	197	28	8	233	2212	50	73	18	2	1	..	..	..	..	..	..	..	19	170	2042	140	2182	1849
	1850	2042	129	6	8	143	2185	23	60	15	2	..	..	..	..	..	..	..	..	..	121	2064	118	2182	1850
1851	2064	115	..	6	121	2185	28	26	5	2	..	..	..	..	..	..	..	..	23	..	101	2084	98	2182	1851
1852	2084	100	7	12	119	2203	40	61	14	2	..	..	..	..	..	..	..	..	25	157	2046	136	2182	1852	
1853	2046	189	22	14	225	2271	48	38	39	8	..	..	..	..	..	..	..	..	37	190	2081	572	2653	1853	

¹ Officers not included. ² 35 excess. ³ 15 excess. ⁴ 9 excess. ⁵ 24 excess.

APPENDIX X.

NAMES of MEN who have been KILLED or DROWNED while on DUTY or otherwise, by Accident, but not in Action, as far as the same can be now ascertained.

Date.	Rank.	Names.	Where.	Under what circumstances.
July 13, 1772	Private. Sergeant	John Dobbs . . . George Sherriff . . . Michael Gib . . . George Shearer . . . Robert Taylor . . . William Robertson . . . John Mair . . . William Scott . . . Andrew Lindsey . . . Edward Fryer . . . David Boney . . . Francis Hardie . . . William Clegghorn . . . Henry Lyall . . . William McLean . . . William Duguid . . . John Brown . . . George Henry . . . John Steedman . . . John Burns . . . Robert Garrow . . . Thomas Peacock . . . David Esin . . . John Stuppert . . . George Burn . . . George Napier . . . Charles Comb . . . Archibald Fullerton . . . William Mair . . .	Gibraltar	Killed . Blown up whilst blasting rock.

In the wreck of the brig 'Mercury,' with all their wives and children, numbering 28 of the former, and 14 of the latter.

After gaining the shore from the 'Mercury,' from cold, wounds, and exhaustion.
In a riot.
By a wooden pipe 16 feet long, falling from a pump on his head.

Sept. 24, 1786	Recruits	Peter Anderson . . . Thomas Hastie . . . John Hutton . . . James Ore . . . Robert Young . . . John Brander . . . James Douglas . . . Henry Lawson . . . Thomas Moescrip . . . Charles Ross . . . Gustavus Ross . . . James Tooh . . . Alexander Gray . . . George Duguid . . . John Macdonald . . . Simon Fraser . . . William Ross . . . Timothy Clark . . . Charles Croabe . . . Joseph Abdy . . . James Burnton . . . David Hunter . . . James Comb . . . Alexander Forbes . . . James Burgoes . . . John Westwaters . . . Alexander White . . . Andrew White . . . William Ramage . . . Daniel Thomson . . .	Near Dunkirk, on passage } from Leith to Gibraltar }	Perished	
25 or 26 Sept.	Recruit.	Daniel Thomson . . .	Mardyck near Dunkirk . .	Perished	
June 4, 1789	Private .	Francis Pearce . . .	Plymouth	Killed .	
June 26, ,,	Drummer	Thomas Mitchell . . .	Chatham	Killed .	
1791	Sergeant	John Fraser	Gibraltar, at Ragged Staff	Drowned	
Dec. 18, 1794	Private .	John Vernon	Woolwich	Drowned	

Names of Men who have been Killed or Drowned while on Duty or otherwise, &c.—*continued*.

Date.	Rank.	Names.	Where.	Under what circumstances.
Aug. 1797	Private .	Miles Ratchiff	Barbadoes	Drowned
	"	Alexander Wright . . .	On passage from England to West Indies.	Drowned
Aug. 1, 1798	"	John Nancarrow	On expedition to Surinam	Drowned
April 19, 1799	"	Philip Patterson	On passage from England to Turkey.	Drowned
May 27, 1800	"	George Laken	Off Turkey	Drowned
Aug. 21, "	"	James Strang	Chatham	Drowned
Oct.	"	Walter Allen	Halifax, Nova Scotia . .	Drowned
June 2, 1801	"	John Rogers	River Nile, near Rah- manieh, Egypt.	Drowned
Aug. 17, "	"	John Bain	From St. Thomas to Martinique.	Drowned
April 4, 1804	"	Daniel Brown	Jersey	Killed .
Feb. 1806	"	John Marley	From England to Gibraltar	Drowned
June 22, "	"	James Dane	Spike Island	Drowned
Jan. 9, 1808	"	Thomas Mitchelson . . .	Gibraltar	Killed .
Jan. 26, "	"	Charles Cranham	Gibraltar	Killed .
Sept. 15, 1809	"	George Spratt	Merida, Spain	Killed .
Oct. 7, "	"	Thomas Lane	Madeira	Killed .
Mar. 21, 1810	"	Thomas Hughes	Tarifa, near to Newfoundland, Signal Hill	Killed .
June 15, "	"	John Screech	Newfoundland, Signal Hill	Killed .
Oct. 22, "	"	William Cook	Newfoundland	Drowned
Dec. 3, "	"	Benjamin Hall	Puntales, Cadiz	Killed .
May 26, 1811	Corporal	James Roope	Newfoundland	Killed .
Oct. 4, "	"	William Brown	Cadiz, near Isla de Leon	Murdered

June 24, 1812	Private.	Thomas Grever . . .	Carthagera . . .	Killed .	By being blown up whilst mining.
Nov. 28, "	"	Paul Harvey . . .	Tarifa . . .	Killed .	By being carried down the main drain during a storm, into the sea.
April 21, 1813	"	William Liddle . . .	Gibraltar . . .	Drowned .	By the springing of a mine.
June 21, "	"	William Dunstan . . .	Gibraltar . . .	Killed .	By losing his way in a dense fog, and falling into the Ring's End Docks.
July 6, "	"	James Ashcroft . . .	Woolwich . . .	Drowned .	
Dec. 27, "	Sergeant	Patrick O'Brien . . .	Dublin . . .	Drowned .	By the conflagration of the barracks.
Dec. 31, "	Private .	Edward Mooney . . .	Nive, near Ustartz . . .	Drowned .	
Nov. 22, "	"	Michael Fitzgerald . . .	From England to Peninsula . . .	Drowned .	} In the wreck of the 'Queen Charlotte.'
Jan. 1, 1814	"	James Duffy . . .	York, Canada . . .	Burned to death.	
Jan. 14, "	Corporal	George Mulrean . . .	Falmouth . . .	Perished .	} Fell overboard.
Jan. 14, "	Private .	James McCartney . . .	Falmouth . . .	Perished .	
Jan. 28, "	"	John Stewart . . .	From Plymouth to Portam . . .	Drowned .	} In the foundering of a chasse-marée in crossing the dangerous bar of the river.
Feb. 24, "	"	John McNight . . .	Adour, near Bayonne . . .	Perished .	
Feb. 24, "	2nd Corpl.	Patrick Power . . .	Adour, near Bayonne . . .	Perished .	} Whilist bathing.
Sept. 18, "	Private .	John Benoy . . .	Chatham, St. Mary's Creek . . .	Drowned .	
Feb. 19, 1815	"	Daniel Dougherty . . .	Newfoundland . . .	Frozen to death.	Was beightened, and falling from exhaustion in the snow, was smothered, and thus died. He was discovered by a Newfoundland dog.
March 6, "	"	David Miah . . .	Off Dauphine Island, Amer . . .	Drowned .	He was pursued by a party sent in quest of him, and jumping into the Great Pond at Signal Hill to effect his escape, was lost in the attempt.
April 7, "	"	Robert Hoston . . .	Bermuda . . .	Drowned .	
July 13, "	"	Thomas Williams . . .	Newfoundland . . .	Drowned .	By falling off the bridge on arousing from sleep.
July 20, "	"	James White . . .	Seine, near Paris . . .	Drowned .	By falling from a window, supposed in a state of somnambulism.
July 31, "	"	David Morgan . . .	St. Denis, France . . .	Killed .	
Nov. 1, "	Sergeant	William Ritchie . . .	Epinay, France . . .	Murdered .	By private David Smith of the corps, who was executed 12 Dec. 1815.
May 1, 1816	Corporal	Morgan Williams . . .	Plymouth . . .	Killed .	By a stone of 2 tons weight falling on him in a quarry when mining.
Aug. 8, "	"	James Miller . . .	Gibraltar . . .	Drowned .	

Names of Men who have been Killed or Drowned while on Duty or otherwise, &c.—*continued.*

Date.	Rank.	Names.	Where.	Under what circumstances.
Dec. 24, 1817	Private .	Walter White . . .	St. Arnaud, France . . .	Lost his way and fell into the canal.
June 22, "	"	John Tretheway . . .	Chatham	Whilst bathing.
Aug. 16, "	"	James Verner . . .	Barbadoes	By the explosion of a mine.
June 19, 1818	"	Alexander Milne . . .	Rheims, France . . .	} Perpetrators were never discovered.
Oct. 22, "	"	James Scott	France	
Jan. 11, 1819	"	William Liddle . . .	Kingston, Upper Canada	While endeavouring to cross the ice on Lake Ontario.
Jan. 19, 1821	"	Garniel Ashton . . .	Corfu	By falling from a scaffold.
Jan. 11, 1822	"	Walter Urie	Chatham	By falling into the ditch of the fortifications.
April 1, "	"	Michael Connolly . . .	At sea, on board H.M.S. 'Salisbury.'	By falling down the hatch-way.
Sept. 8, "	Corporal	Michael Harle . . .	From Gibraltar to England	By a fall. He had given orders to fire a mine, and was springing, by means of a rope, across a chasm, to take cover from the explosion, behind a bold rock, when the rope was cut through by a projecting ledge, and falling many hundred feet down the eastern precipice, he was dashed to pieces.
April 5, 1823	Private .	James Blake	Bermuda	
Nov. 14, "	Corporal	William Williams . . .	Gibraltar	
July 29, 1824	Private .	James Ross	Chatham	Fell overboard from a pontoon raft.
Sept. 26, 1825	"	William Berry	Chatham	Fell overboard from a pontoon raft.
July 14, 1826	"	David Marshall	Corfu	Whilst blasting rock.
March 17, 1827	"	Richard Rosevere	Bermuda	By being blown up when blasting rock.
July 27, "	"	Andrew Mathieson	Chatham	Whilst bathing.
Sept. 3, "	"	Henry Bennett	Gibraltar	By falling from the rock when at work.
Dec. 1, "	"	James Masters	Rideau Canal, Canada	By being blown up whilst blasting rock.
Feb. 16, 1829	"	Walter Sym	Bermuda	} Fell overboard from the 'Weymouth.'
March 4, "	"	Peter Hamford	Bermuda	
July 13, "	"	John Williams	Chatham	} By blasting in a quarry.
Aug. 24, "	"	Thomas Duffy	Rideau Canal, Canada	

May 29, 1880	James Simmons . . .	Rideau Canal, Canada	Killed . . .	By being blown up in a quarry.
June 18, "	John Kerr . . .	Halifax, Nova Scotia	Killed . . .	By a stone falling on him on the works.
July 6, "	Alexander McMicken . . .	Bermuda	Killed . . .	By the explosion of a box of gunpowder when blasting rock.
Jan. 28, 1881	Leonard Jasper . . .	Rideau Canal, Canada	Killed . . .	By being blown up in a quarry.
March 9, "	John Higford . . .	Rideau Canal, Canada	Killed . . .	By an explosion in the canal.
May 31, "	Gumple Nathan . . .	Gibraltar	Killed . . .	By the falling of large pieces of rock upon them, which crushed them to death.
" "	William Street . . .	Gibraltar	Killed . . .	By the falling of the hospital during a hurricane, which crushed him to death.
Aug. 11, "	Charles Shambrook . . .	Barbadoes	Killed . . .	
Nov. 10, "	William Gunn . . .	Rideau Canal, Canada	Drowned	By falling over the works at Fort George.
July 23, 1882	Nathaniel Fulcher . . .	Halifax, Nova Scotia	Killed . . .	
Nov. 6, 1884	John Strachan . . .	Bermuda, Morris' Island.	Drowned	By the upsetting of a boat while surveying the islands in the Lough.
Feb. 6, 1885	James Bennie . . .	Lough Strangford, Ireland	Drowned	By the explosion of a box of gunpowder when blasting rock.
Feb. 22, 1886	Matthew Rosevere . . .	Bermuda	Killed . . .	By the upsetting of the 'Tigris' steamer, during a hurricane.
May 21, "	Archibald McDonald . . .	River Euphrates	Drowned	By a fall from a car.
July 8, "	John Crossett . . .	Leixlip to Chapelizod	Killed . . .	With his wife and four children in the wreck of the barque 'Doncaster.'
July 17, "	John Reid	L'Agulhas Reef, 70 miles S.E. Cape of Good Hope.	Perished	By a fall.
Mar. 8, 1887	John Porteous . . .	Passages, Spain	Killed . . .	Whilst bathing.
July 19, "	Robert Steele . . .	Chatham	Drowned	In a diving apparatus, while employed at the demolition of the brig 'William.'
May 21, 1888	Henry Mitchell . . .	Off Tilbury Fort	Drowned	By an explosion in blasting rock.
Mar. 31, 1840	Thomas Bonds . . .	Bermuda	Killed . . .	By being washed from a rock into the sea, whilst endeavouring to recover his note-book. He was surveying Valentia Island.
Dec. 10, "	Joseph Maxwell . . .	Coast of Kerry	Drowned	
April 26, 1842	Edward Lowe	Kat River, Cape of Good Hope.	Drowned	
Oct. 15, "	William Finlay . . .	Moorsunde, River Murray, South Australia.	Drowned	In endeavouring to recover a wounded duck. When found, he was entangled in the reeds at the bottom of the lagoon, with the duck clenched in his fist.

Names of Men who have been Killed or Drowned while on Duty or otherwise, &c.—*continued.*

Date.	Rank.	Names.	Where.	Under what circumstances.
April 27, 1844	Private .	John Skelton	Spithead	By falling over the gunwale of a boat, during a lurch in a swell of the sea.
July 30, "	"	Daniel Martin	St. Roque, Spain	In a quarrel, by a Spaniard striking him on the head with a chair.
Oct. 22, "	"	George Shanks. . . .	Bermuda	Whilst trying to swim from the sloop 'Annawan' in Grassy Bay to the shore.
May 16, 1845	2nd Corp'l.	Thomas Bone	Bermuda	By the little sound which they were crossing the little sound near Hunt's Bay, striking against a sunken rock and foundering.
" "	Private .	Peter Marshall	Bermuda	
June 12, "	"	William W. Riddle	Chatham, St. Mary's Creek	} Whilst bathing.
July 11, "	"	John Hamill	Bermuda	
Nov. 26, "	"	John Trellewin	Hong Kong, China	By falling down a steep bank.
June 16, 1846	"	Thomas Kilbride	River Ouse, York	Whilst bathing.
Dec. 14, "	"	Joseph Rawlings	Near Bermuda	Fell overboard from the 'Athol,' during one of the heavy lurches of the vessel.
Jan. 2, 1848	"	Hugh Arnold	Kowie River, Cape of Good Hope.	On the tide receding, he was found not far from the shore, in a hole. He is supposed to have missed his way, and fallen into the river.
June 25, "	"	Thomas Hudson	Red River, Hudson's Bay	Whilst bathing.
Aug. 3, "	"	William Miller. . . .	Hong Kong to Macao	Fell overboard.
April 26, 1849	"	Joseph Cox	Chatham	Fell from a raft whilst pontooning.
June 19, "	Sergeant	John Sutton	}	
" "	Corporal	Bartholomew Griffiths		
" "	Engler .	William Henderson		
" "	Private .	David John		
" "	"	Joseph McLachlan		
" "	"	Robert Martin		
" "	"	James Scott		
" "	"	Charles Quigley		
" "	"	James Baker		
" "	"	William Walsh		

"	"	"	Malcolm Nicholson	Prince Edward's Island, 12° south of the Cape of Good Hope, on passage to New Zea- land.	Perished	{ In the wreck of the 'Richard Dart,' freight-ship, with their wives and children, numbering four of the former and nine of the latter.
"	"	"	Samuel Finch			
"	"	"	Alexander Clark			
"	"	"	William C. Green			
"	"	"	John Malreaney			
"	"	"	Robert Alexander			
"	"	"	Nathaniel Vicary			
"	"	"	Samuel Peters			
"	"	"	Paul Orchard			
"	"	"	Richard Holt			
"	"	"	Robert Bruce			
"	"	"	James Ferguson			
"	"	"	William Thomas			
"	"	"	William Mitchell			
"	"	"	William Goldsmith			
Aug. 24,	"	"		Prince Edward's Island, 12° S. of the Cape.	Perished	From frostbite, exposure, and ex- haustion.
Sept. 4,	"	"	William Hillman	Fort Brown, Cape of Good Hope.	Killed	By a waggon running over him.
Oct. 10,	"	"	John Cameron	Sandhurst	Killed	By an explosion of gunpowder, whilst employed in blowing up an ex- perimental stockade.
Oct. 23,	"	"	Robert Player	Sandhurst	Killed	
Mar. 30,	1850	"	John Burgess	Bermuda	Drowned	By missing his way in the dark and falling into the sea.
Sept. 6,	1851	"	Thomas W. Noon	Bicester, near Oxford	Killed	By the upsetting of a railway train.
Aug. 9,	1852	"	David Jones	Keiskama Hook, Cape of Good Hope.	Killed	
Oct. 31,	"	"	John Callan	Keyhaven, nr Hurst Castle	Drowned	By the upsetting of a boat. By falling from a wall 36 feet high, on the works.
Nov. 9,	"	"	James Hicks	Malta	Killed	
Dec. 27,	"	"	John Harris	Corfu	Killed	By a blow in the face from a comrade, who was tried for the offence, and sentenced to six months' imprison- ment.
May 27,	1853	"	John Olivey	River Swale, near Rich- mond, in Yorkshire.	Drowned	Whilst bathing.



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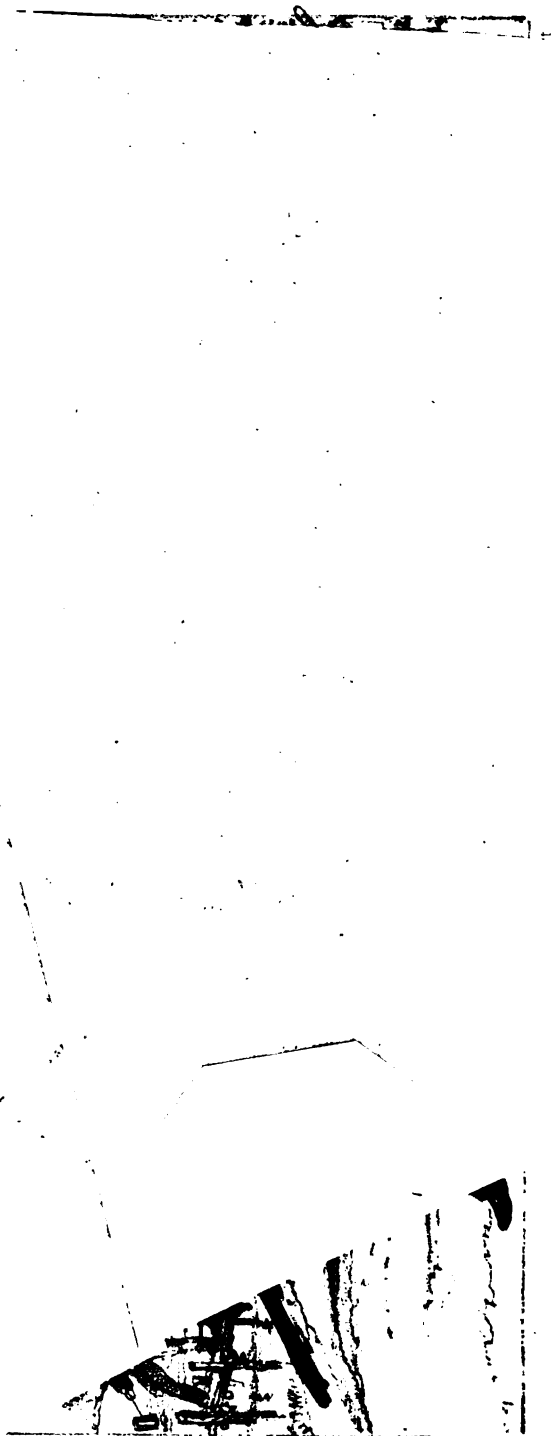


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CLASSIFIED INDEX.

Agriculture and Rural Affairs.

	Pages.
Saydon On valuing Rents, &c.	4
Caird's Letters on Agriculture	5
Cecil's Stud Farm	6
London's Agriculture	13
" Self-Instruction	13
" Lady's Country Companion	14
Low's Elements of Agriculture	14
" Domesticated Animals	14

Arts, Manufactures, and Architecture.

Bourne's Catechism of the Steam Engine	4
" On the Screw Propeller	4
Brande's Dictionary of Science, &c.	4
" Organic Chemistry	4
Cheval on Colour	6
Cressy's Civil Engineering	6
Eastlake On Oil Painting	7
Gwill's Encyclo. of Architecture	8
Jameson's Sacred & Legendary Art	10
" Commonplace-Book	10
Klein's Pictorial Life of Luther	10
London's Rural Architecture	13
Moseley's Engineering	16
Richardson's Art of Horsemanship	18
Steam Engine, by the Artisan Club	4
Use on Strength of Materials	21
Tate's Dictionary of Arts, &c.	20

Biography.

Bodenstedt and Wagner's Schemyl	24
Brightwell's Memorials of Opie	17
Bunsen's Hippolytus	5
Chesterton's Autobiography	6
Clinton's (Fynes) Autobiography	6
Cochayne's Marshal Turenne	24
Fremant's Life of Opie	11
Haydon's Autobiography, by Taylor	9
Hellerhoff's Memoirs	24
Holland's (Lord) Memoirs	29
Lardner's Cabinet Cyclopaedia	12
Maunder's Biographical Treasury	15
Memoir of the Duke of Wellington	24
Memoirs of James Montgomery	15
Merrill's Memoirs of Cicero	15
Russell's Memoirs of Moore	16
" Life of Lord Wm. Russell	19
Sonthey's Life of Wesley	20
" Life and Correspondence	20
Stephens' Ecclesiastical Biography	21
Taylor's Loyola	21
" Wesley	21
Townsend's Eminent Judges	22
Waterton's Autobiography & Essays	22

Books of General Utility.

Action's Cookery	3
Black's Treatise on Brewing	6
Cabinet Gazetteer	6
" Lawyer	6
Cust's Invalid's Own Book	6
Hints on Etiquette	9
Hudson's Executor's Guide	10
" On Making Wills	10
Lardner's Cabinet Cyclopaedia	12
London's Self-Instruction	13
" Lady's Companion	14
" Amateur Gardener	13
Maunder's Treasury of Knowledge	15
" Biographical Treasury	15
" Scientific Treasury	15
" Treasury of History	15
" Natural History	15
Pocket and the Stud	8
Pyrot's English Reading	8
Reece's Medical Guide	18

	Pages.
Rich's Comp. to Latin Dictionary	18
Richardson's Art of Horsemanship	18
Riddle's Latin Dictionary	18
Rider's English Thesaurus	19
Rowton's Debater	19
Short Whist	20
Thomson's Interest Tables	22
Traveller's Library	23 & 24
Webster's Domestic Economy	22
Willich's Popular Tables	24
Witton's Abridgment of Blackstone's Commentaries	24

Botany and Gardening.

Conversations on Botany	6
Hooker's British Flora	9
" Guide to Kew Gardens	9
Lindley's Introduction to Botany	11
" Theory of Horticulture	11
London's Hortus Britannicus	13
" Amateur Gardener	13
" Self-Instruction	13
" Trees and Shrubs	13
" Gardening	13
" Plants	13
Rivers's Rose Amateur's Guide	19

Chronology.

Blair's Chronological Tables	4
Bunsen's Ancient Egypt	5
Haydn's Beaton's Index	8
Nicolas's Chronology of History	12

Commerce and Mercantile Affairs.

Atkinson's Shipping Laws	3
Francis On Life Assurance	8
Lane's Sailor's Guide	13
Lortimer's Letters to a Young Master Mariner	13
M'Culloch's Commerce & Navigation	14
Thomson's Interest Tables	22

Criticism, History, and Memoirs.

Austlin's Germany	3
Balfour's Sketches of Literature	3
Blair's Chron. and Histor. Tables	4
Bunsen's Ancient Egypt	5
" Hippolytus	5
Burton's History of Scotland	5
Chalvabaeus's Modera speculative Philology	6
Conybeare and Howson's St. Paul	6
Eastlake's History of Oil Painting	7
Erskine's History of India	7
Francis's Annals of Life Assurance	7
Gleig's Leipzig Campaign	24
Gurney's Historical Sketches	8
Hamilton's Essays from the Edinburgh Review	8
Haydon's Autobiography, by Taylor	9
Holland's (Lord) Foreign Reminiscences	9
" Whig Party	9
Jeffrey's (Lord) Contributions	10
Kemble's Anglo-Saxons	11
Lardner's Cabinet Cyclopaedia	12
Macaulay's Crit. and Hist. Essays	14
" History of England	14
Speeches	14
Mackintosh's Miscellaneous Works	14
" History of England	14
M'Culloch's Geographical Dictionary	14
Martineau's Church History	15
Maunder's Treasury of History	15
Memoir of the Duke of Wellington	24
Merrill's History of Rome	18
" Roman Republic	18

Milner's Church History	18
Moore's (Thomas) Memoirs, &c.	18
Mure's Greek Lexicon	14
Rank's Ferdinand & Maximilian	24
Rich's Comp. to Latin Dictionary	18
Riddle's Latin Dictionary	18
Rogers's Essays from the Edinburgh Review	19
Rogge's English Thesaurus	19
Russell's (Lady Rachel) Letters	19
" Life of Lord W. Russell	19
St. John's Indian Archipelago	19
Schmitt's History of Greece	20
Smith's Sacred Annals	19
Sonthey's The Doctor &c.	21
Stephens' Ecclesiastical Biography	21
" Lectures on French History	21
Sydney Smith's Works	20
" Sermons	20
Taylor's Loyola	21
" Wesley	21
Thirlwall's History of Greece	21
Townsend's State Trials	22
Turkey and Christendom	22
Turner's Anglo-Saxons	23
" Middle Ages	23
" Sacred Hist. of the World	23
Zumpt's Latin Grammar	24

Geography and Atlases.

Buller's Geography and Atlases	5
Cabinet Gazetteer	5
Durrien's Morocco	24
Hall's Large Library Atlas	8
Hughes's Australian Colonies	24
Jessop's Russia and the War	10
Johnston's General Gazetteer	14
M'Culloch's Geographical Dictionary	14
" Russia and Turkey	24
Milner's Baltic Sea	15
Murray's Encyclo. of Geography	17
Sharp's British Gazetteer	19
Wheeler's Geography of Herodotus	24

Juvenile Books.

Amy Herbert	19
Corner's Children's Sunday Book	6
Earl's Daughter (The)	19
Experience of Life	20
Gertrude	19
Howitt's Boy's Country Book	10
" (Mary) Children's Year	10
Katharine Ashton	70
Lady Una and her Queendom	11
Laneton Paragonage	19
Mrs. Marce's Conversations	15
Margaret Percival	19
Pyrot's English Reading	19

Medicine and Surgery.

Bull's Hints to Mothers	4
" Management of Children	4
Copland's Dictionary of Medicine	6
Cust's Invalid's Own Book	6
Holland's Mental Physiology	9
Latham On Diseases of the Heart	11
Little On Treatment of Deformities	11
Moore On Health, Disease, & Remedy	16
Perce On Food and Diet	17
Psychological Inquiries	18
Reece's Medical Guide	18

Miscellaneous and General Literature.

Atkinson's Sheriff-Law	3
Austlin's Sketches of German Life	3
Carlisle's Lectures and Addresses	24

CLASSIFIED INDEX.

	Page.
Chalybaeus's Modern Speculative Philosophy	6
Defence of <i>Eclipse of Faith</i>	7
<i>Eclipse of Faith</i>	7
Greg's Essays on Political and Social Science	8
Haydn's Book of Dignities	8
Hole's Essay on Mechanics' Institutions	9
Holland's Mental Physiology	9
Hooker's New Guide	9
Howitt's Rural Life of England	9
" Visit to Remarkable Places	9
Jameson's Commonplace Book	10
Jeffrey's (Lord) Contributions	10
Last of the Old Squires	17
Loudon's Lady's Companion	14
Macaulay's Crit. and Hist. Essays	14
" Speeches	14
Mackintosh's Miscellaneous Works	14
Memoirs of a Maitre-d'Armes	24
Maitland's Church in the Catacombs	14
Pascal's Works, by Pearce	17
Pycroft's English Reading	18
Rich's Comp. to Latin Dictionary	18
Riddle's Latin Dictionaries	18
Rownton's Debater	19
Seaward's Narrative of his Shipwreck	19
Sir Roger de Coverley Works	20
Smith's (Rev. Sydenh) Works	21
Southey's Common-place Books	21
" The Doctor &c.	21
Souvestre's Art. Philosoph.	24
" Confessions of a Working Man	24
Stephen's Essays	21
Stow's Training System	21
Thomson's Laws of Thought	21
Townsend's State Trials	24
Willih's Popular Tables	24
Young's English-Greek Lexicon	24
" Latin Gradus	24
Zumpt's Latin Grammar	24

Natural History in general.

Catlow's Popular Conchology	6
Ephemera and Young on the Salmon	7
Gosse's Nat. Hist. of Jamaica	8
Kemp's Natural Hist. of Creation	24
Kirby and Spence's Entomology	11
Lee's Elements of Natural History	11
Mauder's Natural History	12
Turton's Shells of the British Islands	12
Waterton's Essays on Natural Hist.	24
Youatt's The Dog	24
" The Horse	24

1-Volume Encyclopedias and Dictionaries.

Blaine's Rural Sports	4
Brand's Science, Literature, & Art	4
Copland's Dictionary of Medicine	6
Crety's Civil Engineering	6
Crew's Architecture	6
Johnston's Geographical Dictionary	11
Loudon's Agriculture	13
" Rural Architecture	13
" Gardening	13
" Plants	13
" Trees and Shrubs	13
M'Calloch's Geographical Dictionary	14
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	Page.
Jeremy Taylor's Works	10
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" Soul and Body	16
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Morronism	24
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	Page.
Falcon's Marvels of Science	7
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