

THE
BRITISH INDIAN
Military Repository.

VOL. II.

CAPTAIN SAMUEL PARLBY,
BENGAL ARTILLERY, MODEL MASTER,
DUM DUM.

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TO CORRESPONDENTS.

We regret that the excellent paper signed "A HORSE ARTILLERYMAN," arrived too late for insertion in this Number. We beg our Correspondents will favour us with their communications, so as to reach us by the 1st of December or the 1st of June, which will insure their insertion in the succeeding Number, although an increase of pages should become necessary. The above Paper shall have a place in our next; in the mean we will do our best to make up for the delay of its appearance.

"MILES" in our next.

Lieutenant Balderston's copy is made over to A. Stratton, Esq. as desired.

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No. III.

JANUARY.

1823.

ARTICLE I.

Memoir of Colonel T. D. Pearse.

(Continued from page 246, Vol. I.)

IT appears that at the time of Colonel Pearse's march towards Madras, though no tents were allowed for the Bengal sepoys, yet small ones, as bells of arms, were supplied, to protect their arms from the weather. On the Madras Establishment, Colonel Pearse found that tents for the men were furnished, sufficiently capacious to protect both men and arms at the same time. ••

Amongst the numerous remonstrances which Colonel Pearse made upon this subject, the following paragraph, in a letter to Major General Saibbert, is not uninteresting as a record:—

“On this (the Madras) Establishment, the sepoys have no bells of arms; tents for 50 men each are allowed, which cost about 112 rupees 8 annas, or 35 pagodas, two bullocks carry one. The bells of arms of our Establishment cost more in every respect; that is, they cost the Company fully as much; yet storekeepers have

their profits here as well as in Bengal: hence, I conclude, that if every Captain of a battalion was allowed 250 rupees a month for 10 tents and 25 bullocks—to be kept up by him, in good and serviceable condition, and to be shown every muster—the whole Army might be covered, and all parties pleased. This expense would not be 200 rupees a year more than is paid for the bells of arms alone, supposing they cost only 60 rupees each, and that a camel can carry five, (which they cannot do for any time,) and even at that rate, if Lascars are put to the charge, it will not answer it.”

“ I shall send round a tent to you, and only remind you, that Corah affords cloth fit for the purpose in great abundance; and if it never falls into the hands of jobbers, every thing will be easily effected.”

On the 1st of May the Army reached Satiavaram. Colonel Pearse from this place writes several letters, in all of which he alludes to bad rice as the principal cause of the sickness which had prevailed in his Army. We leave the reader to draw his own conclusions, not wishing to draw down upon ourselves any controversy on this subject.

To J. H. Casmajor, Chief of Vizagapatam.

“ SIR,

“ I am now to return my best thanks for the noble supplies which the Army under my command have met with, from the time it entered your district to this day; to the goodness of the provisions I must in a great measure attribute the recovery of my sick; for I verily believe, if we had been served with such abominable stuff as we got from Ganjam to Tickally, that I should have lost two-thirds of my army.”

Col. T. D. Pearse.

That rice was the principal supply received for the subsistence of the Native army, needs no argument; and though in the above paragraph it is not distinctly named, yet, in the following, written from the same place, there is no room for doubt remaining.

To J. Daniel, Esq. Chief of Masulipatam.

“ SIR,

“ I learnt with much concern, that the rice (laid up for our supply,) is not equal to the sample sent, which was taken from what our troops received all through the Vizagapatam district; and I begged he, (*a Mr. Graham,*) would endeavour to get rice of equal quality: for I assure you that our people, having been always accustomed to eat fine rice, will be very sickly if they are by necessity driven to eat the coarse; it does affect their bowels; and if in my progress through the Ganjam country, I had not sent my own bazaar people to the right and left, to purchase better than the wretched stuff laid up for us, I should not have had a thousand men left; for they would have either died or deserted.”

On the 4th May the Army was at Joomingmatoor; on the 7th at Peddapore.

A letter, which is very characteristic of Colonel Pearse's integrity and strength of mind, was written from this place.—

To J. Daniel, Esq. Chief and Council, Masulipatam.

“ SIR AND GENTLEMEN,

“ This morning about 8 o'clock, soon after my arrival here, I received a letter from your Secretary, accompa-

nying the copy of Mr. Hamilton's letter to Mr. Daniel, relative to the elephant supposed to belong to Hyder and now under the protection of the Dutch factory of Jaggernauthpooram, requesting, that after I shall have obtained sufficient knowledge of the circumstance, I will make such use of the intelligence as may seem most conducive to the public service."

"In consequence of a letter of the same tendency, received from Mr. Hamilton, which contained a request to seize the elephant, I had the honor to write to you, offering my services to act in such a manner as you might desire, and yourselves point out: by which, I beg to be considered as offering my services, simply to act under the government of the district; and so as not to take upon myself any responsibility, for aught but the execution of what may be performed by the Army, or any part of it, under my command."

"The case, Gentlemen, is of the most weighty nature; the Laws of Nations interfere, and of them I do not set myself up to be a judge: because in the present situation of affairs, so much depends upon a very little matter, that war may be the consequence of a mistake: yet I believe peace, with the few nations not at war with us, is to be preserved if possible, with honour."

"In regard to the situation of Jaggernauthpooram, I, who am a perfect stranger to this district—to the state of dependence of the parts composing it—and to the powers vested in the ruling authority, cannot form any precise judgment until I am better informed, and for that kind of information, neither time nor opportunity offers."

"Give me leave, however, to point out to you, a mode of doing all that you can desire; I mean how to get the elephant secured. This I conceive may be easily done.

by your addressing the Rajah of the district in which Jaggernautpooram lies, requesting him to seize the elephant, in his own right, as an elephant lodged under the protection of the Dutch flag, for the use of Hyder, who, as an enemy of the English, is certainly so of their allies and dependents; and then, if he requires your aid to effect it, my troops, with his orders, shall complete the seizure."

"Peddapore,
7th May, 1781."

"I am, &c."

Some Commanding Officers, on a similar occasion to the present, would have been obedient with less scruple; others would have refrained compliance altogether, from timidity; and some probably would not have attended in the least, to such an application from a secondary Civil Authority. In the substance of the preceding letter, however, both the man and the soldier is to be admired.

Captain Sandford at this halting place, was placed in arrest by his immediate Commanding Officer, Major Kilpatrick, in consequence of disrespectful conduct towards him; and Colonel Pearse found it necessary to come to the resolution of bringing the offender before a Court Martial.

Here the appeal* against Colonel Pearse's orders, by the Captains of his Army, was at length delivered to him, to be forwarded to General Stibbert. We do not find any copy of this appeal amongst Colonel Pearse's papers; but the nature of its clauses may be guessed at from the answers to them in the letter which was written and forwarded with the appeal to the Commander in Chief in Bengal.

* See page 211, Vol. I.

*To Brigadier General Giles Stibbert,
Commander in Chief.*

“ SIR,

“ I enclose a representation made to you against orders which I found it necessary to issue. I am sorry for it; not from any apprehensions of impropriety in my own conduct, but because it obliges me to lay open a scene of litigation and violence, which tends to subvert all military subordination, and to re-establish a system, which necessity drove Government to abolish.”

“ To the 1st paragraph I answer; that the only leave I gave, was to Captain Sandford, whose letter is marked No. 3, from which I suppose he meant Sir Fyre Coote; though, if that were meant, the rest have re-considered the matter. The letters I received from the other Captains, and my answers, are Nos. 1, 2, 4, 5, and 6; but Captain Sandford has found means to get the rest to sign a general representation, except Captain Bennet; and had all asked I should most cheerfully have acquiesced; therefore I only point out the mistake.”

“ The 2d paragraph states partially, and neither conformably to my words or meaning; for which I refer you to my orders at length, given on the 12th and 13th instant: and now, Sir, I shall tell you the plain reason for giving both.”

“ I found after I left Itchapore, that such a desertion was taking place as threatened the whole Army with annihilation, and it fell chiefly on veterans. I was told that no regard was paid to veterans, and that men of long service had complained of neglect. I saw boys at the head of companies, who could not speak the language, and who of course were not altogether competent to judge of men's merit—young Captains at the head of

some battalions, who were but just promoted, who had not served in those battalions, and who of course had not been long enough with the men to know fully their pretensions. The veterans were going away by hundreds; and having been told that their services were not taken into consideration, to what else could I attribute their discontent, but to neglect. This was therefore a sufficient reason to warrant ordering, that seniority should be a recommendation, and be first considered, when there was no bar to promotion from having misbehav'd. But when I was told that many who had long served, were not competent to fill higher stations, the order of the 13th explained the latitude to be given, to avoid the evil; and every scope was given to reward merit; for, agreeably to that order, any man who had distinguished himself, might be promoted, (assigning the cause for giving the preference,) and every man who by his zeal, activity, or conspicuous merit, deserved to be distinguished, could advance, without impediment, to the rank which he was fit to hold."

"The 3d paragraph states another supposed injury of a different nature, and appeals against the Majors having the appointments of Havildars. The situation of the Majors without this privilege was deplorable: the sepoys paid no regard to them; the very Officers dared not visit them; a Major had recommended two sepoys for promotion, and had been refused; and the sepoys held them in contempt. It is alleged that your orders say, Captains shall exercise the power of Lieutenant Colonels; Majors, of Colonels; and it is argued that the Colonels of our establishment in the European regiments do not appoint serjeants and corporals. I admit it for the Infantry, but I practised the contrary in my

own regiment, without a murmur; and I did it, because it was my right; for a serjeant is a man of the next rank to an Officer, and of the regiment, liable to command mixed bodies of both battalions; as such, the Colonel is the only proper person to appoint and reduce them. Far from any intencion to diminish the proper power of a Captain, it was merely to support subordination, by giving the Majors a share in the promotion, which, without it, they cannot have, because Jemadars are appointed by the Commanding Officers of the Brigade; and it was urged that even these the Captains ought to recommend, and the Majors simply to be the channel of those recommendations. After what has been practised in regard to promotion, surely some check was necessary to those abuses: they might have prevailed again, and though they might not have been general, they were equally to be guarded against. That the Colonels of Brigades did not exercise their power, is not a bar to their rights; they are in fact Brigadiers, and give up their smaller rights, to have more time to attend to their general duties. To draw a line from the King's service is difficult, if not impossible, except from the Artillery; because every battalion has its Colonel, and Colonels certainly appoint non-commissioned officers; and it matters not whether the regiment consists of one battalion, or of twenty, if each has only a Lieutenant Colonel at the head: for there can only be one head to the regiment, and he is the Colonel—in his absence the senior Lieutenant Colonel—-if it were otherwise, a Colonel of a regiment of more than one battalion, would be less than one who had only one battalion, with respect to his regiment, considered as such; and he would only be in his own regiment, the same as an Officer commanding

several regiments, doing duty together under his orders. This I am persuaded was not the intention of yourself, when you penned the order; or of Government in approving of it. The Majors were placed at the head of regiments to be chief, to controul the internal management and economy of the whole; and of course to be respected as the head: but if each Captain in his battalion is to be independent of the Major's authority, as to the internal economy of that battalion, the Major ceases to be in the station of a Colonel, and might as well be in Europe, for any good that he can do in his regiment. This was my reasoning when I gave the order, and still is, and will be, till I am corrected, if in a mistake, by your superior judgment. Far am I from agreeing to the reasoning that a Major may be praised for having one good battalion, and one bad one; he is responsible for the whole regiment, considered as an unit; and the Captain must be answerable to him in the first instance, and the Major to Government. With as much propriety might a Captain in a regiment of one battalion expect to be independent of his Colonel, and to have plenitude of power to do what he pleases with his battalion, as a Lieutenant Colonel commanding a regiment of two battalions can expect it; for the case is exactly similar. The unity of the regiment is destroyed equally in either; and the Colonel is no longer the head of the regiment, than while it continues to preserve that unity undiminished. But if in a regiment the Lieutenant Colonel can set up a right, relative to his battalion, independent of his Colonel; the Captains of the battalion certainly have a better right to be independent of the Lieutenant Colonels; and so the regiment will be reduced to a set of independent companies, acting under

a Colonel, and two Lieutenant Colonels. Besides this, I find that orders given in 1772, and again by General Coote, direct that Havildars be presented to the Field Officer commanding the sepoy corps *for his approbation*; which is in fact for *appointment*, and it was practised by Parker for a time, though it was afterwards dropped in consequence of the disgust it gave."

"The 4th paragraph states as a grievance, that the sepoys have liberty to make their complaints to the Officer who is most likely to redress their grievance. First, I shall observe that the Articles of War declare the right; next, as you know the nature of the sepoys too well for it to be necessary for me to tell you, that if this right is not clearly explained to them, they never can obtain redress, but by modes similar to those adopted by the 20th regiment. Should the appeal be against an officer, and the sepoy be obliged to go first to him, and then upwards, a complaint could never be made, and injustice would rage with impunity; for the person against whom the complaint lies, has only to threaten the complainant with punishment if he proceeds further: the consequence will be that the grievance will remain unredressed, till the man deserts, or, in combination with others, joins in a general complaint, and then it is called mutiny. Complaints have been made, of injustice in regard to promotion, &c. which never could have been known if the order had not been given. But Sir, an occurrence has taken place, of so extraordinary a nature, that it proves the force of this assertion in a most conspicuous manner, though the subject is not a complaint in the appeal. A Major finding the men of his regiment deserting, called for his Native Officers to inquire the cause of it; and he did this, by ordering each Captain to send

them. Each sent his proportion; but it happened that he sent a Subadar of one of the battalions, who had been sick some time, and had not done any duty. Though still unable to do duty, he crawled to the Major's quarters when sent for. The Subaltern was advised to take it amiss, and to put the Subadar in arrest for going to the Major; the ostensible cause for it was, that he had not reported his company to the Subaltern, though he had gone to the Major: but he was actually told that he was put into arrest for going to the Major. As soon as I heard of it, I told the Officer who had put the Subadar in arrest, that he had been guilty of mutiny, for that he had punished a Native officer for obeying the orders of the Major of his regiment. The Subadar was released again before this passed, but his sword had been sent to the Quarter Guard, which only reports to the Major; and the Subadar was again released without reporting to him, either the arrest or release."

"To the 5th paragraph I shall only answer, that as some of the orders of the new establishment have been given, and others announced, I was forced by repeated applications to give auxiliary and temporary orders, to support some degree of subordination. I had also begged the disputants to wait for those orders, which they knew were to follow; and my request was urged with entreaty that they would not disturb my peace with intestine broils, at a time that pestilence, desertion, and almost famine, called for the utmost exertions of my mind and body; when I was hardly equal to them, being far from well. To all this they were totally deaf, —their importunities rose higher, and became more troublesome,—till at length, determined to put a stop to such violence, I took the pen, and sought relief from

my own orders. Little is to be apprehended from a Commanding Officer, who has only to superintend an establishment, in which the rules are settled, and not in expectation; and the very orders I have given positively say, *they are only to be observed, till the orders of the Establishment shall settle the point.*"

"But Sir, I have not enumerated all the signs of an intention to overthrow the Major's authority, so shall proceed, though they are not subjects of this appeal. It has been disputed whether the Major has any right to give orders regarding clothing. In consequence of a general order of my own, two Captains dressed their men in their new clothing; they say they did it to examine them, but had that been the case, they would have spoken to the Major about it, and have ordered the men to put their coats off as soon as the parade was dismissed; but quite contrary to this, the men continued to wear the new clothing during the remainder of the day; and the Major thus defied, was accused of an intention to deprive the men of their rights in the battalion, and of interfering in matters which they, (the Captains) were alone answerable for. The absurdity of this is evident: for if this be allowed, one battalion will be at a review in new clothing, and the other in half worn-out, or old, according to the Captain's pleasure."

"I send you an appeal made against a Major, for ordering his battalions not to go out to exercise without first apprizing him of it, and my answers Nos. 7 and 8."

"It has been alleged, that as Officers sign the muster rolls upon honour, the Major ought not to cause the roll to be called at muster; yet he is to sign them, and consequently to be answerable for those who may happen not to have any honour."

“ And to complete all, and reduce every thing to the old system, it has been urged, *that the Captains ought to entertain all recruits; to subsist and supply them; to discharge all men; and to make all promotions, without the interference of the Major, or recommendation of the Subaltern.* Let this but take place, and the new system must perish as a thing of course.”

“ A Major, at the head of the regiment ordered a manœuvre to be performed; and finding it not done as he intended, he himself directed how it should be done, partly in English, and partly in Hindoostance, to save time; this was also a subject of dispute, and had nearly produced a Court Martial.”

“ I must now conclude by sending you a copy of a correspondence, Nos. 9 and 10, between Captain Sandford and Major Kilpatrick, which will shew you completely the violence that reigns. The consequence is, that though I am employed from morning to night on public business of a very troublesome and intricate nature, I must sit down to examine a regiment,* and employ my Officers on a General Court Martial. On this head you shall hear further in a few days.”

“ Therefore Sir, I humbly beg that the Regulations which are to be our guide may be hastened, to relieve one part of the Army you command from anarchy and confusion, which now break down all the bounds yet raised to support subordination; and whilst so great a display is made of the prodigious zeal, and of the determination not to be remiss, indifference or neglect become, in some at

* Colonel Pearse paraded Major Kilpatrick's regiment, and to a man they declared their perfect satisfaction in Major Kilpatrick as a Commanding Officer, and brought forward many instances of his kindness.

least, more conspicuous than does them honour, and the Service suffers in consequence."

"You will perceive that the appeal is not general; a Captain Bennett has not signed it, which I observed in the former part of this letter."

"I am, &c. &c.

"*Peddapore,* (Signed) T. D. PEARSE."
10th May, 1781."

"P. S. Captain Ogilvie never wrote on the subject; but urged by the rest, he came and asked if he might sign it, and was told, on my part, to do as he pleased. Captain Powell spoke about the orders, and we had a long conversation on the subject the day they were issued; but he never mentioned any address to you. The explanation was given in consequence of the conversation with him, and he was as I thought at the time perfectly satisfied."

The letters referred to in the proceedings are as follows:

- No. 1, Captain Sandford, of 14th April.
- 2, Captain Pearson, of ditto.
- " 3, Captain Sandford, of 15th ditto.
- 4, Captain Green, of 17th ditto.
- 5, Captain Scott, of 21st ditto.
- 6, Acting Brigade Major in reply.
- 7, Pearson and Vanristel, of 21st ditto.
- 8, To Major Wedderburn.
- 9, Sandford and Hill's correspondence.
- 10, Kilpatrick and Sandford's ditto.
- 11, } Orders.
- 12, }

The Army halted at Peddapore seven days, in order to oblige the Rajah of the place to go to Masulipatam;

according to a requisition from Mr. Darnley and the Council to Colonel Pearce. On the 14th the Army marched to Rajanagur. On the 15th May the Army crossed the Cadaverree at a ford, and encamped at Cowoor. On the 16th the camp was at Gowerapatnam; on the 17th at Gertnagooda; on the 18th at Neeloocherta; and on the 20th at Ellore. Here Colonel Pearce addressed the following letter to Mr. Hastings.

*To The Honorable Warren Hastings, Esq. Governor
General and Supreme Council.*

“HONORABLE SIR AND SIRS,

“I beg leave to inform you of the arrival of the Army under my command at Ellore; the distance from this place to Midnapore has been measured 645 miles, and we have performed it in 64 marches. I am very much concerned at not hearing any thing of the Mahratta horse; we have suffered so very much by desertion, that the junction of the horse is more than ever desirable; yet I now begin to despair of having them, because the Kistna will rise in a few days, and we must get beyond it before the 2d of June, or run the risk of undergoing great difficulties. When this is effected, if we wait for the horse, the stores of provisions which we are to use on our march must be consumed; if to avoid this, we push on, I dare suppose the horse will not be able to follow. All this I have stated to Sir Eyre Coote, and hope now daily for his orders, to extricate me from this perplexity. The General has ordered me to Nellore, but that was before he heard of the horse; what will be his orders now, I cannot guess; but whatever they may be, I shall do my utmost to carry them into execution. My sick have not yet joined. We were suffered to plunge into another

danger, without being apprized of it. At Yertnagoodan there is a great mart for cotton, and an extensive trade between that place and Poonah, Nagpore, Benares, and Bengal; and great roads lead from it to all these places; before I could get notice of it we lost 150 men."

"The persons resident in these districts, must have been very stupid if they were ignorant of these circumstance; but indeed they seem to be too good merchants not to have known it perfectly well. As there is such a road, and peace with Berar, permit me to suggest raising 2000 recruits *expressly* to march through Nagpore and join the Bengal Army in the Carnatic. I say *expressly*, that they may not be deceived or astonished, when they find where they are going, as they would be, if it were not an original agreement. The only thing will then be, to find an Officer who will really and truly raise them, on these express terms; and faithfully explain before hand, the very worst possible concerning it, that they might engage with their eyes open."

"I am, &c. &c.

"Ellore,
20th May, 1781."

T. D. PEARSE."

Major Edmonstone was President of the General Court Martial sitting upon Captain Sandford, and it appears that a reference was made to Colonel Pearse by the Court, on the subject of a prisoner's right to object to certain Members of the Court by which he is to be tried.

The following answer was returned by Colonel Pearse :

To Major Edmonstone,

President of the General Court Martial now sitting.

“SIR,

“Agreeable to the usage of the service, a prisoner has not any right to object to a Member, without assigning his reasons; and of them the Court are to judge whether they are, or are not sufficient. In the trial of Lord George Sackville, the prisoner objected to Lieutenant General William Belford, and assigned reasons that himself and General Belford had been on ill-terms relative to certain points of command: General Belford having declared, that though Lord George Sackville, by his appointment of Lieutenant General at the Board of Ordnance, was Lieutenant Colonel of the Royal regiment of Artillery, he, (Lieutenant General Belford,) would not receive orders from Lord George Sackville. The Court considered the matter, and determined that the reasons assigned were not sufficient; but General Belford, rising from his seat, begged to be excused from sitting on the trial, as he had been objected to by the prisoner: this was granted.”

“In the case of Captain Sandford, I find he has simply said, that he shall want Majors Wedderburn and Byrn as evidences: that objection is not good, because even members might give evidence; but still less can the objection be good, when the very questions have not been communicated to the Court. I should have wished the Court had been cleared, and the prisoner directed to communicate the nature of the evidence he should want, that the Court might have determined whether persons giving such evidence were competent to sit.”

“If a prisoner can object at once, he may evade a trial altogether; and in small armies he may do even worse, by objecting to all whom he may suppose not likely to answer his purpose, and only admitting those whom possibly he may know before hand to entertain such opinions as may affect their judgment; and this is of infinitely worse tendency to the service than even evading trial.”

“I desire that this may be communicated to the Court; for though I by no means suppose, either that the prisoner meant to evade trial, or to choose his judges; or could flatter himself that he could by any means benefit by the exchange; yet, the precedent is of such dangerous consequence, that I cannot let it pass, without apprising the Court that I shall represent it to the Supreme Council, in order that if the point be doubtful now, it may be made clear for future Courts.”

“*Ellore,*

“I am, &c. &c.”

21st May, 1781.”

At *Ellore*, Colonel Pearse found it necessary to create some extra staff to carry on the duties of the different departments of his Army.

Lieutenant Bushby was appointed Deputy Quarter Master General; Lieutenant Mordaunt, Deputy Baggage Master, and Deputy Commissary of Provisions; Lieutenant Blundell, Bridge Master; and Captain Hearsay, Commissary of Provisions.

A Native General Court Martial for the trial of deserters was assembled at *Ellore*.

Shack Nattoo, a sepoy, was tried for shooting his Native Commandant, condemned to be hanged, and executed on the 29th.

Eight thousand hired bullocks to supply the wants of Sir Eyre Coote's Army, (which was completely at a

stand for want of cattle for the train &c.) are mentioned as being in company with the Army from Ellore.

In a letter to the Honorable Warren Hastings, Colonel Pearse writes,

“The mention of the melancholy subject of the desertions, makes it necessary for me to digress, and remark, that the Hindoos are nine out of ten in the numbers composing this Army; therefore the desertions might be supposed to have been in the same proportion; but the fact is quite otherwise; I may venture to assert with safety, that twentynine Hindoos have deserted for one Mussulman. The cause is but too evident: an Hindoo can live on two rupees a month, and save five, after paying for necessaries—and of those who have died, many have been found possessed of from 65 to 110 rupees—whereas, the Mussulman will live well whilst he can; is seldom worth a rupee, and therefore has a tie upon the service that the other has not: for the Hindoo with 100 rupees, returning to his own home, can stock a farm, and live happily for the rest of his days: or make his family happy, by leaving the money with them and going to earn more: his stature and appearance, in the latter case, ensuring his reception into any corps.”

“For this reason, and for this only, I must give it as my opinion, that all possible encouragement ought to be given to Mussulmen; and that we ought to cease to seek for tall smooth-faced Hindoos, and to get shorter and rough-faced Mussulmen soldiers.”

On the 30th June, the Army marched from Ellore, and crossed the Kistna the next morning.

On the application of Colonel Pearse to the Chief in Council at Masulipatan, a reinforcement of two battalions of the Madras troops was granted; and Captain Dickson was appointed Adjutant General of the Army.

The Army mustered on the 30th of June 3000 men under arms, before the Madras troops joined.

Colonel Pearse proceeded to Masulipatam from Ellore, to settle some money matters, &c. &c. connected with the Army under his command; and re-joined it on the 6th, on the south bank of the Kistna, from whence the following truly interesting letter was written :

To the Honorable Warren Hastings, Esq.

“DEAR SIR,

“Accident often leads men to useful discoveries; such an accident happened to me yesterday, as men grew merry, drinking the health of the best of Princes.”

“It was boldly asserted, that Sir Eyre Coote was much dissatisfied with you; because when he went away, you had promised him troops, money, and provisions, and he had not received them. I replied, there are always men enough, whose business it is to do mischief; and that Sir Eyre Coote had been beset by such men ever since he has been in India. I am certain the pains taken to sow dissensions between him and Mr. Hastings, have been such, that I am astonished they have not been more successful than they are. To take up this first part—troops.—It is I trust notorious, that he has made good his promise. The Bengal Army under my command has crossed the Kistna: true, not so early perhaps as Sir Eyre might have wished, but early enough to be of infinite service. With respect to the detention of the Army at Midnapore, I explained the causes to Sir Eyre in a letter which he has replied to in these words: ‘You have informed me of circumstances relative to the detention of the detachment that I was totally unacquainted with; I must lament it, as it is more than pro-

bable that the subsequent difficulties you have met with, are owing to that detention.'—I proceed. Though you say Sir Eyre did not believe we were intended to join him, he must be convinced of his mistake by this time. The train we have was augmented at my particular request; for I conceived, first, that it would overawe the Mahrattas, if they were wavering; secondly, that agreeable to advices received from this place, I was to expect to meet a potent enemy in the Circars; and thirdly, that whether I met any one or not, north of the Kistna, it would be so much an object for Hyder to prevent our junction, that I conceived he would endeavour to do so if possible, and I am still of that opinion. But though neither Mr. Hastings nor Sir Eyre Coote could tell before hand that one of the six battalions ordered for this service, would mutiny against its Commanding Officer, that happened; and, as I explained to Sir Eyre Coote, it caused the detention, and the reduction of the Army to its present state of weakness. However, the delay was lucky for us: we could not have passed through Cuttack at all in the middle of January, and consequently the Mahrattas might, if they had pleased, without any risk have opposed us, and have obliged the Army to return with disgrace; on the contrary, the detention put it out of their power to oppose us with any probability of success, and peace has followed with Berar; but this had nearly been the cause of the Army not being sent, and nothing but Mr. Hastings's firmness has effected it. Men, whose hearts are bad enough to do any thing, used every means to spread alarms, to raise lies, and to prevent the Army going at all; and they prevailed on men, whose hearts were good, to believe their evil inventions, and to press Mr. Hastings

to stop the detachment totally, to keep it for the internal defence of Bengal. Their propositions went so far, that had he not resisted every importunity, the English would not have had a foot of ground in India at the time we are now talking. Money he has sent, but how he got it to send, is most astonishing; for every infamous report that could be spread, to hurt public credit, I knew and heard daily in Calcutta. Provisions were sent as soon as they could be, and Mr. Hastings could not be blamed because the bullocks and sheep died. And now as to the promised peace with the Mahrattas: with Berar it is settled; Chunnagee, who was to invade Bengal, is coming to my aid, and peace may probably be concluded with the Peishwah at this very time. Sir Eyre in angry mood may say he wanted peace on any terms, I am sure he never meant it; he would be the first to say, die with honour, rather than submit to ignominy."

"Now, dear Sir, all this long letter is not to display my zeal in your cause, but simply to tell you that you have not been communicative enough with Cooté; and that for want of such information, the miscreants that beset him have repeated, no troops! no money! no peace! your regulations overturned! no provisions! till the old man really believes that the Bengal detachment is still at Calcutta, that he has not received a rupee, nor a maund of rice, and that you do not intend to make peace, even on honorable terms. Pray make somebody send him extracts from the trial of Grant, to shew him the villainies that compelled you to agree to the new arrangements—convince him how very general those practices were—let him know the mutinies in the 20th battalion, and what has since happened in Cooké's; for I can see by a paragraph in one of his letters, how very

sore he is. I wrote to him about the number of servants allowed to each rank, and said I should be much obliged to him for a copy of his regulations, that I might conform to them as nearly as our state would admit; his answer was—I have it not in my power to send you a copy of my regulations; and if it were so they would be of no use to you, as they have been all overturned by regulations made by Brigadier General Stibbert. The Owens, and the Macs, who surround him, din all this in his ears. Owen is at the bottom of all this, I am certain. When men complain of his supersedings, he turns to the Bengal Army, and bids them see how many Majors have been appointed, who supersede, and are coming among the Madras officers on service; and to keep Coote firm to support himself, he perpetually dins in his ears, the new regulations made on purpose to supersede his. Nay, though Coote's regulations were the most extravagant that ever were made, I hear he now arraigns the extravagance of this Establishment, and laments that the Bengalees have more than the Madrasces. Fauc says that he has written to Europe against the former having so much pay and allowances, and recommended to the Directors to put them on the Coast Establishment."

"I must now, as I am going into the enemy's country, take my leave for a while; as I certainly shall not have time to tire you with long letters; but before I do this I must do justice to the coasters as I find them."

"Wonder not at wars, or the loss of National honour, discontented Rajahs, and the dangers to which we are exposed; but wonder how we keep a single foot of ground in India. Tyranny and rapine have exalted their standards here, and lord it with wanton cruelty. Of Ganjam

I can only say, that for the sake of getting rid of a little bad rice, this Army was almost ruined; delays were created to detain us; the villages were emptied of the inhabitants to prevent their selling to us; they were reminded of the ravages committed by the battalions that served under Peach, on their return under little Ahmnty; and in short every thing was done to prevent our being supplied with aught besides the *poison* that was laid up for us, for the provisions deserve no better name. The very elephants would hardly eat the rice; the Rajahs all fled for fear we were sent to fleece them or devour them; nevertheless we did get on, we got supplies, cheap and good, to prove that we were destined to be made a bargain of."

"At Tickally I told you the Kemediy Rajah met me: then I began to learn, what afterwards I found to be systematic, that the Rajahs are oppressed to such a degree, that they can hardly forbear breaking out into open war, and seem to be prevented from doing so, only by a desire to disappoint their oppressors. The Kemediy Rajah had just been put up, after the Vizac meeting; of course he had paid up his balances, &c. &c. so he had only been ordered to do, and to undo, and there I left him."

"But at Vizanagram I learnt a great deal more." To detail the treatment the Rajahs there have met with, would require a volume instead of a letter: what I saw, shocked me beyond measure. Great pains were taken to prevent my going to Vizanagram; it was said the Rajah would be ^{too} offended, he wished our detachment to take some other route. I persisted in going, only because it was inland, and had shelter: but the object was to prevent my learning the mal-practices. Sitteram Rauze was represented to me as disaffected; desirous to pick a quarrel;

and to set up for independence; as being monstrously in arrears, and unwilling to pay a rupee: in short, as a man whom it would be necessary to send a force against to reduce; and he was said to be making preparations to resist, and repairing his fort. The fact was this, *he paid Rumbold an enormous sum to settle him on his present footing; determined to abide to it, he will not pay for the continuance of it, and therefore a quarrel must be picked to set up another, or to make him pay for his preservation.* This he told me without reserve, and added, he was the friend of the Company, and would do any thing to serve them, but the treatment he had met with was such, that he could hardly bear it; and if times did not mend very speedily, he was determined to go to Benares, to end his days, and let the country go to whom they pleased; for he neither could, nor would govern it. *The demands on me, he says, are more than I can bear; one chief succeeds another as often as the moons; and each must make his fortune at my expense. The present chief is my sworn enemy, so is Mr. Smith; accordingly I received an order to pay off all arrears. I am willing to do it, but I borrowed money from the English, to pay Rumbold, and though unable to do both, when I offer my tribute, first, the due of the sercants is to be adjusted, and the remainder goes to the Company. If not sufficient, new loans are offered; and the illegal interest is first taken out; so the debt increases, and the means of oppressing me increase also. At the time I was doing all I could to pay my tribute, I received an order to raise a body of horse; I did so at a great expense: before it was accomplished, I received orders to disband them; I did that also; but whilst I was doing it, an order came to raise a body of sepoy and pikemen: I complied. Before the levies were*

completed, orders came to disband them, and I am doing it; but I have not money to pay them, so they keep together. The face of one of the bastions fell down, I sent word of it, and asked leave to repair it; the leave was refused me: but as I could not repair the bastion, the expectation of seeing a body of Hyder's horse in my palace, drove me to make a small entrenchment to keep them from the foot of my bastion. Now this has been represented as a most insufferable crime, and an order is come, couched in gross terms, to destroy it. Some time ago an expedition was set on foot against me, and an army fit to besiege Madras was ordered to march. I had no hostile intentions; no fort fit to resist: so I sent the keys, paid, and all was well again. Thus each that comes, finds means to make me pay. I am ready to go with you; I will go any where with all the force I can collect; but when I raise it, even by their own orders, they declare apprehensions of my force and intentions, and order me to disband. All this dishonors me in the eyes of mankind. You want bullocks, and I am told, if I do not give them, they shall be seized and sent: so Mr. Casmajor writes to me. I am getting them, but to prevent it, I am ordered to go to Vizagapatam immediately; but told, it is supposed, I shall make the Bengal troops a pretence to stay, therefore bid to avail myself of it, and to go the instant you set out. The bullocks are a new demand, it requires time to collect the number. You say Mr. Casmajor has desired you to take them from hence; and you cannot stop; ~~what~~ can I do? but beg you to let me send them to Mr. Casmajor, and let him dispatch them to you. N.B. I did so, and never got a bullock, nor was it intended I should have one. To go to Vizagapatam, or to Madras, is a disgrace that is hardly supportable; because we are

treated with such contempt, that it is not to be borne. The Chief may perhaps condescend to see us, but unable to speak a word, he sits with a stupid stare, and his Debash interprets. If we plead our own cause, no one understands a word we say; the Debash must be paid to do any thing, and the Master to hear it. Justice is never obtainable; because our antagonist pays also; the only chance is, his paying less. You people from Bengal all talk to be understood; here nobody either does, or will understand. Their Debashes are the interpreters, and until we can transact our own business, face to face, the same thing must happen over and over. I am determined when you return by this route, to accompany you to Bengal, that I may go and lay my complaints before Mr. Hastings, and so obtain orders to do me justice; for the Circuit Sircar was restored lately, and happy is the State where the Governor can and will hear the cause, and do justice. Mr. Smith is my enemy, only because Mr. Rambold put me in. I have done every thing I was ordered; have paid off a great part of the arrears; will pay the rest in a very short time; have money now to send, and it is going. On my part, I only said I should be glad of his company if I had your permission to take him; and that he would not need any Debash to talk to you, nor would any appear before him: that I earnestly recommended it to him, to pay his arrears close up; to pay off his debts to the English; never to borrow any more; to live frugally till he had got a year's revenue before hand; then to send his tribute regularly at the stipulated time; if he did this, none could hurt, teaze, or perplex him: he might bid all his enemies defiance.

“Juggapella Rauze, Rajah of Peddapore, is as much harassed to the full. He also had received orders to

raise troops, and to disband; and had done so; *but he was very refractory*, and so I was applied to, not to pass Peddapore, till he should have set out for Masulipatam. Accordingly, I set to work about it; the Rajah declared he had not any hostile intentions, unless driven to hostilities; and after all this, he wished to settle his tribute; but it was insisted on that he should go to Masulipatam, and he was resolved to die and see his whole family perish, rather than go without conditions. His terms were, that he should be called down in the usual manner, and assured that the Merassee business should not be brought forward at present, but allowed to lie over till he could appeal again to Madras; and lastly, that he should not be obliged to settle his business with Venkatroyloo, but with the Chief. What the Merassee business means is as follows: Whilst he was a minor, a new post was created, and a certain sum stipulated, for which certain lands were assigned; but the lands exceeded the stipulation, and by means of the post, a great grievance was established; as the possessor raised under that power, seven times the stipulation; the enforcing it was effected by the Company's troops; he complained of it, *and paid near a lack of Pagodas to Rumbold*, to get the post abolished, and to settle 10,000 pagodas a year on Venkatroyloo, in lieu of the collections which yielded 35,000. Venkatroyloo never would demand or receive the stipulation; and having been to Madras, has purchased, as it is said, for 20,000 pagodas, the re-establishment of the post; and orders are come to enforce it. He offered to pay three years of the stipulation into the treasury, to be disposed of as they pleased, provided Venkatroyloo refused to take it; but Venkatroyloo, by virtue of this appointment, assumes a right to sit above

him, even as a Rajah. He is only of about 20 years standing, whereas Juggapella Rauze has had his country in his family above 300, and he cannot bear the degradation. This being stated, he begged me to make known his request, and I did so, and waited for an answer. In the mean time I settled with him, that he should go down at any rate, settle his tribute, pay the stipulation, and trust to the effect of my representation: for I had taken the liberty to point out, that whether the measure was right or wrong, this was not the time to make a change from an absolute agreement; because the doing so might drive the principal Zemindars to arms; and that would strip them of the tribute due, at the very time that, by their own letters to me, they declared every thing depended upon receiving it. They answered my letter; agreed to what I asked; and he went down: but, as I knew they would suppose he had influenced me by money, I thought it necessary to inform them, that so far from making me any present, he had absolutely affronted me by sending a lame old elephant, covered with a tattered blanket, which I sent back with the contempt it deserved. Thus by some management, I prevented the necessity of force: which, by the letter the Masulipatam Board wrote to me, they had cautiously avoided warranting; so that they wanted me to use force, and left the responsibility to me; a trap I did not choose to fall into. It was this cautious wording of their letter, that made me at all listen to his tale; for I did all I could to avoid hearing it."

"Opperow is another Rajah. I had a perwannah on him for 300 bearers, and was desired to enforce it; Kenneway was sent, and from him I learnt, that Opperow is indebted to all the Company's servants, in large sums,

for which he pays exorbitant interest. He had been ordered to Masulipatam; but, because of the above dues, he was allowed time to borrow money, and our peons are to collect it for him; for it is a practice here that I find very common, to send out troops upon every frivolous pretence of that kind, though they seldom are sent for the Company's tribute, an instance may suffice. They had written repeatedly to Juggapella Rauze to go down; and he formed delays; at last they sent a Subaltern with a company to seize him. The man has a fort, which, though in a state of ruin, would bid defiance to a battalion without guns; and he brought a 6-pounder to the gate, and bid the troops defiance. From which I infer that there was no real intention to seize him, but to irritate him to some act that could apparently warrant sending a large force to reduce him; the consequence of which must have been, a general war with all their Zemindars, who all looked up to this, the principal, to act as he did. I send a copy of the resolutions of council concerning the Merassee business; in which, whatever were the secret motives, there is a great appearance of justice. This, Juggapella Rauze begged me to read, and I took a copy of it to shew you a little of the state of things, and to explain the causes of dissatisfaction among the Zemindars of the district. As for myself, I neither sought to know them, or hear a word I could avoid; but as they employed me against my will, what I did learn, I think it a duty to the Company to communicate to you. I hear it is surmised that supervisors are coming to make an inquiry into the state of the Sircars. If I, who am a mere traveller, can, as I pass along, pick up so much, judge what men sent on purpose will hear!"

“ Their management in other respects is all of a piece. When I left Sattiaveram, I quitted Sitteram Rauze’s country; and from thence to Ellore I could hardly get supplies of provisions. To me the cause was perfectly clear. Through Sitteram Rauze’s country, I was supplied by his own people, we had profusion, and the best of every thing; but through this district, I was cursed with the Company’s servants; who, to get a rupee, would sell an Army. Their orders were so very contradictory and vague, that I was actually detained two days at Sattiaveram, till in consequence of my own orders, provisions were laid at all the places; and to get away, I carried on Sitteram Rauze’s people to Toomingatoor. Provisions indeed were collected at Samulcottah; but as they had not got 10 bullocks to carry it, it was utterly useless. eight days elapsed at Peddapore and Sattiaveram, all which I wanted to have had at Ellore, that I might collect the convoy, repair the train, and make sure of crossing the river. When I reached Ellore, the time was critical, and yet things were not ready: provisions there were in abundance, but the bullocks were so far from ready, that at last I set out incomplete, and had nearly been stopped by the river, for it rose suddenly above 4 feet; if we had not crossed, I should have borne the blame; they would all have joined to say as they did, that I might have gone away earlier. — True, I might, but if I had, I should have perished from famine; or have gone to Cooke without the only thing he wanted from me — bullocks to carry provisions, and to drag his train. But it is over now, and my grain will all be here to-morrow, except perhaps 1600 bullocks; which, as they were not ready to march, were left behind for want of drivers, and God knows whether I shall ever see them or the

grain again. Lucky it is indeed that Mr. Daniel came up, for the man who was here before is a silly block-head; and though we were so long expected, we should not have had any thing ready; for what has been done, has been in consequence of his great exertions, as you may suppose indeed from hearing that I was forced to leave 1600 bullocks behind, that are called the Company's own, for want of drivers."

"The task that falls to my share is the most difficult an officer can have; yet it seldom entitles a man even to thanks. A convoy is generally accounted a mere common duty; but of all others it is the nicest, the most dangerous, and the most troublesome: but I trust we shall do very well. The rising of the rivers will keep the enemy south of Nellore; and then I trust Coote will join us, with the assistance of the fleet when it can be heard of."

"After all my misfortunes, I have still, including Native officers, 3820 men; but I have been forced to miss the only opportunity I could have, of mending my fortune, by sacrificing all advantages from the bazaars to the public, to keep provisions at a moderate price. This was the only emolument I could have had, though Peach made a fortune in the same place, by having the contract for cattle on higher terms than the present are; and indeed, to have gained any thing by it, it must be higher; for I do not believe the contractor can save himself, or could have done it between Ganjam and this place. This, however, is no business of mine, not that the contract could have made his fortune in the time, had he not been carrying on a war, and of course receiving presents; all I have had you know already, and I have no further expectations."

“ I do not tell this in the way of complaint, I only mention it to shew, that envied as my station is, it has only entitled me to a load of vexation: however I keep my health and spirits, and as you find, can afford time to write long letters.”

“ I shall conclude with a request to be favoured with one short letter, to tell me whether it is true as the world says, that I have been near losing you by sickness; and am I to lose you by your going home?—if so, alas poor Pearse! That you may be happy wherever you may be, is the most fervent wish of,

Dear Sir,

“ *Soyth side of the Kistna,*
7th June, 1781.”

&c. &c. &c.
T. D. P.”

The following letter is dictated with that spirit, which warmed the breast of Colonel Pearse, the true spirit of a soldier.

To Brigadier General Giles Stibbert,
Commander in Chief.

“ SIR,

“ I am now to acquaint you that I have given leave of absence to Captain Ogilvie, to go to Masulipatam, for the benefit of his health, as he has been very ill lately; and when he is there, I shall order him to return to Bengal. An Officer, *not at the point of death*, who quits his station just as he comes *in* sight of the scene of action, deserves no favour; and I hope therefore, that he will never be permitted to return to the Army under my command. The very certificates shew how little necessary it was that he should go, and would have opened the eyes of any one, not determined to shut them.”

“ Lieutenant Bowie, at the point of death, has obtained the fullest certificates and recommendations, and I have

given him leave to go to sea, or return to Bengal, as may be most conducive to his health."

"Lieutenant Mordaunt is extremely ill with the liver complaint, but he is determined in spite of all recommendations, to see it out; however, I shall endeavour to prevail upon him to go away, for he is a valuable young Officer; so is Lieutenant Bowie."

On the 11th June, the Army, (which had been long detained on the south bank of the Kistna, for supplies of money, cattle, and provisions, from Masulipatam), marched to Cundalah. On the 12th the Army reached Sandole; on the 13th, Baupetla; on the 14th, Yantopollom. Here Col. Pearse sent orders to Capt. Bridges, commanding the 7th Circar battalion* then at Ongole, to join him at Tingatoor with his battalion. On the 15th the Army reached Raperlaw; on the 16th the Ongole river.

A Captain Lysaght was offered by Colonel Pearse, the post of Quarter Master General, but he declined it; and Lieut. Gillespie is mentioned, (in a letter from the south of the Paularoo, 18th June,) as having been placed in the situation.

On the 25th the Army was at Nellore; from whence Colonel Pearse writes the following letter to the Governor of Madras:

To the Honorable Charles Smith, Esq. President and Select Committee, Madras.

"HONORABLE SIR AND SIRS,

"Doubtless you have heard from Captain Patterson of a mutiny amongst the Nawab's troops on account of

* One of the battalions ordered to join the Army by the Council at Masulipatam, and subsequently by orders from Madras.

a man's being punished. Though it was quelled, it is of very serious consequence, and their numbers ought to be reduced. A mode offers which I submit to you; it is, to let as many entertain with me as are willing; and I am told near 1000 want it. If it be approved of, we shall want arms, for I left my spare ones at Ellore and Ongole: the latter I can soon get, and have sent for; the former are out of reach."

"Not knowing my actual destination I am at a loss how to prepare. I shall suppose it is Madras, though rumour says we are destined for another place; if to Madras, I consider my army as a convoy, and shall carry every thing I can to you. But in this case, the longer we stay here, the less we shall convoy; as the enemy will most likely send reinforcements to oppose us."

"The Phouzdar of this place has got a great deal of grain; more than I can want or carry, for we have brought only about 5000 bullocks from Masulipatam; and of them, many are hardly able to bear their loads. We have besides, about 1200 draft bullocks; of which, about 280 are worth very little, and 350 for slaughter, (which were sent from Vizac and Ingeram,) these must be for your Army, as my people do not use animal food; but they ate, and were from the first, *carriou*. They wanted to deliver me large flocks of sheep, but I declined taking them, because they will only incumber me, and perish on the road. The Phouzdar has 2000 bullocks ready for us. I find he could get more, which, if not wanted by me, can be returned, or kept here for further supplies."

"As there are no tumbrils for the 24-pounders I conclude they are not for me; if they are, I apprise you we have not the means to carry any ammunition, except bullocks, and that is the worst of all possible carriage.

Experience now confirms the opinion I have always strenuously urged, that all ammunition ought to go on carriages; for the draft bullocks we brought with us, are better than when they set out; but all the carriage cattle are nearly disabled from sore backs, yet they can all be put to the traces. The magazine,—or bullocks,—are the subjects of eternal vexation: the carriages would make a fence against horse; the bullocks only confusion. It is vain to talk of length of train: the bullocks take up more room, and are defenceless; the carriages could be drawn up in a state to be protected, in a tenth part of the time, and could not be carried off, for at the worst, the cattle being taken away, the carriages could not travel. Besides ammunition is never secure in a heap: a rocket striking the pile might destroy the whole; if it struck a carriage, it might blow up that one, and there the mischief would end. Water might do as much harm as fire, for we cannot always be sure of dry ground in the rains. I wish this matter was maturely considered; to me it is so evident, that I cannot cease to urge the use of carriages. The objection against them, founded upon the supposed difficulty of sending them to many parts where troops may be sent, is answered at once, by saying, wherever guns can go, the ammunition carriages can pass; where guns are not to go, the troops cannot want more than their pouches can hold, or their supplies may be sent in a few minutes. I hint this for futurity. I know the impossibility of getting carriages now, and so must use the means we have; but I foresee that an Army may lose its ammunition by the present mode, which could not suffer any loss if it had carriages. Let me add that in Europe, where the roads are not near so good as in this country, beasts of burthen are unknown; and on

ly light carriages are used; and as they have had more experience than we have, so they may be supposed the better judges.”*

“If you can send us by water, four pairs of tumbril wheels and axletrees, we should be much assisted; for many are in a most disabled state, past repairing in our present situation. However, we shall patch them as well as we can, to get on, for all difficulties are surmounted with diligence and time; but if we march past Madras, the exchange must be made there, which may be perhaps in your power.”

“On my arrival here the Vencatagerry Rajah sent his vakeel with a letter, and a small present, which I received. I enclose a translation of the letter and my answer, which you will see are merely complimentary. Your letter of the 21st has this morning come to hand, and it enabled me to speak more fully to the Rajah. His vakeel, who is in my camp, tells me the Rajah will declare in our favour, and join me, if I will send a detachment to Narepette, to overawe Lallah's people, who are constantly about him, and urging him to declare in favour of Hyder. But unless I can do that, or move towards him with my Army, he dares not openly profess his attachment, as it will bring immediate destruction on his country. This is very good reasoning on his part, but I cannot send a detachment on such a business; because an Army parcelled out has no strength, and I have not any authority from you, or the General to send one; rather than do this, I would advance, and take an intermediate position, so as to support him, and delay for a time in the environs of this place. This I submit to your consideration; for, under

* See Article VII, of the present No. on this subject. Eo.

the orders I have received from General Sir Eyre Coote, supported by your letter, I cannot take upon me to move, unless an enemy should make it necessary.'"

"His vakeel next recommended my writing a letter in strong terms, requiring him to declare or join me: and said that the Rajah would make use of it to temporize, by shewing it to Lallah's people, and pointing out his apprehensions of destruction from this quarter, if he should declare in their favour. This, as I had not authority to do more, I have done, and send you a copy of the letter. For my own part, I do not think there is any reason to doubt his intentions; but I do not choose to trust to casualties, lest I should be led into mistakes from the want of a thorough knowledge of the men I have to deal with."

"The Ongole Rajah wanted to accompany me, but had not money to enable him to set out."

"I am happy at the receipt of your letter, as it clears up the point relative to the battering cannon. I shall prepare to carry them; but whether I take them or not, I shall want the Europeans for the cannon we have already."

"I have urged the Nawab's manager to get horses for the troopers that were sent round to this place: the officer tells me he has got only 23, and part of them are bare, and unfit for service."

"Captain Lysaght having represented that his services may be wanted in the Masulipatam district, I have given him leave to return."

"I have sent back Lieutenant Mackay, and put Lieutenant **** in possession of his post."

"I found it necessary to appoint a Quarter Master General and an Adjutant General: the former I offered to Captain Lysaght, and on his declining to accept it, I

gave it to the Deputy Quarter Master General of the Bengal troops, who came with me; and I appointed my own principal *Aide-de-camp* Adjutant General. I thought it necessary to inform you of this, as I have sent word of it to Sir Eyre Coote, and the Governor General and Supreme Council."

"Nellore,
27th June, 1781."

"I am, &c.
T. D. P."

"P.S. The Phousdar has actually got vast quantities of every thing: there was a contest about the supply, when Mr. Turing wanted to lay hands on it, and in consequence, he made a representation of it to me. He says, what I do not use, he will ship for Madras, and send thither. Mr. Turing came to me, and wanted to interfere, but as a receiver under a receiver, can only answer the purpose of monopoly, and of enhancing the price, and as I find it is neither painful or troublesome to transact business with the Nawab's officers, I declined his interference."

To Sir Eyre Coote, &c. &c. &c.

"SIR,

"Uncertain as I am what are your instructions respecting the Army under my command, the addition of the 24-pounders gives me reason to suppose there is foundation for the reports that prevail, that our destination is Arcot. Accordingly I am making the best preparations I can, to be able to accomplish your wishes, and carry your orders into execution. From the short return I sent, you know our strength, exclusive of the troops I found in garrison, who are to accompany me, as I find by the letter from the Select Committee. The state of the country thereabouts points out to me that we must

depend chiefly on what we carry for our supplies; but I conceive it would greatly facilitate our operations, if magazines could be so formed as to secure our supplies, if the place should hold out for some time. All this I dare say makes a part of your plan, but as the preparatory part must fall to my share, I hope I am doing right in collecting all I can, because what we do not want we can leave here. I should have been very glad to have received some outline to have guided my judgment; for all I am doing may be wrong, if the plan be different from what I suppose; relying on reports, which, whether well or ill-founded, are so current that they have reached me from Calcutta. The troopers sent to this place are only in part mounted, and I despair of getting horses to complete them, but will do my best; for, small as the numbers are, they will be of service to us. I believe we could get a great number of the Nawab's men to entertain with us, if it should be thought advisable to take them; and perhaps it may be approved, when it is known, that they are now discontented and mutinous for want of pay. I have my doubts of the attachment of the people of this place to the Nawab, therefore cannot think it safe to remove all our troops from it; on the contrary, if they could be supplied by other means, I should judge it best to keep a garrison of our own here, till the troubles are over. The place itself is paltry, for the walls are in a ruinous state; but it could not be taken by the enemy without a siege, unless treachery should give it up; to guard against which, I think we ought to have a garrison in it. For the present I have only taken the European artillery, the 24-pounders, and the horse. I mean to put the European infantry to the guns, and shall take them out to teach them; but the sepoys I shall leave till

the last moment, to keep the place in awe, and to preserve Captain Patterson's command as entire as can be. That no time may be lost, I have written at large on the subject to the Select Committee. I sent you in, a day or two ago, a return of present strength, and copies of all letters sent since those you had received, by which you will see what were my views, and the execution of them you have learnt by my arrival at this place. We lost a great many men by desertion at the Kistna, and on the way; but the evil is abated, for we have not lost a man this week. The reports that prevailed really frightened our men away. I was forced to invent news to keep them in spirits. It had its effect; for I told them the enemy ran before us, and to this day we have not seen a soul to disturb us; so that, hearing they had been here, I gained credit. Be assured Sir, I will do every thing in my power; I will neither spare pains nor endeavours: success I cannot command, but I will strive to deserve it. We mustered to-day, and in two more days I shall send new returns."

" I am, &c. &c.

" 30th June, 1781."

T. D. P."

Sir Eyre Coote had sent orders to Colonel Pearse, that when he arrived with his Army at Nellore, he was to wait for further instructions. It appears however from the preceding, and following letters, that Sir Eyre Coote had not admitted Colonel Pearse into his confidence, or communicated to him any proposed plan of operations, and therefore he had only to blame himself for the apparently useless detention of the Army here, as Colonel Pearse complains of the delay.

*To the Honorable Charles Smith, Esq.
Governor of Madras.*

“ SIR, .

“ I addressed the Select Committee a day or two ago relative to this Army generally, and particularly as to certain points respecting the Vencategerry Rajah. I must trouble you on the subject of our future operations. First, I beg to observe, that whatever be our destination, the longer we wait here, the worse it will be for us, and the task more difficult to execute; because the troops lose their spirits by halting, and not knowing the causes why we do not proceed, they suppose that they are very different from what may be avowed: in short, that the enemy are too strong, and we too weak, for it to be safe or practicable for us to advance. The stories they hear from the town's-people confirm these opinions in their minds. From the nature of the guns and stores sent to me, a kind of guess may be formed that a siege is to be undertaken; and rumour speaks so plainly of Arcot, that I will, in what follows, take it for granted that it is so: though I own I am so totally in the dark, that I absolutely know not what orders to give, or for what to prepare. I wish I could have been honoured with a little more confidence if the plan is laid; or that it had been settled so, that we might have been put in motion to execute it, as soon as we could have made the necessary and unavoidable preparations. But to return to the subject.—If Arcot be our object, there are some points necessary to enquire about. The first is, whence are provisions to be drawn for the troops during the siege? Admitting we can carry a month's provisions, it will take seventeen days to go to the place; so that on our arrival, we could only have thirteen days in store. If by any ill

fortune we should be so long, or longer in taking it, we should be under the necessity of seeking for provisions, unless we could previously seize some place of strength, and therein lay up a store for our future use. Is there such a place? and can a magazine be formed there? and whence are the supplies to be collected? are not, I hope, improper questions. For, in case of failure of provisions, we might be obliged to quit a certain conquest, from inability to wait till the proper time to make it. We set out from Ellore with about 9000 maunds of provisions, and with other small supplies not worth mentioning. I trust we shall be able to set off with as much from hence, but the difficulty lies in want of cattle. I expected to have had 6000 carriage cattle from Masulipatam, but we were disappointed of 1450, of the Company's cattle, which were left for want of drivers. The Nawab's manager here, cannot furnish many carriage cattle; it will be well, if he can deliver us enough to carry the camp equipage of the reinforcement we are to take from hence, and the stores of the 24-pounders, with pack saddles; nay, I fear it is next to impossible, though enough of draft cattle could be had. But to what end collect draft cattle? they will not carry their own straw; cannot be taught to carry till saddles are provided; and then not in less than a fortnight, even if there were regular drivers to teach them. But granting bullocks and saddles ready, the men are not to be got. The horrors that strike the minds of the people, on account of Bailey's disaster, and the retreat from Conjeveram operate stronger than offers of money, promises, or threats. Now Sir, disagreeable as these truths may be, it is my duty to explain them to you, for whether I am to conduct the operations, or the General in person, as rumour

says, is of no consequence; the preparatory part must fall to me; and therefore that no time may be lost, I explain what must be done, and yet time is losing daily, from the absolute ignorance I am in as to the end purposed. I must now proceed to a subject of a different nature: I mean this place. Nellore is an oblong square, surrounded with a mud wall, having, at two or three of the angles of the square, round towers faced with stone. The curtains, or sides, have towers at distances from each other, according to the country fashion; and they are mud or stone—a kind of patch work. There is a ditch, narrow and not deep, dug out of the rock as far as it runs, and out of the earth for the remainder of the circumference. The walls are in a very miserable plight, doubting whether to fall or stand; therefore will soon determine on the former. Admit the contrary, and suppose them to stand, may to be kept up with small repairs to the end of the present troubles—it is my opinion this is practicable, and it is in consequence of that opinion that I took a view of the inside. There I find the reinforcement that was sent for me; and returns tell me, 2318 of the Nawab's troops. Amongst the latter discontent prevails, occasioned by the want of pay. Troops, ill paid, cannot be kept in discipline: hence mutiny and treasons. Thrice they have mutinied since Captain Patterson came here; or at least have behaved in a mutinous manner. Notwithstanding the bad state of the walls, I do conceive that Nellore, with a proper garrison, may be of great importance. Grain might be laid up, either to send to Madras, or to the Army; and it might remain there till convoys could be sent to transport it, to the part nearer to the seat of our operations. Bullocks to carry it, might also be kept in safety here;

and certainly they might be sent forward at convenient opportunities, to lodge the grain in some place further advanced, and nearer to the Army. But to make Nellore of this importance, it must be garrisoned by the Company's troops, and they must be the majority, and their commandant must be governor of the town, as much so as in Trichinopoly, &c. where the Company's troops are stationed. Whether this may be agreeable to the Nawab or not, it is for his service; and I suppose he might easily be persuaded to agree to it during the war. I find Captain Patterson has powers, but greatly short of this. However it appeared to me to be highly improper to diminish his authority by taking the reinforcement intended for me out of the garrison, and therefore, I have only ordered that they be in readiness to march. When we do march Sir, I pray you consider the state Nellore will be left in, if other troops are not sent to reinforce the garrison. I am of opinion that Captain Patterson cannot stay with safety, without a body of the Company's troops. What then is to be done? the Europeans, the Artillery, the 24-pounders, and the horse, I shall order out; the 24-pounders I have taken, because it will require time to get the bullocks ready for the stores."

"If there are any parts of this letter, that you may deem such as ought not to have come from my pen, I beg you to consider that I am embarked in the cause too deeply, not to be more zealous about it, than men in my state, not employed in the same manner; and that being thus zealous, I am less studious of forms, than of doing the duties of my station according to the best of my abilities."

"I am, &c.

"30th June, 1781."

T. D. PEARSE."

“P.S. Since I had finished the letter, I have heard that the greater part of the Masulipatam bullocks are coming on; and taking into consideration the moral certainty of augmentation, I have written to the Ongole Rajah, to send 1000 or 1500 cattle, loaded with grain, and provided with drivers. These if not wanted can be returned: wanted by us they cannot be, for already the vast number we have will be, if not more than we can cover, at least as many as we can; and to convoy the whole safe, will be more than I can flatter myself with performing. But as I have said before, difficulties submit to perseverance; and I shall set my heart against them, and use every exertion in my power, and really I do not despair of performing what may be committed to my charge in a satisfactory manner.”

It appears that Captain Ogilvie had so far *recovered from his illness*, as to re-join the Army at Nellore, on the 30th June.

Major Wedderburn is mentioned as having been left dangerously ill at Ongole; and Captain Pearson, whom Colonel Pearse speaks of as a very deserving Officer, was appointed to the command of the 25th regiment in the absence of Major Wedderburn. •

The Madras Council having appointed an Officer specially to command the troops of that presidency, which had joined the Army, Colonel Pearse now appointed Major Edmonstone to the command of the Bengal troops, with the staff of an *Aid-de-camp*. •

*To Sir Eyre Coote, K. B. Commander in Chief, and
the Hon. C. Smith, Governor of Madras.*

“The Vencategerry Rajah has just sent word that he has heard of our arrival at Ongole. Hyder has ordered

Lallah not to oppose us, but to lay waste the north country; that he will send Tippoo with 10,000 horse, and as many foot, to join him; and that he means not to meddle with us, till we get to the place where he engaged *Bailley*. Lallah has orders to decamp every thing within four coss; but not to approach Nellore. The Rajah prays me to advance to Narpette, that he may declare and join; and says, 'I shall then be able to check *Lallah*; preserve the Nellore country; and secure him.' The General says positively *halt*; so does your letter: what must I do? I cannot see villages burnt around me, and not move; yet if I advance to Narpette, I shall disobey orders; if I stand still, I shall destroy the reputation of the Army, and let an Ally be sacrificed: therefore I must advance, for if once we lose our reputation, we are undone. Already my people begin to despond from halting. When I hear of Lallah's advancing, I must absolutely stop him, if I can."

"I am, &c.

"1st July, 1781."

(Signed) T. D. PEARSE."

The following laconic letter to Mr. Hastings, will no doubt prove entertaining to the reader.

To Mr. Hastings.

DEAR SIR,

"I arrived here on the 25th of June, and am now waiting till a plan is laid for future operations. I am quite in the dark as to what I am to do; so much so, that I have written a letter of complaint to Madras, which went off yesterday."

"An Hirkaru is come into the camp this day from Poonamallee, with the following news in a letter from Captain Hardig, who commands there, to Lieutenant Speedman, of the Artillery, with us:

‘ A Dutch war—Johnson and a fleet with 4000 troops, gone to take the Cape.—Lord Macartney to be Governor at Madras.—Cotsford to succeed him.—Sadlier to be second in Council.—Whitehill removed and disgraced.—The Council to consist of twelve, and Smith is the 9th, Johnson the 10th. The Select Committee to consist of Lord Macartney, Sadlier, Monro, Holland, and Cotsford.’

‘ The 16,000 pagodas allowed to Counsellors is struck off—Tiagu taken by Tippoo—Wandewash attacked again—Chillambram taken—Dutch ships at Madras seized.—Dutch at Pulicat offer to surrender prisoners of war, and beg for troops to protect them from Eallah.’
If all this is not true, it is just as I received it. I shall send you a copy of my letter to Smith to-morrow.”

Major Byrn, with 500 sepoy and 500 of the Nawab’s troops, two guns and an howitzer, were detached on the 7th of July, to proceed to Narpette, in aid of the Ven-
catagerry Rajah, and with the hope of inducing him to declare for the Company.

A salute of 19 guns was fired by Colonel Pearse’s orders on the 11th of July, in consequence of the communication from the Select Committee at Madras, of a successful action, in which Sir Eyre Coote has beaten Hyder near Mootepollom.

On the 23d of July Colonel Pearse writes to Mr. Hastings as follows:—

To Mr. Hastings.

“ SIR,

“ Since I wrote last I have received a letter from Coote; (who had just received all my letters in a packet,) and he says; ‘ *All I can say in reply is, that I highly approve of your whole conduct;*’ and then he gives

me orders to proceed to Pulicat, drop my incumbrances, and perform the part of a soldier according to circumstances. This is too good news to be delayed."

" I am, &c.

" Nellore,
23d July, 1781."

T. D. PEARSE."

On the 25th of July the Army marched from Nellore, and Colonel Pearse writes the following letter to the new Governor of Madras.

To the Right Honorable Lord George Macartney,
&c. &c. &c.

" MY LORD,

" Last night I was made superlatively happy by the receipt of your letter, and one from Sir Eyre Coote; more especially as the latter fully assured me, that I had so conducted myself as to meet his approbation."

We marched this morning, shall be at Carrawan the day after to-morrow, and the next day expect to enter the island; here all my cares will end, for then the convoy will be in security. I have left the Nawab's troops, the battalion, the 24-pounders, and all patients in the hospital, *not able to march*; notwithstanding, the convoy is very extensive, and I shall rejoice extremely to get rid of it. I have taken the Europeans; they got shoes from Masulipatam, made up necessaries after I sent them back, and are now able to march.*

* These Europeans were some Artillery men who were ordered to join the Army at Nellore; but they were so totally without necessaries, that Colonel Pearse had declined taking them, "*being without shoes or stockings, and many without even decent clothing.*"

“ I hear Hyder has threatened to cut off Lallah’s head, and I have therefore told the Vencategherry Rajah, who still resolves to join me, that if Lallah is inclined to come over to us, I will receive him and his forces; and that if he brings any treasure or jewels, they shall be secure; and that I will not, nor shall any one else touch them. I was led to this, from seeing that the villages in our route were not injured, which indicates good-will towards us. I hope that I have not stipulated too much; it appears to me so expedient to spread the spirit of desertion amongst his army, that if once it can be begun, Hyder will moulder away to nothing in a month.”

“ I am, &c. &c.

“ 25th July, 1781.”

T. D. PEARSE.”

The following letter in cyphers was despatched on the 28th; no doubt it contains some intelligence important at that time. We give it to our readers, as it may afford amusement, at any rate, to those who have the leisure and inclination to attempt to decypher it.

*To the Right Honorable Lord George Macartney,
Governor of Madras.*

“ MY LORD,

“ 48. 15. 31.—10. 9. 5.—39. 3. 63. 40. 27.—80. 1.
13. 20. 56. 46. 25.—4.—2. 30. 71. 24. 42.—52. 23.
96. 91. 59.—101. 70. 120.—36. 68. 45. 99. 41. 10.—
6.—7. 56. 74. 72. 91. 120. 51.—99. 68.—66. 9. 113.
63.—9. 2.—50. 1. 121. 2. 65. 17. 24. 120.—80. 74.
21. 71. 26—110.—84. 91. 39. 61. 82.—48. 15. 9.
63.—100. 5. 10. 91. 89.—53. 43.—22. 74. 41. 120.—
63. 74.—9. 27. 32. 1. 48.—88.—96. 110. 104. 7. 112.
1. 63. 74.—65. 46. 53. 23.—24. 39. 42. 45. 71. 70.—
12.—80. 70. 71. 96.—43. 36. 56.—31. 77. 61. 91.

109. 20. 74. 48. 40.—53. 113—99. 101—37. 84. 4. 54.—119. 118. 120. 104. 115. 101.—The rains have afforded us^e plenty of water and grass. I received the duplicates of your letter and Sir Eyre's late last night. The originals reached me the night before, as I informed you yesterday."

" I am, &c. &c.

" 18. 16. 94. 82. 46. 56. 40. T. D. PEARSE."
25th of July, 1781."

A letter of the same description was also despatched to Sir Eyre Coote.

*To His Excellency Lieut. General Sir Eyre Coote, K. B.
Commander in Chief, &c.*

" SIR,

" I marched from Nellore yesterday, but only proceeded 9 miles, because it was the first march. To-day I stopped after a march of 12 miles, as we found water, and a good place to encamp on."

" The duplicates of your letter came last night—the originals the night before: and truly I can say, the letter made me superlatively happy, as you so kindly expressed your approbation of my conduct in the past.—All your orders shall be strictly obeyed. 36.—2. 20. 71. 24. 42.—52. 23. 96. 91. 59.—101. 70. 120.—36. 68. 45. 99. 41. 10.—48. 15. 31.—10. 9. 5.—39. 3. 63. 40.—27.—80. 1. 13. 20.—56. 46. 25.—48. 30. 31. 27. 40.—13. 5.—32. 46. 41. 16. 74. 77.—60. 53. 64. 118.—98. 91.—110. 94.—113. 93. 19. 91. 80. 26.—48. 15. 1.—70. 77. 82. 91. 61. 68.—95. 30. 20. 45. 52 + 3. 74. 61. 78. 120.—2. 15. 1. 16. 24. 10.—99. 80. 96. 91. 55. 49. 101.—4. 63.—92. 112. 89.—74. 63. 30. 20.—65.—99. 13.—41. 46. 48.—43. 80. 27.

54. 81.—I. L. N.—104. 36. 120. 109. 91. 121.—
 112. 106.—1. 27.—10. 23. 9. 28. 32. 40.—2. 1.—
 102. 91. 24. 42.—97. 93. 41.—54. 120. 82. + 9. 2.—
 5. 5. 53. 54. 52.—71. 61. 31.—60. 4. 64. 24. + 11.
 31. 91. 50.—46.—19. 66.—102. 100. 9.—48. 40. 34.
 31. 56.—97. 99. 5.—9. 48. 63. 71. 72. 73.—16. 2.
 48. 20.—121. 34. 32. 15.—107. 110. 121. 99. 82. 115.
 71. 94.—101. 39. 119. 120.—93. 2.—100. 120.—13.
 16. 43. 48.—102. 100. 120. 94.—25. 31.—9. 27. 31.—
 20. 28.—63. 84. 52.—4. 2. 24. 9. 23. 10.—”

“ I took the European company, and put all to the
 guns; they were too few to act as infantry, and I wanted
 to have my guns perfectly manned; they are so. 65.—
 63. 1. 20. 11.—80. 30. 31.—27. 46. 34. 96. 52.—4.—
 9. 13.—55. 39. 59. 37. 70. 36. 28. 58.—101. 1.—9.
 16. 20. 4. 10.—113. 78. 93. 56. 37. 36. 48. 14.—112.
 106.—3. 74. 59. 39. 58. 91.—38.—80. 112.—66. 40.
 91. 51.—79. 77.—78. 93. 96. 101. 118. 120.—63.—
 15. 1. 27. 46. 76.—58. 84. 64. 77.—4.—17. 31. 24.
 36. 40. 16. 52.—110. 101.—111. 99. 105. 120. 121.—
 9.—21. 39. 114.—51. 53. 19. 66.*52. 56.—91. 41. 72.
 120.—17. 16. 48.—4. 63.—36. 13.—80. 20.—74. 86.
 61.—93. 82. 86. 99. 54. 96. 9. 81. 91.—46. 41.—39.
 37. 72. 1. 76. 54. 80.—112. 3.—101. 100. 120.—104.
 118. 31. 23. 96. 116.—102. 120. 111. 40. 50. 80.—
 125.—96. 15. 31.—108. 99. 107.—89. 1. 9. 10. 2.—
 6.—25. 39. 48. 31. 59.—60. 52.—71. 34. 46. 63. 51.”

“ I am, &c. &c.

T. D. PEARSE.”

“ 22. 34. 28. 21. 74. 61. 52,

The Army was at Gurdore on the 25th; at Catta Wab-
 loor. on the 26th; Pombalo on the 27th. On the 29th,
 the Army was at Neasabrum Choultry; on the 30th at

Ramanca Chuter; on the 31st at Chicaracottah; on the 1st of August the Army reached Pulicat, and on the 3rd Colonel Pearce joined the grand army under Sir Eyre Coote.

The Army was at Poonamalee on the 7th, and at St. Thomas's Mount on the 9th of August.

At this place Colonel Pearce laid before Sir Eyre Coote, the voluminous proceedings of the Court Martial upon Captain Sandford, with the following letter:

*To His Excellency Lieut. General Sir Eyre Coote, K. B.
Commander in Chief.*

“SIR,

“I have the honour to lay before you the proceedings of a General Court Martial, held by my order, for the trial of Captain Sandford, of the 24th regiment; and for your information I think it necessary to give you a short history of the rise of the present trial.”

“The sickness that seized the troops at Ganjam, dismayed the sepoys very much, and just after we left Itchapore, so great a desertion prevailed, as made me apprehensive that the arms of whole regiments would be left on the ground; and it so truly alarmed me as to create the utmost uneasiness in my mind. Disputes between the Majors and Captains had also prevailed, not only in the 24th regiment, but in others also. And as I conceived that disunion amongst the Officers, must operate to increase desertion, and on the contrary, that cordiality would check it, I called on all Officers to unite, to inquire the cause of the desertion—to endeavour to calm the minds of the troops—and remove dissatisfaction if possible. My order was far from producing the effects intended. Major Kilpatrick ordered the Native

officers to his tent to make inquiries, and though the Captains sent them, they took the inquiry so much amiss, that in the end it occasioned this investigation; which, by the proceedings you will find was carried to lengths, unusual, as well as unexpected. At last I was obliged to call the regiment before me and the Majors of the Army, to ascertain whether they had any causes of complaint against Major Kilpatrick whilst he commanded them; the result was, that so far from a single complaint being made, many spoke in his praise, for his kindness to them and his fatherly care. This, from what had passed, was quite unexpected, for it was really believed that a general complaint would have been made, so confidently were the discontents reported through the camp."

"The investigation set on foot, you will find by the proceedings, tended directly to accuse Major Kilpatrick of bad conduct in his battalion. Something of the kind, it appears, was begun before we crossed the Subanreca, though the result was not brought forward, as it certainly ought to have been, if real zeal for the service had been the cause of it. But I must inform you, that the disputes began between the Major and Captain Scott, before the Captain had obtained command of his battalion, and whilst the regiment was only forming, to put him in possession of his part of it; this is also mentioned in the proceedings."

"These are some of the general outlines, though other causes conspired to create ill-will between them."

"From the complaints preferred to me on account of the Majors making the inquiry before mentioned, I plainly perceived, that it was attempted to set their authority aside in their own regiments, and to establish an

authority in the Captains, that would have placed the Majors in a situation not to have been endured. To remedy it, I gave orders that havildars should be appointed by the Majors, in regimental orders; naicks, by the Captains, with the approbation of the Majors, and the recommendation of the Subalterns who commanded companies. An idea prevailed that Major Kilpatrick had suggested these regulations, but it was not so. I knew before I left the Presidency, that orders to that effect were to be issued; and I found that by your own regulations, havildars were to be presented to the Commanding Officer of sepoy corps for approbation; and that Sir Robert Barker had made such regulations long before, which had been enforced by Colonel Parker, and had drawn on him a general odium, for reasons which I need not point out. However, the idea that Major Kilpatrick was the instigator of the orders I gave, inflamed the minds of not only the Captains of the 24th regiment, but even most of the rest, and produced a remonstrance against my order, which was transmitted to the Presidency. Since that event, (though I cannot say since it arrived,) orders still stronger than any I gave, have come down and been issued; which, not only confirmed the power I gave the Majors for the support of military subordination, but much greater; and such as, if enforced, must quash the bad practices that did prevail, which cost Major Grant his commission, and would probably affect many others, if investigations were to be set on foot, either by private or public authority."

"The sentence passed would not have been satisfactory to me, if I had had the approval; because I conceive it is at variance with the evidence, and know the causes and manner of making the investigation which gave rise to

the latter charge: for though it does not appear that Captain Sandford gave the orders alleged, *with his own voice*, yet they were given by his agent, in a language which the agent understood, though the persons to whom he afterwards gave the orders did not understand them. However, doubtless the Court were acquainted with circumstances which I am not, and therefore I do not mean to arraign their judgment, though I cannot say I should have approved of it."

"From the whole proceedings I may positively say, that such ill-will prevails between the Officers and the Major, that it is not proper they should remain together in the same corps; and therefore I recommend it to your consideration, whether it will not be proper to make removals. I enclose you also three crimes against Native officers of that regiment, which will, I think, shew that removals are necessary, as there is some appearance of ill-will towards them: and Turab Khan has been once tried and acquitted, on the subject of the disputes that prevail in the regiment."

"Far am I from approving what Major Kilpatrick did in his battalion, but nevertheless, I cannot approve of stirring up complaints, or seeking for them; because recrimination may sometimes be necessary in defence. There was not just cause for recrimination, until the disputes which had begun on points of mere discipline, made the Commanding Officer of a regiment proceed to put an Officer under his command into arrest; and because I could not obtain from Captain Sandford any report of the investigation he had made, though I ordered him to report it; and because the investigation was totally foreign to the charge just given in against Captain Sandford, by Major Kilpatrick."

“ I must, before I conclude, assure you I most heartily lament that such a trial has happened. When I was appointed to the command I hold, I made a particular request to have Captain Sandford sent with the detachment, to afford me some opportunity of serving him, if possible, as an Officer whom I had taken notice of, so early as 1771 ; and who might always have commanded my whole interest when I had any ; on the contrary, Major Kilpatrick was an officer I knew very little of, not more than a slight acquaintance would afford.”

“ I am, &c.

“ *St. Thomas's Mount,* (Signed) T. D. PEARSE.”
9th August, 1781.”

“ P.S. I had not read Captain Sandford's defence when I wrote this letter : I now find it necessary to say something in answer to what he says concerning me :—and first, in answer to the observation, *that on the fourth day a General Order was issued, forbidding the Officers of the 24th regiment from being present at the trial.* It is very true there was such an order, for I found that every Officer would be called, either by the Crown or the prisoner, and it is not right that evidences should be present during the examination of other evidences, who are to answer to the same point. As Captain Sandford was required to give in his list of evidences, but declined doing so ; and as I knew every Officer was concerned, and had been taking an active part, I concluded they would all be necessary, and it turned out so ; every one was called on, sworn, and gave evidence. He observes that he was deprived of assistance by this order. After Captain Scott was examined, Captain Sandford sent a letter, telling me he wanted Captain Scott's assistance, but he was deprived of it by my order. To which I replied, that if

the Crown did not object to it, he might attend to assist him; and he did attend and assisted him from that day or the next, and the other Officers, after their examination, remained in court."

"Captain Sandford says he wrote to me for a copy of Runjeet Sing's trial; that I refused to give him one; and that for want of it he was distressed in his defence. He did write, and I did decline giving the trial out of the office. I sent it to the Presidency, to the Judge Advocate's office; after it was gone away, I was asked for it again; and I gave answer that it was gone: but if it had been in camp I should not have given it up, because I found that it was wanted only to raise a cavil about interpreters not being sworn. The fact was, the Judge Advocate took upon himself to translate it, and it was of no consequence whether it was correct or not, only as a record, and for my inspection: for the Court, and evidences, spoke in one common language, and in sepoy trials, the proceedings are never read over from the records; they record as they go along, in their own breasts, and judge from what they hear, and not from what is written down."

"Runjeet Sing was found guilty of the charge, and sentenced to be reduced to the ranks for two months. The next day Lieutenant Hughes, (who commanded Captain Sandford's company,) took Runjeet Sing for his orderly. When a man is taken for a fixed orderly, it is a mark of distinction in the corps; and it appeared so improper to distinguish a man who was suffering punishment for a crime he had committed, that Major Kilpatrick forbid his being sent as an orderly to any Officer; and had he not done so, I would have commanded it, had it come to my knowledge officially. The act was contempt

of all authority: mine, the Court's, the Major's, were all insulted by it; and instead of complaining of this circumstance as an hardship, Captain Sandford ought to be very thankful that Lieutenant Hughes was not put into arrest for it."

"Captain Sandford speaks next about the mode of inquiry that I made. The orders are all recited except the order informing the Army of the result, which I add for your information. It appeared to me the most simple mode, and the most likely to produce a general complaint; and when I came to a company where I knew of the demands on them, I observed to the Majors, here so many rupees are charged, of course we shall have complaints: still all were silent—we were all astonished—but the fact was, that they had never made complaints, until sent for and ordered to relate what stoppages had been made from them. Fear induced them to answer, but you see plainly from the proceedings, that they did not complain. The man who was said to have complained to Lieutenant Daw, swore that he never did complain—that he was squabbling with the Subadar, Jurab Khan, about the sum that should be stopped—the Officer overheard it—an emissary of Captain Sandford's explained it, and Lieutenant Daw reported it to Captain Sandford, who brought the Subadar to trial. He was acquitted with great justice and impartiality, and could not have been found guilty without absolute perjury on the evidence produced; he was cleared to be sure, as soon as the trial was approved and published, as I trust is right and usual." •

"I am, &c. &c.

T. D. PEARSE."

When the Bengal troops joined the grand Army at St. Thomas's Mount on the 3rd of August, Sir Eyre Coote

ordered them to be dispersed amongst the several brigades; a proceeding, which we trust may have originated from some other cause than that of a personal feeling, on the part of General Coote, unfriendly to Colonel Pearse.

We are, however, unable to bring forward a single argument in justification of a measure, which, every person in the least acquainted with the extreme contrast in the habits, religious prejudices, and modes of life, existing between the Native soldiery of the two Presidencies, must pronounce, to say the least of it, to have been rash and ill-judged.

The feelings of the Commandant of the Bengal troops were severely mortified by Sir Eyre Coote's orders. In a letter to Mr. Hastings, Colonel Pearse writes,

“ I have the *misfortune* to inform you, that from the day on which the detachment joined Sir Eyre Coote, he has totally deprived me of the command, and has refused to let me exercise any authority over those troops, who came with me from Bengal.”

The bazaar establishments of the Bengal Army were also broken up; the cattle were allowed to stray without protection or restraint; and 400 bullocks, part of the supply brought by Colonel Pearse, were in one day carried off by Hyder's marauders.

Captain Sandford was sentenced by the Court Martial to be reprimanded by Colonel Pearse, in the presence of Majors Blane and Wedderburn; and he attended at Colonel Pearse's tent, received the reprimand, and was released from arrest.

Some idea of the thoughtless, overbearing, and insulting conduct of this Officer may be formed, from the circumstance of his having proceeded (immediately upon

his release from arrest) to his tent, put on his sword, and returning to Colonel Pearse's, challenged him to fight a duel.

For this serious crime, he was again tried by a Court Martial. The result does not appear in Colonel Pearse's papers.

A fatal duel took place at this time, from causes connected with the long continued dissensions between the Captains and Majors; and Major Kilpatrick died from a wound received in a duel with Captain Scott, by whom he had been challenged.

The siege of Arcot, as Colonel Pearse had supposed would be the case, was determined upon immediately on his arrival; but, as it was reported that Hyder had laid up a considerable supply of provisions and ammunition at Tripassore, an attack upon that place was in the first instance resolved upon.

On the 16th of August the Army advanced from the Mount to Poonamalee, and from thence to Tripassore on the following day, and the place surrendered to the British, after three days' siege, on the very morning on which Hyder's army appeared on the surrounding heights.

This wary leader finding that he was too late to save his fort, drew up his army in a very strong position a few miles off, on the very spot on which he had defeated Bailey.

Great as the wants of Sir Eyre Coote's army were, they found but a small supply of provisions in Tripassore; and vain had been the repeated remonstrances of Colonel Pearse in this respect; for the Army advanced from St. Thomas's Mount with a supply, adequate to a few days' consumption only, and the cattle of the train

was constantly harassed on foraging parties, to bring in the necessary supplies of provisions.

To give battle to the enemy seems to have been General Coote's sole consideration; and a want of co-operation in the principal Officers and the subordinate departments of the Army, which may be attributed partly to the violent jealousies between the King's and Company's Officers, but above all to the neglect of all confidential communication with some of the leaders of his divisions, had nearly led to the most fatal consequences.

Early on the 27th, the Army was put in motion to attack the strong position which Hyder still maintained. The following truly interesting letter to Mr. Hastings, contains an account of the action of this day; from which it appears that good fortune alone preserved the British army from total destruction:

To Mr. Hastings.

“DEAR SIR,

“Little did I think that I should ever sit down to write politics to you, and be an advocate for peace with Hyder. Yet I am now going to do it, and to submit my reasons; and if you do not like them, or the whole letter, tear it, and put it out of your sight for ever.”

“First, I must inform you, that three-fourths of the Nawab's possessions are mortgaged to individuals, who find the mortgage too lucrative for them to suffer the debt to be liquidated, as long as they can possibly prevent it. Admit then that the remainder of the revenue is sufficient to pay the old man's expenses, for the support of himself and his religious establishment, and the revenues of the Carnatic vanish. Consequently, the only resources for carrying on this war, are to be drawn from the contribu-

tions from Bengal. What the produce of the former is, you know, and you of course can find how much you must inevitably furnish, to support a war, that is too *lucrative a job* to be ever ended, whilst it can be kept up."

"Next I must tell you that we have no Army. I am pretty certain I do not assert what I cannot prove, when I say we have not ten thousand fighting men in this Army, which is the only one likely to be employed against Hyder's *Host*. And it appears to be impossible to keep up this paltry number; for, though there are many causes of diminution of strength, such as death, slaughter, discontent for want of pay, and the inevitable consequence—desertion—yet there are not the means of raising recruits to supply our losses, for *the country is a desert*. The inhabitants are swept off; and if there were means of getting them, they would be raw and undisciplined, consequently not fit to oppose an enemy whose troops improve by fighting; and though discontented at the unavoidable fatigues of the war, and the precarious manner of obtaining their supplies, have not shewn the signs of it by deserting. And if they do go off, it is not to strengthen our Army, for they do not come over to us."

"Next, I must tell you that if ever we can get money, and get men, it is not possible to subsist them; for, though you send provisions, we seem absolutely certain of not getting cattle to move them. We sallied forth in quest of adventures from the Mount; went and took Tripassore, and then were obliged to harass our cattle almost to death to get provisions into it to support the garrison. From thence we went and fought a battle; lost about 400 men; killed about as many of the enemy; and were forced to return in haste towards Madras,

to get food to subsist upon. Here we are, not above 12 miles from it, and yet it is with the greatest difficulty we get a seer of rice a day for our troops, who seldom get dhol or ghee to make the rice a proper nourishment; and if dhol is sometimes given to the troops, it is in lieu of rice, so that it does not answer the end proposed—the troops are starving. There will be, or there are, 16 days provisions for us, (the troops only), at Poonamalee. The troops can carry 4, the cattle are to be loaded with 15. The bullocks left, (after taking a proper number for the train,) will be able to carry one and a half day's food for the fighting men, with which, and what we may pick up by the way, it may be possible to go as it is *believed is intended*, to relieve Vellore.—Granting that Vellore is already relieved by Lang's exertions and good fortune, (as report says), still all our cattle will be insufficient to bring in supplies during a siege, nor do I see how it is possible to afford guards to protect the necessary implements to carry it on. What prospect is there then of taking Arcot? yet if we fail, we shall lose our credit and the few troops we have, and leave Hyder master of the Carnatic."

"I will next say positively, that our Chief is not equal to the task of carrying on the war; the confusion of his orders in the late action, plainly shew he is past the time of military knowledge. I will give you a sketch of them, and then you shall judge for yourself."

"Hyder had taken his post on the ground on which he beat Bailley. It was extremely strong by nature, and he knew it. We, to our cost, were so totally ignorant of the ground, that it was with difficulty we got on at all. There was an avenue of trees, and when the fray began in front, we found a water-course on the eastern side of it. The

left which was part of the second line crossed, and got possession of a tope, where the men took post. The right was ordered to form on the west side, and consisted of three battalions; we formed obliquely, and then it was ordered to advance in line and turn the enemy's left. We moved for that purpose, but Hyder artfully, I should have said skilfully, opened batteries on our right to draw our attention that way:—Cooté fell into the trap— we were ordered to move to the right, and so separated from our left wing—and Owen, being hard pressed, sent to apprize him that he could not maintain his ground without a reinforcement. By this time we had advanced upon the west side of the avenue, and had crossed a water-course, over which the guns passed with extreme difficulty. The rear of my brigade, which composed the left of this line, was not quite across when Cooté came up.”

“(N.B. To make things clear—the army was marching, ready to form two lines; what would have been the front line, became the right wing; and what would have been the second, became the left wing where I commanded, but it was reinforced by four battalions of my brigade.)

“‘What are you doing Sir?’ says he, ‘Where are you going?’—I am following the rest of the line as I was ordered.—Sir, it is all wrong—your left should be at the avenue, and you are far from it.—Sir, I know it.—I thought we ought to be there— I was going to form the right parallel to the avenue, to turn the guns of the battery which fires upon my rear, but the line moved on, and I was forced to follow it. But, Sir, you have troops enough to do it now—do it!—I cannot, Sir; you see the last of my troops, and the line is still marching by the right, shall I stop?—No!—Shall I

march back?—No! that will break the line.—Then, Sir, you must send orders to the right to return, or we shall be still further off.—Sir, if we both talk together, neither will understand.’—I took off my hat and said, ‘I am all attention.’ He then began a long harangue, and told me it was his intention to form a line, and then advance in line to the front, and drive the enemy’s left upon their right—this was the amount of it. To which I answered, ‘Well then, Sir, if you will only tell me what I am to do, I will execute it.’ Coote, instead of answering, turned his horse’s head, rode towards the avenue, and I followed the line; for, as that was to advance upon the enemy, it was necessary to keep it compact. Orders had been given to advance as soon as the line was formed, (it was the original order, and had we done so, it all would have been well); but the firing on our right made him change his intention, and caused all the subsequent confusion. The advance began before the orders to return to the left were received by Monro, and his troops were advancing through a very thick jungle, and were broken into tens in consequence. About this time Colonel Brown came up with a battalion from the second line, and Coote met Owen’s messenger, who came with the advice that Owen could not maintain his post. Coote ordered that battalion to go to Owen; he then came up to me again. ‘Sir, all is wrong—we are abandoning our left, and leaving it and our baggage to be cut to pieces—send the 18-pounder’—It went, but as I had no command there, and my brigade was moving on, I rode to the head of it. Orders then came which contradicted all that was doing. I was told Stuart was to command the left, having secured the baggage, and disposed of the forces of the second line. Orders were given for the

line to fall back out of the jungle, and then to march back to the left, and I was sent with two battalions of my brigade to reinforce Owen. Stuart was with me—we were just gone, when he ordered two more battalions from my brigade to follow us. The messenger who came from Owen was to conduct us; we marched back along the western side of the avenue to the place where we had crossed the water-course, and with the utmost difficulty got over; (*the day on which we marched back after the action, we found that within 300 yards of the place, the water-course ended,*) and then we entered the avenue to return to Owen. After I was gone, the line fell back, marched by the left, formed parallel to the avenue, passed it, fell back again by order, remained exposed to a terrible fire for above an hour, and then moved on again; advanced to a village, drove the enemy out, moved on, was stopped by a swamp and exposed to a raking fire. Monro was so disgusted, he would not act. There was shelter for the troops a little in their rear, or in their front; but he would not act from himself, for Coote had affronted him; he had told him that *he was giving advice, when he should be doing his duty*. Coote had left the right to visit me on the left, where, finding I had got before Owen's post and made it useless, he first ordered the camp to be marked out, then to advance to reinforce Owen's troops, and then he left us and went to the right again. We went on, drove the enemy from the rising ground, and took possession of that which Hyder had occupied, which was full two miles from the avenue. The next morning we saw the right encamped about half a mile from the avenue, and about two miles from us. If the enemy had understood his business, as well as Hyder is supposed to do, he would have separated us for ever. He tried

to draw me further from the right, by placing a gun, where he supposed I would advance to take it: if I had done so, his right would have attacked me in front, and a large body of horse in the rear. I fortunately foresaw what would happen, and would not advance: on the contrary, another battalion having been sent to support Owen's post, I ordered it to join me, and was in the act of moving to the right, obliquely advancing on the enemy to recover the interval, when I received orders to do so. When I had assembled four battalions, and found that this force kept Hyder's main body at bay, I was about to move on, but first I sent to Owen to know if he could tell me where Coote was, and what was become of the right wing, for they had not advanced, and as this was between 3 and 4 o'clock, I surmised that they had retreated. I had not heard from, or seen Coote for two hours; and then I reflected, if they had retreated, we must cover them, and that the post I held, was not to be quitted: though a bold push from our quarter would have effected even that, if we were successful. My orders were *peremptory to support Owen's post at all events*, and if I had failed in my attempt, (and four battalions could not promise much success against such a body as we saw, and such a train as fired upon us) death, by the articles of war, was my inevitable doom, and justly so; for, in the case supposed, it would have been the cause of the destruction of the whole Army, therefore I halted. But when a fifth battalion came, I determined to seek the right, which I could then do without abandoning Owen's post. I was in the act of doing so, when I received orders to the very effect; and heartily glad I was to find matters were not as I had supposed. But if I could have learnt how matters stood, when I

had discretionary orders to do the best, not forgetting that the preservation of the post was of the last importance, Hyder might have been driven off the field in a much earlier part of the day."

"Do not infer vanity in me, for all this; I relate it to shew the confusion of orders which prevailed. You ought to know the dependence that is to be placed in *him* who conducts the war. The confusion was such, as could not, and did not escape the observation of every body, and you may hear further accounts of it from others. But I am competent only to tell *what I know*; and, with it, *what I did*, is so blended, that I could not do one, without telling the other also. I would never have said half so much as I have, if the situation of our affairs, did not demand that I should speak the whole truth."

"And now, having shewn that we have neither men, money, provisions, or a General fit to lead us, I shall proceed to the subject of this letter, which is to recommend peace. — *Peace, on Hyder's own terms*, the grounds of which are, to acknowledge his son *Nawab of the Carnatic*: in which case, it is said, he offers to form an alliance with us, offensive and defensive; to pay the expenses of the war; to disband his French troops; and to assist us against the Patán attacks. But before I proceed, let me just take a sketch of those who are to succeed Coote, in case of any accident; and if I may judge from all accounts and my own observations, he is seeking for one: for, after the failure at Chillamdrum, he lay down in the verandah of a house for some hours, and would not speak; here he was exposed to the whole fire of the enemy, had placed a candle in the house and lay before it—no persuasion could procure a word

from him, or even induce him to put out the candle. In the late affair, wherever he could get into the midst of the fire, there he was: nay, he exposed himself to be taken, for he advanced before my line, close to some of the enemy, and Owen, who saw his danger, cried out, 'General, for God's sake, where are you going?'—Now the next to Coote is Monro, of whom I shall not say any thing more.—Stuart is next to him, and many are the doubts here concerning him; besides, he lost his leg in the late action. Stuart is to retire after this campaign at any rate.—Lord McLeod is next; he is an old woman, not fit to command a regiment.—Lieutenant Colonel Crawford, (*a Colonel in India*), is next. He is as good a soldier, as one who was never out of St. James's Park can be; but he is brave, cool, and temperate; and his abilities must be judged of hereafter.—Lang is next. He has shewn that he is a very good Officer, by his defence of Vellore; but whether he is equal to the task of conducting an Army, under all the difficulties which our's has to encounter, I do not know.—Brathwaite is next to him, and he has done nothing to the southward; so, as he could not do the little that was to be done there, we may suppose he is not altogether the best of the bunch.—The next is myself, and sorry I should be to say, that I am fit for so arduous an undertaking.—Of all those I have mentioned, Crawford seems to be the least exceptionable, and some of the others may do for under parts; but if he should fall, what is to become of India? Now for the great article. It is notorious that a great part of our misfortunes in the Carnatic, are owing to the Rajah's bad government, by which he has alienated the minds of his troops and subjects: both fly to Hyder, who receives them eagerly; with the former he fights his battles, by

means of the latter he subsists his Army." When he can guard the lauds, he lends money to carry on cultivation; the Rajah's subjects raised the grain which he has supported his Army upon. He repaired the pagoda at Tripassore; the inhabitants draw comparisons: the conqueror helps us—the old master oppresses us,—the English, in their struggle to drive back the conqueror, devour us—and if they succeed, what are we to expect but more oppression to supply the coffers of our old master, to pay off the debts incurred by the war, and to pay miscreants who ought to be rewarded with halters! If, to extricate the Nawab, you make him deliver up the mortgaged countries, complaints from the sufferers will raise all England into a flame; and *more lawyers will come out, to ruin the last wreck that remains.* Our laws are so odious, that being tried, they will blast the last hope of reconciling the people to our Government. Suppose the Nawab dies; a civil war will succeed, and the people will call in Hyder—hence a new war. In the mean time, let me consider our state at home. We are now at war with America, France, Spain, and Holland, and it is also said with Russia, Sweden, and Denmark. The French and Dutch will assuredly make an effort to get here; they will form alliances with any who are our enemies—with any who will acknowledge Hyder's son *Nawab of the Carnatic.* Hyder will join and renew the war, if we should make peace this instant on any terms except accepting of his son—but time presses.—Next spring we may expect that so great an alliance as there is against us, will be able to act, and force a passage to India, if they find us at war with Hyder. Thus destruction seems impending; but should they find we have accepted

Hyder's son, and pensioned the useless Nawab, *the cause of our misfortunes*, they will be forced to return, and all their hopes of India must vanish for ever. For in that case we shall be sure of commanding the aid of that very Army which now oppresses us; with which, and with our own recruited, we may fairly bid all defiance. A peace with Hyder, secures Ceylon to us; and that, as it must ruin the Dutch, must force them into peace, and when once the confederacy begins to break, the rest will make terms as fast as they can. With Hyder's force, to aid us, the Mahrattas must accept our own terms, and a Peishwah of our own choosing, will effectually shut out the French and Dutch. We must in the end remain masters of India. The present family, protected by us, will always be ready to make Jaffier's, if any contest should occur between us and the man accepted by us: and thus the future Nawabs will become Mobairicks and Asuph ul Dowlahs. Thus then we shall secure to Great Britain an empire in the East, which may enable them to bring shame on the confederacy in Europe. If we persist in war, I fear the end must be ruin: for, grant that we fight and gain some battles more, and lose 2000 of our men, (we must conclude that desertion and sickness will carry off in the mean time as many more), we shall then be only 6,000 strong: and since 10,000 can but cope with 100,000, 6,000 can only hope to oppose 60,000; but Hyder has 100,000 at least. If he loses 10,000 men whilst we lose 4,000, he will have 90,000 left; that is, 60,000 to keep our 6,000 at bay, and 30,000 to carry on sieges, and so add to our distresses. All this may happen, whether the French, or Dutch, or others, join or not; and if they do so, I leave the sequel to your own judgment."

“I am ready enough to grant that this country has great resources; but we cannot avail ourselves of them. The Nellore district might, under proper management, have furnished cattle and provisions for all our wants; but it is under a *set of miscreants who hold it in mortgage*, and they are under the Nawab’s officers, who strive all they can to prevent exertion. From their whole conduct, one would think the Nawab was in league with Hyder against us, for he has not shewn any exertion. The crops of the Carnatic must fail this year, and the little that is raised must fall into Hyder’s hands: therefore we must get rice from the northward, of which I firmly believe that every seer, what with prime cost and carriage, will stand the government in one rupee—the half of this sum is assuredly, within bounds. Only look at my accounts, there you will find that the expenses of maintaining the carriage cattle, *exceeded* the amount collected for the grain from the troops; and the price of the grain and the purchase money of those cattle must be added to this loss. Yet, these cattle and their drivers, were *mustered* and paid at much lower wages than they now get. *Here they are never mustered: the agents charge what they please—their accounts are hardly looked at.* Never let any one talk of the extravagance of the Bengal Establishment: we spend by hundreds of rupees; they by thousands of pagodas. I brought 6,000 bullocks into Coote’s camp; they did not benefit by 1,000, for those who might have taken charge, refused to receive them: the followers of the camp stole them, and it was impossible to prevent it. The agents, sent at last to receive them, actually sold them before our faces. I only got ill-will for representing it. I told Coote repeatedly of it; I added, it will always be so, until you

have Officers in charge whom you can break for mismanagement. He agreed it was true; swore for half an hour, and then was persuaded it was all false.—*They know how to soften him.*”

“ If then, to carry on war, you drain Bengal to the last rupee, it will not save the Carnatic, but it will ruin your own government. If you endeavour to supply recruits, or to increase the Army by reinforcements, first consider the consequences: the deserters from us will meet them somewhere; they will tell of our distresses; they will magnify them; they will tell the new-comers how little pains were taken after they joined, to *alleviate their distresses*, and how much apparently was done to *increase them*; if then they do not mutiny and refuse to advance, their numbers will dwindle away by desertion. I hate this subject, and nothing but the necessity of your knowing the truth, should prompt me to it; nothing but the real love I bear you should force me to it. Do not think I wish to return, and get out of this scene of trouble,—no; I am determined to see it out. If I must perish—be it so—you never should find me flinch from any thing. I did care for my life when I left you,—it is now of no consequence to me—the sooner I fall the better—my situation has made me wish it—still however, in the time of need I can forget, and only feel my miseries when I have nothing else to employ my mind. Now even while writing on the subject of our affairs, I am so engaged in the subject, that I hardly recollect I am miserable. Be your determination for war—I am ready to act my part in the battles—nay, in that I have some chance; I may perhaps in some way distinguish myself—I will if I can; if for peace—I must return and sink into my former insignificance. A soldier therefore, according to a mere

soldier's idea, ought to wish for war; but I would readily suffer myself, and urge every thing for peace: not to ease my poor self, but my country. If you know of resources equal to the war, and such as will promise a glorious end of it, for God's sake, attribute what I write to my ignorance of them. If you do not know every thing I have written before; take what you can learn from my letter, as it was meant for your information."

"The Nawab, by his mismanagement, has rendered himself unfit to govern any longer; and whenever that happens, in any state, *it ought to revert to first principles*. In plain terms, *there ought to be a revolution*; and he that will promise greater advantages to the State, ought to be put at the head of it. Hyder's son seems to promise these advantages here; if we accept him, we may get time to breathe, and time to get strength to reject him again, if he should not answer our purposes. Causim Alli and Jaffier* exchanged places upon the same principles, and Bengal became our's for ever. I who write this, cannot do it from any hopes of gain; I am too low in the list, to be ever thought of: therefore at least I have one merit, that I write disinterestedly. From what I see, we appear to be engaged in what force of arms cannot relieve us from; and therefore I recommend *address*; and this is ever a soldier's maxim, as well as a politician's. Let me remove the idea of giving Hyder too great power. He has it now: one son settled here will be separated, and there is another for Mysore; but this would be all: therefore the same power that raises one, may also support the other, and establish rivals for

* Alluding to the revolution effected by Mr. Vansittart, in 1760, when Meer Jaffier, the 1st Nawab of Bengal, was dethroned, and Meer Causim, his son-in-law, set up.

power and benefit by the disunion. This prospect is not very far distant. Age must effect it in a few years; for, though Hyder has raised himself to a throne, he has not to immortality."

"Do not let me suffer in your opinion for what I write: for though there should not be sound policy in it, there is sound honesty; and that I hope will always entitle me to claim the privilege of subscribing myself,

Dear Sir,

"*Cloute,*

Your faithful servant,

12th September, 1781."

T. D. P.

in thunder, lightning, rain, and the croaking of myriads of frogs."

"P. S. Coote took the approval of Sandford's trial on himself, alleging that it was his right as King's Commander in Chief, so that it will go to England, and I cannot send it to you. Major Kilpatrick died of the wounds he received from Captain Scott in a duel, occasioned by the disputes in the regiment originally. Varas now commands the regiment. Coote peremptorily refused to let me exercise the command over the Bengal troops, agreeably to the instructions of the Board, so that I only know by common report, they are deserting very fast, but the 13th regiment is in my brigade, and it has lost near 100 men lately; and a plan was laid for the whole to go off, but it was discovered in time. All this is owing to the little pains taken to support them, and could have been prevented if they had remained together in a body by means of the bazaar they had, and a little management on the part of the Government and Commander in Chief, to have enabled me to get dhol and ghee for their use."

On the 18th of September Colonel Pearse dates the following letter, the interest and value of which as a document will be felt, we are assured, by many of our readers.

To Mr. Hastings.

“DEAR SIR,

“Since my last *Monro* and *McLeod** have decamped, and are going home. Thus two of the individuals mentioned in my letter are disposed of; and *Brathwaite* went against a little fort, shewed that he was not the best of the group, was defeated, wounded, and is returned to *Tanjore*. *Stuart* if not dead, is next to it. Thus by chances unforeseen and unexpected, I am become the next of the Company's Officers to *Cote*, in the acting Army, and command the left wing in my own right. By this *Dickson* is again become my *Aid-de-camp*, and *Humphreys*, my Secretary. But now a more serious difficulty engages me than before. *Crawford*, I told you was a King's Lieutenant Colonel, with a Colonel's Brevet, by virtue of which, he commands *while Cote is alive*, the right wing; but it appears that the Company have at last resolved to support their own Officers, and have therefore empowered their Governor and Council to appoint their senior Officer a Brigadier General, to prevent their Army from being commanded by a King's Colonel, who may accidentally serve here. If therefore *Stuart* should die, *Lang* will succeed to that rank; but how matters are to be regulated, if any accident should happen to *Cote*, before *Lang* joins, I am at a loss to determine; for certainly the case will admit of dispute. If I yield to *Crawford*, I shall yield the right of the Company's offi-

* *Sir Hector Monro and Lord McLeod.*

cers; if I contest the point he produces his King's commission. The order is very publicly known, but it is not published. Crawford knows it, and he was going home, but Coote prevailed on him to stay until we return from the trip now undertaken; and thus he has created a *stumblingblock*, which, if any thing should happen to him, might be productive of the worst consequences to the service. Coote ought to have removed it, but his ill-will, to me made the thought of my being second in command insupportable. Brathwaite went out a Major to Bencoolen in 1779, from thence he came to the Coast army, got in, and has risen by the accidents of the service, to be a Colonel senior to me. I do not complain of this on his account, but Horne, who returned a Captain Lieutenant of Artillery, the year that I came out as a Major, has claimed rank above Brathwaite, and has got removed to the infantry, as a Colonel above Brathwaite; so, if he should arrive, he also will be above me, which is hardly bearable, for he was not a Major until many years after I was a Lieutenant Colonel, and as the Coast officers have made such a clamour about their rank, I think the Bengal officers have an equal right to cry out. Crawford, I said was brave, cool, and temperate; but I said also that he was without experience. He seems to know this, for he actually asked to be excused the tour of Field Officer of the day, alleging, that he was so young a soldier, and totally unacquainted with the duty. Since that, however, he has had the experience of a campaign, is now second in command here, and would, I make no doubt, soon be able to acquit himself of all his duties with propriety; so that, as I acknowledge his abilities, I the more regret that I am in a possible situation to dispute his authority, though I earnestly hope that this will not be necessary.

We are now going to Vellore, but by what route I am not informed. If by the straight road, we shall have fighting enough, and I wish that our successes may be equal to it; if by the hills, we shall have labour enough; and if we are not fortunate, we may perhaps return to starve at Madras, for there are only 3,000 bags of rice left there. I am, therefore, still of the same opinion, of the immediate necessity of peace, as I was when I wrote to you before; and Coote told me yesterday so lamentable a tale of the situation of finances here, and with you, that I was *horror struck*."

"Let me now say a few words in favour of my volunteers, who were promoted to the rank of Ensigns on the Bengal Establishment. You know that they turned out to go on service to the Coast, and to act as a company of volunteers against the enemy. They never asked for, or wished to hasten their promotion by so doing; but to shew that they were worthy of the favour which had been shewn them, by their zeal for the service, and desire to learn their duties in the best school, which is a camp, against an enemy. Soon after they arrived here, many of them were put into the Madras army as Ensigns, not at their request, nor by any interest which they made, but because this Establishment wanted Officers. They served with cheerfulness, not expecting that by so doing it would turn to their disadvantage; yet, so it has proved: before I left the Midnapore provinces, they were all made Ensigns on the Bengal Establishment; the very thing they all hoped for when they embarked with Coote. They therefore expected to be permitted to accept the commissions that were thus granted them: it was refused; they prayed to be allowed to avail themselves of those commissions when the service should be over:

this was also refused. It was said their appointments to commissions on the Coast, was prior to those given in the Bengal army; and therefore that they should not be allowed to return, *but must and should remain on the Coast*. Now, dear Sir, this is a very great hardship. They were originally appointed volunteers on the Bengal Establishment; they were actually my own company; they proceeded as my company, and it was declared so in orders. Madras had no right therefore to take them by force, and make them Officers on this Establishment, though this Government might, with all propriety, appoint them to do duty as Ensigns with their troops until you demanded them; or entirely, if you give them up, and the young men acquiesced. All they ask is to be kept on the Bengal list, or to be permitted to take up their rank in the Bengal army, when their services on the Coast can be dispensed with. In my heart I wish that this may be allowed; for most of them are very good Officers, and I have not heard one of them spoken ill of. To me it appears to be a great hardship also on the Madras cadets, to keep these lads here; for by so doing, the cadets, *now coming out in swarms*, are kept out of commissions; and your Establishment which has not been supplied with so many cadets, is kept thin of Officers. This is a *Cootism*; who can do any thing, but be good tempered. He is in a most furious rage about the new Establishment, but, God forbid that his raging should overturn it. The only objections which I have heard him urge, are, that Stibbert proposed it, and you approved it without consulting him; and he alleges that it creates confusion—that the other Establishments want the same—and that it is illegal, because not authorized by the Court of Directors—that the King's Officers will not allow of

it, and will not serve—that he has orders from the King not to suffer His officers to be superseded. *This is the true reason*:—He cannot bear to see a Company's Officer get forward, and can readily and gravely assert, that it is right, that young Mr. Squagg, who from a barber's apprentice, became an Ensign in 1779, embarked for India under Lord McLeod in 1780; was promoted to be Lieutenant in the beginning of that year, or on the passage, and by the chapter of accidents, has got to be the oldest Lieutenant before the end of 1781, ought in consequence of the death of a Captain of the 73rd, and one of his own appointment, to succeed; and thus to take rank at once, above all the Company's Captains, who have had the command of battalions these ten years. He began in this strain the other day before me; and I answered him, 'that I thought it would be right, if the King's officers should rank above us, were we to meet on service in Europe or America, but that we ought to rank above them in India; because, from our services here we were fitter to command; that having ears, eyes, and understanding, as well as the King's officers, we extracted from their system of discipline, what was adaptable to our state, and so formed one, which differed from theirs in points, in which the nature of the country, the manners, and religion, shewed us that it was necessary.'—He replied, 'Sir, there shall be none but King's officers, it is notorious that the King's troops did every thing and saved the Carnatic, and had it not been for them, you would not have had a foot of land in India.' I replied, 'Sir, remember that I am a King's officer, and in His pay, and now I must tell you, that though you saved the Carnatic with the King's troops last war, you will save it by the Company's troops *this*

time, and with their Officers; for it was not a Company's officer brought us thus low, nor was it the 73rd regiment that drove Hyder away three days ago. 'Sir,' said Coote, 'I do not mean to say that the Company's troops or officers are deficient in point of abilities or courage; God forbid that I should; I know the contrary: but I mean that there should be no Company's forces in the political question of their right; and Officers might learn their duty, with King's commissions.'—This, and a good deal more, passed on the subject, when, in consequence of my asking to command the troops which I brought from Bengal, he instantly fired, flew at the Board and Stibbert, and we wrangled stoutly until supper came in, during which meal he hardly spoke a word to me. I had this all over again another day, (*except the King's officers' part*), upon repeating my request which had been unanswered before. Unfortunately I read the instructions which I had received, and he flew in such a rage that I thought he would have beaten the table to pieces. We have been on pretty good terms since; but I found that I was not to command, and that every attempt to get the command of the Bengal troops, would not only be in vain, but might create a flame, *not proper to light up in a camp, where there is not any thing to roast*. Here I leave off to go and eat his venison, as he has invited me to dinner; and now, though I have a great deal more to say, I must stop, for we are to march at 4 o'clock; so God preserve you!"

"I am,

Dear Sir,

Your faithful servant,

T. D. PEARSE."

"Veloote,

18th September, 1781."

On the 1st of October, the following letter was written to Mr. Hastings :

To Mr. Hastings.

“ DEAR SIR,

“ I am now to inform you of our progress since I last wrote, and of our second victory, which was in every way much superior to the former one.”

“ On the 19th the Army marched from the camp, near Poonamalee, and, proceeding by the road through the jungles, arrived at a fort called Poloor, near the famous temple of Tritany. On the 23rd the fort surrendered at night. The temple is situated on a hill of considerable height, lying between two others (to which it joins) still higher, and fronting the western hill. Hyder's camp was perceived to be about 8 miles distant. The 24th and 25th were spent in getting in and delivering grain, and on the 26th we marched to a village called Parangee, where, it was reported, Hyder's left lay, but the account proved erroneous. On the 27th the General went out to reconnoitre, and found the enemy's whole force in camp, not 5 miles from our right, at a village called Cup-poor. His left extended a great distance into the country; his front I think was facing the east or north-east. His own green tents were a little to the south of Cup-poor. At the east end of this village there was a small hill of rocks, from which there ran the bank of an artificial lake, nearly north, about half a mile from whence it turned off west, and so passed along the north side of the village. On the northern side of that lake there ran a water-course, which in some parts had a deep channel, and it ran through broken swampy ground, until it turned off towards the south, and by so doing supplied a tract

of paddy fields which ran along the eastern branch of the lake. In the continuation of the east bank of Cuppoor lake, and about a mile from its northern end, there was a village called Soorapoor, which had a large pond with a bank as usual and watered paddy fields on the east side, and the ground lying west of the pond was rocky and jungly. About 5 miles north east of Soorapoor, lay Sholingur mountains and pagoda; the latter is a place of great note. A ridge of rocks extended from thence about 4 miles, in a circular form, of which circle Cuppoor is nearly the centre. Having now described the ground, I can make what is to follow clearer than I could have done otherwise. We crossed the ridge of rocks within a mile of their southern extremity, kept them on our right, till the head of the line reached the Sholingur mountains, at the foot of which the baggage was lodged with two battalions and four guns. About a quarter past 3 o'clock, the firing began on the right, before which the country was open, and the enemy began soon after to advance in line: Soorapoor lay before the left. Tippoo Sahib, with a considerable force of horse and foot, took post there, and with two guns from his left, fired towards our centre. He sent eight other pieces to the left flank of our line, and as soon as it began to move forward, they opened their fire, but, being at a great distance, the shot did not do any thing of consequence. The right having open ground, moved on very rapidly, but the left was entangled in the rocky ground, and could not keep pace; it was besides necessary for the left to keep inclining to the right, to clear Soorapoor pond. All these impediments kept the left wing back very considerably, and were the causes of two tumbrils and a limber being left behind, one of which, and the limber, the enemy after-

wards carried off. As the right was separated from the left, the enemy made a charge on the left of the right wing, but was received by the 13th regiment and the 17th battalion of Carnatic sepoys, *in such perfect order, and without a musquet being fired*, that they turned back in dismay, and suffered excessively, not only from showers of grape as they advanced and retreated, but from the 2d battalion as they fell back. The right pushed forwards and took a gun, I believe it was opposite to the 13th regiment. Hyder was present at the charge, and finding it did not succeed, he went to Soorapoor. Tippoo had removed his infantry, and gone round the left flank to fire upon our rear; the left wing was at the pond, and the village about 800 yards from it. When Hyder got there, he found the wing so much scattered, that he ordered his horse to charge. As they passed along the front, which was the most compact, they suffered extremely from the grape: nevertheless they pushed through an interval that lay near the right of the wing, but did no kind of harm. It unfortunately happened that the limber and tumbrils had belonged to that very interval, so that there was no grape to be had to take them in front. Another party had gone round to the rear, but finding how much the rest had suffered, they went towards the baggage, and were repulsed. Tippoo also fired some shot at the baggage, but finding more resistance than he expected, he turned towards the rear of the left wing. Orders had come to the left to follow the right, but Tippoo being in the rear, a body of horse on the flank, and the gross of Hyder's army, near the rocks of Cuppoor, with four guns advanced, and firing from the banks of the lake on the left, and the ground being as described, too difficult to be passed in line, I deemed it most prudent

to stand firm; for the pond and rocky ground behind, secured my flank and rear, and where we then were posted, the ground was highest. Had we quitted it, Tippoo would have come to our ground, and have fired on our rear, whilst we should have been entangled in the wet and swamp, and the horse that were on the flank could have turned us and charged our rear. Therefore instead of obeying the orders, I sent word to Coote of our situation, and recommended that the right should join us. This was attempted, but the right found it impossible by reason of the swamp and nullah. Only the 13th regiment effected it. My left was at the pond, and my right near the swamp, when Coote came up to us, and received a report that the regiment could not join, but could advance to Cuppoor village and grove. The enemy were at this time going off very fast, and the General ordered the right to do what had been proposed. They therefore advanced, and the 2nd brigade, which was the right of all, pushed on and discovered the enemy. A most furious cannonade commenced, but as it was beyond the village and grove, the cause was unknown. The General therefore ordered my wing to stand fast. It was sunset, and when we went to see what was the matter, it was dark, and the firing over in all quarters. We encamped at and about Cuppoor, on Hyder's own ground, and about 11 o'clock, I joined with the baggage, and encamped in a second line behind Cuppoor."

"The Kalastry Rajah, Bumcaup Dewan, and two Polygars came off, and left Hyder, and promised us plenty of provisions, in quest of which we marched to Sholimpoor next morning. In our way, we buried Hyder's dead, found two wells full of dead bodies, and counted 650 or 700 horses lying in the field. By accounts since

received, he carried off 1,500 doolies loaded with wounded men. Our loss was less than 100 men, and our reward was a gun and supplies from the Polloms, from whence Hyder drew his subsistence; so that he has suffered an irreparable loss, and I hope will grow tired of the war which promises so little benefit. The enclosed orders will shew the rest."

"Now let me recount a little adventure of my own: when the line I commanded had got through the rocks, I was labouring very hard to get it compact, for I perceived the horse were preparing to charge. I was at the interval through which they passed. My horse took fright and ran away, kicking with all his might, and was surrounded by the horsemen. One man's arm was raised to cut me down, when he received a shot in his back that saved me. With difficulty I turned my horse, and rode full speed back to the line, was pursued by another man, when somebody shot him. Humphries got a wound, a man closed to cut him down, he pressed towards the man, ran his arm along the sword close to the man's hand, and so broke the force of the blow: another came up, and he shot him. I believe he shot the man that was going to cut me down, but Humphries will not say so. My Jemadar and my horse which he was riding, were both wounded by our troops. The enemy carried off my little Toorkey, that was Angelo's, and also the horses of Dickson, my Aid-de-camp, and Kennaway's and Gillies's instruments, medicines, and palankeen; so that I am a sufferer in small matters; and it is well it is no worse. I suppose I have the proverb in my favour, for my situation was critical and yet laughable; for nothing could be more so than to see me riding off with the enemy. The men were so drunk, they did not know

what they are about, and my horse kicked so furiously, that he helped to preserve me. One man got close to me, just as I had got the better of my horse. I put my hand to my pistol, and he rode off; but if ever I go into an action again without a good sword in my hand, I shall think I am a fool indeed. We are now in the land of plenty, and preparing to go on again; and the next time I write will, I hope, be to tell you of the complete overthrow of Hyder."

"I am, Dear Sir,

Your faithful servant,

"1st October, 1781."

T. D. PEARSE."

"Coote has got a commission of Brigadier General for Lang, to prevent his coming under Crawford; so I alone suffer, as I do in every respect, except health."

"In the two actions we have had, the troops that marched under my command, distinguished themselves by their gallantry. The General Orders on that subject pointed out the 13th regiment as the particular corps. I have only to add, that the battalion of the 13th regiment, commanded by Captain Powell in the action of the 27th August, merited the highest encomiums for their spirited attack upon a village from whence they dislodged the enemy: and as this fell immediately under my cognizance, having been performed in the part where I commanded, I hope it will appear proper to mention it."

"I am with the greatest respect. &c. &c."

The following truly parental letter written to a Lieutenant Mertrick, a protege of Colonel Pearse's, contains such excellent admonition and advice, and these are so kindly given, that we trust many of our readers may derive instruction as well as amusement from the perusal of it.

“DEAR SIR,

“You came out recommended to my care and protection, and I did not hesitate to attend to the recommendations you brought; therefore, as they required of me to superintend your conduct, this letter will I trust be kindly received by you. I heard to-day that you are very negligent, and do not discharge the duties of your office, and that you even neglect those of an officer generally. When the regiment last went on service, you staid behind without leave, under the pretence of sickness. All this shocked me so very much, that I sent for you this evening to speak to you about it; judge then how great was my astonishment at hearing that you were gone to sick quarters! Who has been so much your enemy as to advise you to take such a step, at such a time! and why was it taken without mentioning it to me! Do you not know that when an army is in the field against an enemy, it is ruinous to the reputation of an officer to remain in sick quarters, without such evident proofs of the necessity of it, as shall excite even pity. Let me beg you will reflect in time and not expose yourself to ruin. I expect from one under my charge, that he makes his duty his study. I got you the post of Adjutant, not for the rupees; those, if your pay had not been sufficient, you might have had from me, *but to make you an officer.* The Adjutant who does his duty properly, must be the most active officer in his regiment.—He must be the first and the last on the parade; know every exercise, and the detail of every duty; must be expert and exact in making returns, and consequently know the exact strength of every part of his corps, so as to inform the Commanding Officer of every thing in it at once, without even referring to pa-

pers.—He must know the state of the arms, accoutrements and ammunition; the characters and conduct of the Native officers, and of every private man: and can he do this without the closest attention to his duty? can he do it in sick quarters? I expect also, instead of seeking occasion to avoid duty, particularly those of danger, that any person who may be under my charge, will be foremost on every occasion, ever emulous to get *into the way, not out of it*. With respect to moral character, I require only that he behaves like a gentleman. If he can do that, and be a man of immoral character, he must have more assurance than I have met with in the course of my experience. Wildness is common in youth, and pardonable when it does not degenerate into vice; but wildness, if not checked in time, too often ends in vice, to the utter ruin of the party concerned: and now I have told you what I require, I have done my duty by you. If you desire that I continue my favour to you, you will pay attention to what I say, and set such a guard on your conduct, as shall prevent my having occasion to animadvert again. Return therefore to your duty, if it be possible, attend to it with the closest regard, *to every part of it*, and never let me hear it said again that one I patronized, has formed improper connections. Be assured of this—young as you are—if by your neglect, or by any improper behaviour, you lose the post you hold: I mean, if you are deprived of it as a punishment, I will never get you another. I obtained this by proving, when I asked for it, that you had some qualifications for it,—do not put me to the blush by proving the contrary. This is the best proof I can give you that I am your friend, and I will continue so as long as you let me. If you suppose that by attempting to return, you are exposed to

be taken prisoner, you must not attempt it; for should you be taken, your enemies would say what you have done, is on purpose."

"I am, &c.

"28th October."

T. D. PEARSE."

To the Honorable W. Hastings, Esq.

"DEAR SIR,

"On the day before the battle Coote sent for me to state the situation of affairs, and to ask my opinion on them, and then I heard from him, what till now I could not commit to paper, viz. that Coote, Hughes, Macartney, and McPherson, had agreed on terms of peace with the Mahrattas.—The three first on the part of the King as well as the Company, and that if you opposed them, you must stand to the consequences. I presume also you have heard of them from McPherson, and the King's *Triumvirate*: though I longed to send this intelligence earlier, I could not, for every letter I sent, I expected would fall into Coote's hands. I should indeed have ventured to do so, when I sent the account of the battle; but I honestly confess, it did not then enter my mind, neither did it when I wrote to put you on your guard and to advise you to secure McPherson for the majority.* And now I should not mention it, only

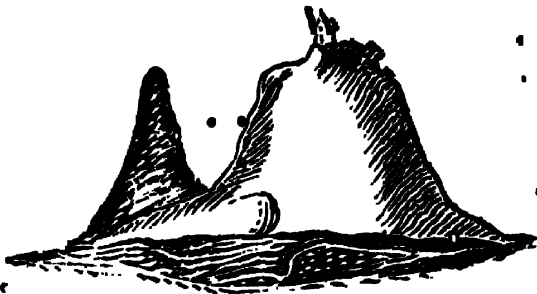
* This alludes to a short letter of the 6th of October, in which is the following sentence:

"Coote intends to return to Bengal as soon as the campaign is over, and has hopes of getting the upper hand, by means of Ferguson: now pray do not conceive this to be an idle notion. I obtained the matter from one of his family, who in a warm dispute with me let it slip. Though you have Wheeler now, remember he was against you, and he that turns and once may do it again. Secure Ferguson, the next comer may be against you, and give Coote three to two.

to put you more on your guard, and to shew you that there is now on foot a double government, and that Coote is trying every thing to get you into a scrape if he can: you have so long considered your enemies to be your friends, that it is time you should begin to open your eyes, and see who is intent upon injuring you."

"As I know the letters sent with Petrie's, giving an account of battles, &c. down to the 3rd October, arrived safe, I conclude that your's also did. Since that I wrote on the 6th the short letter, to put you on your guard, and on the 18th, a letter of mere chitchat, and to tell you that I had lost a packet which was coming to me, which however was found again about ten days afterwards, by means of a diligent search made by nine hurkarus, whom I sent out."

"Now, then, follows the history of our adventures since we entered the Polloms; Sholingveram is close to them, and to that place we marched the day after the battle. It is a stupendous rock with a temple on it, the hill is double, thus



- We arrived there on the 28th, staid the 29th and 30th, marched 4 miles towards the Polloms on the 1st October, and 6½ into the Polloms, to a place called Attamanchery-

on the 2nd. It is situated in a valley that lies between very high rocky hills, and such is the whole cultivated country all the way from thence to Vellore and Chittore; and I believe back northward to Midnapore, and westward to Hyder's country, and southward to Cape Comorin: for certain it is, that what appears as a chain of mountains that parts the Carnatic, is only a chain of hills, in the midst of which fruitful valleys run in all manner of directions. These in certain places are so narrow as to be called passes; and such was dear Cuttack: Oh! that it was our's, and I the taker of it. Provisions came in very slowly, and only once did we get any for our servants from the day we entered, to the return to Tripasore. The sepoys were supplied with 2 seers of *paddy* a day, to be beat into 1 *seer of rice*; and so we lived *from hand to mouth*, and by not serving out any rice to servants or followers. Coote was getting forward till Lallah broke into the Polloms, and threw all into confusion. He entered by the Tritany pass, and burnt all the villages close to us. On the 11th he burnt one close to our Head-Quarters, whilst we were sitting at dinner; and I really expected that he would come and sit down with us, or make us rise and follow him. The next day Coote took a detachment, went out to drive him away, and surprised him in camp on the 13th in the morning, took his heel ropes and halters, pickets, broken pots, and some victuals that were dressing on the fire, about forty lame horses, and returned in great triumph on the 14th. This made him fall quite in love with the Bengal troops; for Edmonstone, and other fools of like nature, had been continually telling him how unsteady they were, that there was not any possibility of making them leave off firing, when once they began; or of restraining them if

they would go on; nor any possibility of keeping them from plundering, if there were any thing to be got at, &c. &c. &c. Now it happened that Coote had two Bengal regiments with him, which passed through all that was left by the enemy, and never offered to touch a pot, or a bag of rice, or any one thing whatever, though food was so desirable a thing that they would have been glad of a chattack. Their steadiness and their bravery, he had learnt on the 27th at Sholingveram, and so every assertion to their prejudice has been refuted: yet he did not give me credit for the opinion I gave, (when the contrary *was dinned in his ears,*) that they were as brave as any men on earth, and with proper discipline, and strict justice, might be made equal to Prussian troops in all points, and superior in many, from their simple mode of life. At dinner at Chittoor, he avowed publicly the same sentiments, and then I told him, that he was given to understand they would not fight, but he had found they would, though he did not believe me when I asserted what he had since found true. He confessed that they had forced him to change the opinion he had entertained, and to adopt that which I had uniformly delivered. But these are digressions from the main point. To proceed,—Lallah being driven away, things began to go on as before, that is, the fighting men got a couple of seers of paddy a day, and rice might be had at 3 seers for a rupee in our bazaars, in any quantity, and all who had any money to buy with, could get 12 or 13 seers of paddy, and 6 seers of caulty—a species of grain, they give to horses; mutton of exquisite flavour at one rupee a sheep; fowls, 14 or 15 for a hum, &c. All this I knew to my cost, as the rate is taken for 1000 rupees worth of grain bought at the place, and eaten by my servants and cattle within a

month, and my people had their profit out of it you may suppose. When we first arrived in the Polloms, Owen was detached with six battalions, part of their cavalry, their six guns, and two 6-pounders. The object of his mission was to get provisions, and to intercept a convoy of Hyder's through the Dalmajeery pass. The convoy moved twice and returned again; and Owen made frequent excursions from the place where he was stationed; he sent in some bullocks and sheep and got some rice for his men. On the 20th we heard that he had done very great feats; he marched to the river Pouce, crossed it, and took a large drove of cattle, but out of the thousands taken, he only brought away a few hundreds, leaving 6,000 bullocks, and a great number of sheep and goats. Tippoo Sahib was encamped on the opposite side of the river; and Owen took it into his head that he could go and take Chittoor Fort by storm. The grenadier company and a pettard were actually sent to him for the purpose; but before he attempted this *Quirottic scheme*, Hyder marched from his camp suddenly, and on the 23rd attacked Owen in his post, obliged him to retire with the loss of 300 killed and wounded and of all his baggage. The Carnatic battalion in the rear broke and dispersed. A 6-pounder fell into the enemy's hands; the Bengal grenadiers, forty in number, headed by Captain Moore, re-took the gun, but lost sixteen killed and wounded. Their resolution not only saved the gun, but the whole detachment. The enemy pushed them quite through the pass, and did not quit them until Owen had reached the plain ground, on our camp side of the pass. Thus ended his famous expedition to our shame and great detriment. He had timely notice of Hyder's approach, but would not believe it, until he

saw his army marching up in columns. One column got fairly into his rear, and made for the pass to cut off his retreat, when Owen saw that, he also pushed to secure it. He had intended to march in the morning, and his troops knew it. When he wanted to move, he beat '*the General*.'—The troops did not consider it a signal of haste, and therefore took their time. Had he beaten "*to arms*," he would not have lost a man; however, as Hyder had appeared, and had not destroyed the detachment entirely, Coote gave Owen as many thanks and praises, as if he had gained a victory: but he did justice to the grenadiers in the same orders. The news of the attack reached our camp about 11 o'clock, and '*the General*' beat immediately afterwards. But there was paddy for four days to deliver, so that it was 4 o'clock before the second line was in motion. The cattle had been so starved, that we were until 3 o'clock moving 12 miles, and then we found Coote and Owen at a place called Opperpillie. Owen was in fact *surprised*, and what is much worse, *with his eyes open*, and at the very time he was meditating an expedition to 'surprise Tippoo and take his fort. We remained at the place next day, and then we marched back to Pollipette, (a town we had passed), where our provisions were laid up."

"At Tritanny the *General told me he had received advices from Lang, that being attacked on the 15th October, he could not hold out, because his provisions were expended. However it was on the 25th, that we returned towards Pollipette, and then we heard of Lang's distresses a second time. He was in the last distress, and '*must be relieved immediately*.' Cattle were borrowed from every body to send to Shunaveram, where Mr. Fauter had very opportunely made a discovery of a great

quantity of provisions, which he might have discovered before if he had pleased. But now it became necessary to *do something*, not only on account of Vellore, but because the Nawab had written to the Council, accusing Coote of not doing any thing, and asserting that he had provisions for the whole Army for months in his possession: this I heard from Coote before we marched from Attamancherry; that is, on or before the 23rd. I heard it on the 23rd from him; but it was current before that he had received such a letter, and was in a great rage about it. The letter came I think on the 19th, for on that day he got a large packet while we were at table, and replied to it the next day: and it was about this time the report began to spread, for he cannot keep secret for a moment any thing that displeases him. Having supplied ourselves, away we went, as we expected a battle. On the 1st of November, the Army marched and passed over *Oxen's ground*, and proceeded towards Vellore; the next day made two marches: the first carried us across the river Pouce, and there if Hyder had dared to face us, was a place where he might have destroyed half our Army with almost impunity; for though there was very little water, such were the difficulties attending the crossing, from the nature of the country on both sides of the bed, and such the advantages of the opposite bank, that though he could have engaged our whole line from end to end, we could not, (without forming and fighting it out on the banks), have forced a passage, and must after forming, have marched by the flank again, to get to the only passage that we knew of, or that guns could go through. It took two and a half or three hours to cross *without opposition*. Having got over, we stopped about three miles beyond it to refresh, then pushed on through another pass towards

Vellore, and got to our ground about 8 o'clock. The next day we reached Vellore. The pass, which was the first obstacle we had to overcome, was of so difficult a nature, that a battalion might have stood there against an army, and after we had got through it, we had a swamp to cross, intersected with water-courses, and bad soft ground, which it was with great difficulty we crossed at all. The Vellore side of the pass was also advantageous ground, and if possible, a better place to have opposed us, than the river Pouce. But when we arrived, we ceased to wonder that we had not been attacked; Tippoo Sahib had left the banks of the Pouce, and retired to his father on the night of the 1st at 12 o'clock; and Hyder begun to cross the Palar on the 30th and 31st, and was, as we now found, gone to the south of Arcot, and lay with his army between Arcot and Arnee; it was said his troops were discontented, having had no rice for three days, and that he himself was so chagrined at not having cut off Owen, who, (to use Hyder's supposed words) had only five *'half'* battalions, that he had not been seen since; but I own I then thought he had retreated to secure Arcot, supposing, as was very natural, that we should go to Vellore, lodge our grain there, and then march down the avenue to Arcot, on the Arcot side of the river, for it would be little short of madness to have crossed the river in the face of his army. His conduct since shews that my conjecture was right, as you will find by the sequel. Having halted our troops one day, and delivered to them about five days provisions, and four days to our people, we marched on the afternoon of the next to the ground where we had halted on the 2nd, so were at the Pollums on the 6th, and the next day arrived at Chittoor early in the morning. We had taken from

Vellore the grenadier company, Colonel Lang, and the supernumerary officers; but though Coote gave out an abundance of thanks to Lang, and said that he *deserved every thing the Company could do for him*, yet his promotion was not declared, from whence I, (and I am not singular) supposed that it had been proposed in Council, and opposed by Coote, for fear of offending the King's Lieutenant Colonel, Colonel Crawford; who, as well as the rest of them,* think it prodigiously hard that the Directors have given authority to make Brigadiers in India; and Coote declared to me that he had orders from the King, not to suffer His Officers to be superseded. Be it true, or be it false, *His Kingship* sets the example; for otherwise Crawford would not have *been in the way* to be offended by the reward of merit, due to an Officer who so nobly withstood all attempts of the enemy to get possession of so important a place as Vellore; which, had it fallen into Hyder's hands, would have prevented our ever recovering the Carnatic, if we may flatter ourselves with such hopes now. Lang was therefore ordered to the left wing, which till then I had commanded, and I was turned out, and became literally *a follower of the Army, without any command or power*. It was thought that Chittoor would run out of its place, to jump over our heads, and take us in, for fear of a tremendous hill, from which, as Hyder frightened it, it was concluded we could do so too. However, before night we found the place perfectly reconciled to its new masters, and they to it. Two guns got to the top of the hill, two howitzers fired from the town against the fort, but Hyder's people fired shot for shot, and when summoned, sent word *we might go to the devil*. The hill is indeed near the place, but far too high to be of any

* The King's brevet Colonels.

use to an enemy; and so rugged in all parts, being composed only of vast fragments of rock lying without earth between them, on the fort side, that except on the top, a gun cannot be placed, and firing from one point at another 1,000 feet below it, is much the same as to let firing alone altogether, as they soon found. All the 8th we amused ourselves with the same work, still believing the enemy would take fright. The chief engineer was killed on the night of the 7th, and was the only Officer we lost; but on the 9th a battery of two 18-pounders having been formed on the west side of the artificial lake, and within 300 yards of a round tower that was in a falling state, a breach was made in it before night, and the enemy sent out to capitulate. Coote refused the terms they asked, and the firing was renewed. Next day the guns were removed from the summit of the hill, to a burnt village, close to the foot of the glacis on the town side. The grenadiers were sent down, and the other troops that were to support them, and then Coote sent word that he would storm if they would not surrender. He granted them all private property, and we became masters of the place, the very place that Mr. Owen wanted to take with a petard; and now I see, that his thrashing at the entrance of the Poloms saved his detachment; had he once entered through the pass into the Chittoor valley, and had Hyder then taken possession of the pass, we should not have heard how it happened. While we were thus amusing ourselves with taking Chittoor, *the frightened Hyder* returned to the North of the Pallaar, and went to some place near Sholingur; the garrison of Paloor, a little place near Tritanny, were forced to abandon it, and left four 18-pounders behind to Hyder's mercy; we do not know whether they were destroyed or not. From thence he marched to Po-

lipett, where the spare baggage was left under the charge of a battalion with three 6-pounders of our's, and two heavier guns of the Polygars. Hyder surprised them, took off all the baggage and the four guns, and carried off Lieutenant Bushby and a Conductor, four days rice for the whole Army, forty horses of the troop, some sick sepoy's, all the women that were left, and then sent Tippoo to besiege Trippasore. We staid till the 16th in the morning, and then set off post to relieve Trippasore; arrived at Polipett on the 17th, and on the 18th in the morning, distinctly heard the guns firing against the place. We marched the same day to Nagree. You must have seen that hill from Madras in the shape of a *large nose*. Proceeded from thence at 2 o'clock on the 19th; it rained all the way: the distance was small, but the road was so bad with the rain, and the nature of the country, that we did not get clear of the pass till dark, and then stopped at a place where there was not a particle of fodder for the cattle. In the night many of our people were drowned by the inundation occasioned by the incessant rain; on the road great numbers perished for want of sustenance to support them against the inclemency of the weather. Colonel Owen had the rear guard, and did not come up till noon of the 20th. He said that within the space of 50 yards he saw a dozen men lying dead. Bullocks dropped dead, and their drivers beside them: the whole way was strewd with dead, as if we had been defeated and harassed by the enemy. We could not move on the 20th, as it rained all night a perfect deluge: on the 21st it was fairer, we set out early, and reached Trippasore river, crossed and encamped on the Trippasore side. The last two miles of the route were through a stiff clay, too bad to halt on.

In this dreadful march we lost 104 horses of the cavalry, about 1,000 bullocks, one elephant, some camels, and numbers of men. Tippoo had abandoned Trippasore, on hearing of our approach. He had battered the place with four heavy guns, had made a regular battery and approach, and was proceeding with the zigzag to the very ditch itself. There was already a good breach made in the curtain, and the place might have been stormed in a few days, for in a few hours another breach of 100 yards long in the curtain, would have been effected. We are now destroying the place, and are in hopes of shortly receiving orders to go into cantonments, as we are without tents to cover us, and with hardly any food to save our people from starving; for now there are not even supplies to be bought for money."

"All officers are five months in arrears, the men were paid up to the end of August a few days ago. This is a true narrative of what I have seen, and, therefore, I now leave you to judge what will be the end of the war."

"Trippasore,
27th November, 1781."

"It is said that Coote intends to send one of the King's regiments* to Bengal, as soon as they arrive; if he does so, it will deprive you of the power of granting warrants for Courts Martial, and it is said that this is his reason for doing it. I hope that you will not allow of this; but when the regiment arrives, order it back to the scene of action, where alone it can be of any use."

"Mr. Benfield† is become Governor of Madras; Lord Macartney, not being able to manage alone, from

* Part of the force daily expected under General Meadows.

† This was the notorious Paul Benfield, excelling in *all the arts of western rillainy*.—See Burke's speeches—Mill's History of India, &c. &c.

his total ignorance of the country and the manners and customs of the natives. Certainly it is not a reflection upon His Lordship to be ignorant of them, but it is disgraceful in the Company to send out such a man. And Mr. B. having paid the *best of bests* for his return and support, His Lordship has been ordered to support him, and has chosen him *Regent*;* now then, if things do go right, it must be a miracle indeed!"

General Coote at this time went to Madras from Tripasore, to settle with the Council where the troops should winter; and on the 30th of November the Army moved to Poonamalee.

It was in the year 1781 that Mr. Hastings undertook his well known visit to Benares, for the purpose of extorting a sum of money from the Rajah Cheyte Sing, to supply the immediate calls upon the Company's Treasury, which was at this period quite exhausted.

The circumstances of the arrest of Cheyte Sing, on the 15th of August, and the subsequent fray in which the unfortunate Rajah escaped, and in which a party of sepoys and several Officers fell a sacrifice to Mr. Hastings's imprudent measures, are to be found in detail in several of the Histories of British India.

Alluding to this unfortunate event, Col. Pearse, in one or two letters, laments the death of a Captain Mayaffre, an old and intimate friend, who was one of the victims, being in command of the Artillery at Benares when Mr. Hastings arrived.

By the instructions which Colonel Pearse received before he marched with the Bengal troops, it appears that he was to have had the permanent command of them, as

* This circumstance we do not find mentioned in any History of India: perhaps the sentence has an ironical meaning.

far as respected ‘*musters, payments, and all official acts which related to the detachment*’ (until his return to Bengal) ‘*without change.*’

“Sir Eyre Coote, having deprived Colonel Pearse of the command of the Bengal troops, immediately on their joining his army, the Board, (following up the same spirit of persecution), on the plea of his not having the command, passed a resolution on the 1st of November 1781, by which the allowannces fixed for the command were taken away from Colonel Pearse.

In December, Colonel Pearse addresses Mr. Hastings on these points, and complains of Sir Eyre Coote’s act, as one of tyranny, and injustice. He says,

“The assertion of its being an act of tyranny and injustice, I make good, by shewing that before I arrived here, Coote had appointed Owen, *specially to command the Bengal troops serving on the coast.* This was contrary to the instructions of the Board, and forced upon the Bengal Establishment an Officer, who, by the orders of the Court of Directors, could not belong to it. But as soon as an Officer, appointed by the Board, arrived here, (*viz.* myself,) Coote removes Owen from the command, and refused to let the Officer, duly appointed, exercise those powers with which he was regularly invested. I do not want to quill the scene: I see *all is desperate,* and I am ready to *share in the general ruin,* provided I have no more than my due proportion of it.”

Every attempt was apparently made, on the part of Général Coote, to drive away Colonel Pearse from the Army in disgust; and the reader will find in the sequel, that it was his lot to undergo the severest trials which a military man, who has the pride of a soldier about him can suffer.

The personal inconveniences and hardships which Colonel Pearse must have undergone in this campaign, are never complained of, but with all the conscious ability of a Commander; supercession and insult he could not put up with in silence; and at length, he made a last appeal in which he requested, that if he could not be reinstated in his command, he might be recalled from the Army.

On the 20th of December, he writes to Mr. Hastings as follows.

“This dividing our sepoys has done much injury to the service: the vague assertion that they are all servants of one master, is of no avail. English, Hanoverians, Hessians, the mercenaries hired by the English, and the rest of the petty Princes of Germany, served with the armies under Ferdinand, but each nation had its own Commanding Officer, and the troops of each served in bodies and were not intermingled, though they took post together and composed a body, which was one division of the Army. In America, Charlton commanded the army; the British troops, under Phillips, composed the right wing, and the German troops, under Reidal, the left wing.”

“Intermingling the troops of different nations, is notoriously not the practice in Europe, particularly under Marlborough.”

“Mount, 20th December, 1781.”

Mr. Petrie a particular friend of Colonel Pearse's, was at this time about to set out on a voyage to Europe, and he was anxiously looking for the arrival of the vessel at Madras, when orders to march to Vellore, which place was threatened with famine, were issued, and Colonel Pearse writes :

“ DEAR PETRIE,

“ It is in vain almost to hope to see you now, we are ordered to march to relieve Vellore ; where, after all our *mighty expedition*, they are again starving. This is occasioned by our trip to take Chittoor, which, report says, is re-taken by Hyder. The place at any rate is besieged, and must fall ; and so I predicted, when we imprisoned a battalion in it, and two companies of grenadiers, and left them with only the paltry guns which we found there. I do not see how we are to effect the relief of Vellore, if Hyder does his duty, as he is between us and the place with all his force; and knowing our project, he certainly will be under no anxiety in providing for the defence of Arcot, and therefore may bring his whole force against us.—We must go off without necessaries, tents, &c. we take only light guns, and our distressed state he knows, as well as we do.”

“ Coote is too ill to go—Colonel Lang must command—he nobly defended Vellore: not that it was attacked in form, but for a year he found ways and means to maintain his garrison and his detachment, in a fort which was enclosed within another, on a hill, close to Vellore, and commanding it; and he repulsed Hyder in three attacks.”

“ If Lang commands, I must be second in command. I heartily wish however, as the case is critical, that Coote was going with us, because I believe the sepoys have an opinion of him; but if we get well through the business, so much the better, as it will shew them we can do without him.”

“ *Madrus,*
17th December, 1781.”

On the first promulgation of the orders for the march to Vellore, the sepoy^s, who were without tents, necessaries, and without even pay later than the 1st of September, refused to march—the time was a critical one; the service demanded the utmost exertion, and fortunately a sum of money equal to two months arrears was obtained from Madras, and the discontents in a great measure subdued.

General Coote, worn out and disabled by sickness, determined notwithstanding to proceed with the Army; and Colonel Lang, *on the day of the march*, sent in his resignation.

Sir Eyre Coote was still at Madras, but Colonel Pearce received orders to march the Army to Veloute, near Pondamallee, where the General joined him at midnight.

The conduct of Colonel Lang was certainly very unjustifiable; we can hardly conceive a sufficient cause, that shall exculpate an Officer for the act of quitting his post, *on the eve of actual service*, and with the enemy almost in sight. Yet, though Colonel Lang merited censure and disgrace for this act, he was by the personal intreaties of Lord Macartney, afterwards solicited to return to the Army on his Lordship's receiving intelligence of the serious illness of Sir Eyre Coote; a circumstance which Colonel Pearce very justly complained of on his return from the service.

“ DEAR PETRIE,

“ Again we have marched as far as Tripassore. The Army moved under my command as far as Veloute near Pondamallee, and Coote joined us at midnight. His rheumatic pains make it inconvenient to him to move early, so we set out at half past 10, to march 15

miles. The leading divisions got to the ground at 5; the baggage &c. were in motion all night, and the cattle *fasted* of course. To-day we halt—Lang has resigned his command—Crawford is going home, and as Stuart is not able to take the field, these accidents give me the second post, which I shall hold until we return, and are joined by the *swarm** from England.

“ *Trippusore,*
4th January, 1782.”

In a letter to General Stibbert on the same day, Colonel Pearse explains the causes which induced Colonel Lang to send in his resignation. He says,

“ It is but fair to tell you, by what chance I am now in the second post here.—

Stuart is unable to take the field—Crawford thinks the balls at St. James’s better than those at the Court of Hyder—and Lang, unable to bear the supercession of Horne, who came out a Captain Lieutenant of Artillery in 1768, and not thinking it right to serve under every King’s officer who may bring a brevet of *Colonel in India* with him, desired to be made a Brigadier General—every body concluded that he would get the rank, for Coote, in his *bushels of thanks*, declared that Lang deserved *every thing the Company could do for him*; but when he asked this favour, whether he had enemies to oppose it,

*This alludes to the expected arrival of several King’s Officers, with Brevets of *Colonel in India*, under General Meadows, who, with three regiments of European infantry, sailed from England in a fleet under Commodore Johnstone, principally for the purpose of taking the Cape of Good Hope: but as Admiral Suffrein, with a French fleet had arrived with reinforcements before the English reached the Cape, the object of the expedition was in part given up, and the troops proceeded on to India.

or asked for it too peremptorily, or Coote and Macartney found out that he would in that case command all the *King's Brevets*; it is certain that he was refused that which was in the Board's power to grant by authority from the Court of Directors, who have sent that power to India, expressly to keep their Armies in Command of their own Officers, and so he sent in his resignation.— When the *swarm* does arrive, I hope you will think me right in desiring to quit this Army and to return to Bengal, unless the Board use the power to save me from such mortifications; for Horne was not a Major till a year or two after I was a Lieutenant Colonel, and my cousin Huiberstone* was at school when I left England."

"I am, Dear Sir,

"Trippassore,

&c.

4th January, 1782."

T. D. PEARSE."

On the 18th of January, the following interesting letter was written to General Stibbert.

To General Stibbert.

"DEAR SIR,

"I wrote to you from this place (Trippasore) on the 4th, as we were starting for Vellore, and this is the sequel of our adventures.—

On the 5th, Coote was found speechless in a fit, and was for a time supposed to be dead; the Staff at Head Quarters instantly sent intelligence to Lord Macartney, on which his Lordship sent for Lang, told him the state

* One of the Officers with General Meadows. He was afterwards mortally wounded in the unfortunate rencounter with the Mahratta fleet off Gheriah, on the 7th of April 1782; being a passenger in the Ranger Snow, from Bombay, with Colonel McLeod and Major Shaw. See Mills's History of India, page 536, vol. ii.

the General was in, and asked him if he would go to camp, to command."

"Lang, as you may suppose, gladly embraced the opportunity, set out in a few hours, and joined us on the 7th in the morning; so *I was turned out of the first line into my old post, and if I could have got away, would most assuredly have quitted the Army.*"

"We marched on the 6th from Trippasore; reached the Marmundul hills on the 9th, late in the afternoon. Hyder's Army was encamped near them, with his left towards the hills, and his right towards Lallapet; he had a rocky hill in his front, round which we encamped the same night, but Hyder shifted his ground, re-crossed the Poonee river, and went to Lallapet. The Poonee is a mere bed of sand, and had not in the deepest parts, more than 10 inches of water in it."

"The route to Vellore, lay along the southern side of the Marmundul hills, through a country formerly well cultivated, and consequently abounding in artificial lakes. Three of these were close to each other, and one of them supplied a cultivation, which it was necessary that we should pass. Before Hyder set off, he cut the banks of it and produced an inundation. On the Vellore side was a large lake lying across a valley, and on the Lallapet side a dry one, through which we passed. On the 10th, early in the morning we moved on, and about 8 o'clock part of our line had reached the inundation. Hyder's army appeared, *by the dust,* to be coming down fast upon our rear, where I commanded. The rear guard sent intelligence of Hyder's approach, and I sent word of it to Coote. At this time our line was in the bed of the dry lake, the Lallapet side was rocky and higher than the bed, and to that Hyder was moving as

fast as possible. The Vellore side was also high and advantageous for us, so that I wanted to gain it before Hyder could get to the side which we were leaving, to avoid the annoyance which he could have given us while in the hollow. When the General received my message, he was in the swamp, and sent word that he was desirous to get across it with the line and baggage before he formed, and therefore he directed that the line should move on, unless I found it necessary to form. This was what I wished, for the reasons before mentioned, for at that time I was ignorant that there were any swamps in the way. I therefore ordered the rear guard, consisting of one regiment of infantry and two of cavalry, to proceed in columns of single corps, with the cavalry nearest to the Marmundul hills, and thus we crossed the bed of the lake.—When we reached the Vellore side, I found the swamp was not far distant, and the greater part of the baggage was on the enemy's side of it. The followers on foot and beasts of burden were gone on, but the carts laden with rice for the Army, ammunition, and baggage, were nearly all on my side of the swamp, and could only cross one at a time; and foreseeing, that if the enemy was not opposed, that he would be at the swamp long before half of them were over, I instantly resolved to take post. To do this, I ordered three battalions, all that remained on the enemy's side of the swamp, to draw up between a burnt village on our right, and the lake with the swamp on our left, or rather a little in our rear. I then sent the rear guard round the lake, nearer to the hills, to prevent the enemy's turning our flank, and getting into our rear; a company of grenadier sepoy was also thrown into the village. The ground in front was rocky, and was broken by a small pond

and choultry. The grenadiers kept our flanks free from rocketeers, but they got amongst the rocky ground in our front, and threw a great many amongst us—we had one 12-pounder, one howitzer, and six 6-pounders in the line, and three 3-pounders with the rear guard, but these were useless to us, being destined for a particular service.”

“As the line was forming, Hyder opened between twenty and thirty heavy guns upon us from the Lallapet side of the dry lake, and there he drew up part of his forces; the rest he sent down towards our right, where if they had arrived in time, they would have done us great damage. Coote seeing what was going on, from the other side, posted the first line with its left towards the same village upon some high ground, that fell from them towards the continuation of the cultivation, and he then ordered a regiment, and one 18-pounder* and four 12-pounders, to a post between their left and the burnt village, but on the Vellore side of the swamp, to flank the swamp as we should cross it. The rest of my line was standing under a hill with its rear close to the swamp. We remained in this position above an hour. Hyder keeping up a constant cannonade; we scarcely firing at all, and merely sufficient to keep our troops in temper, as our shot could not have reached Hyder to do any good; his shot, from the great elevation which he gave his guns, fell dead behind us in general, and the few that fell before us never rose again.”

“In this position we remained until all the baggage, carts, &c. had crossed the first branch of the swamp, and

* The 18-pounders appear to have been used as field pieces at this time; probably, as Hyder brought so many guns into the field, pieces of this calibre were particularly useful in keeping him at a respectable distance.

only five or six carts were in the second, and then, as it was certain that these could get across with, or before the troops, we moved off and passed also."

"There was a small choultry close to the Vellore side of the swamp, into which I had thrown a company of grenadier sepoy and two guns, and then went to report to Coote, having previously put the line in motion to make room for the baggage and cattle which were crossing. The General gave me his warmest thanks for all that had been done, and ordered us to move on in two lines. As we crossed the swamp we came to a company of European grenadiers, who were posted in a dry spot between the two branches of the swamp, having been sent there to secure our rear in case of our being pushed; and after I sent the guns to the choultry, my Aid-de-camp overtook another company coming to our aid; but the General went to the foot of the hill, found the enemy there, or coming towards it, and he ordered these Europeans to take possession of it, at or about the time that he sent me the order, of which mention is made below. They took post on the hill, and were reinforced with a company of grenadier sepoy of the 26th regiment. The enemy's rocketeers and polygars crossed the swamp, took possession of the choultry, and from thence annoyed the Europeans on the hill; the latter sent half their force, and attacked the choultry, but were repulsed with the loss of their Officer, who was killed, and the enemy got possession of his body; and the party would have suffered most severely, had not the other Captain of the grenadier company with his Europeans covered their retreat to the hill. The enemy also lost their leader, who was the chief of the Mysore polygars, and I found afterwards that his name was Dulwie, chief

of Chitturcull, near Seringapatam: he commanded a large body of burkundauze and pikemen in Hyder's army. It was now intimated to the General, that the enemy were going round by the post which the rear guard had occupied, to the valley that was crossed by the lake, to get at our baggage and stores. I therefore received the General's orders to take a force and stop them, and proceeded with two battalions, and joined the two other battalions and two regiments of cavalry with the body guard, which were protecting the baggage. The enemy advanced to the side of the lake, and we opened a fire upon the foremost of their horse; they fell back, upon which the enemy's guns which had fired upon our line, opened from the side of the lake. They did us very little damage as they were too far off, and I forbid any firing from our guns, except when the enemy's parties attempted to advance. Hyder now gave over firing, and went back to the ground from which he had marched. Thus we lost one Officer killed, two wounded, and between 40 and 50 rank and file."

"Though Vellore was only one march from our camp in the morning, we could not get to it until the 11th, but were encamped within three miles of it on the 10th. Hyder only possessed himself of two coolie loads of rice of our whole convoy. Having carried our point, we remained at Vellore on the 12th to refresh, and commenced our return on the 13th. About 11 o'clock we saw a cloud of dust, which betrayed the movement of Hyder's army towards the swamp: at about twelve the head of our line entered it. Here I was again in command, as we marched by the left. The baggage was crossing fast, and the advance guard had crossed, when Hyder formed his line opposite to the ground where the Europeans had been posted on the 10th."

“ His apparent intention was to take our line in flank as it passed. A large body of horse advanced, and he opened the fire of his Artillery when the Europeans began to cross the swamp. Coote sent for two 12-pounders of the second line, and ordered the 18-pounders of the first line into the rocks near the burnt village; and he ordered that the instant Hyder opened his guns, our’s should return as heavy a fire as possible. Accordingly a very heavy caannonade commenced; but as our troops crossed, the whole were formed to advance upon Hyder, and he fell back towards the Palaar, under a very heavy fire from our right. Just at sunset all was quiet, but as the Army was beginning to move back to Marmundul, a party of Hyder’s troops advanced to a height and opened a fire upon us from three guns; they were however presently driven away by the left, and before dark we got into the road and remained there. We lost in this day two Officers wounded, one since dead of a mortification from his wounds, and 42 rank and file killed and wounded. On the 14th we crossed the Poonee; on the 15th we reached Parenjie; on the 16th we moved into the plains to the old post, and though there was a great deal of manœuvring the whole day with the enemy, yet not a shot was fired. The manœuvres were performed by the line under my command, and met with Coote’s highest approbation; he declared this in public orders, and said, that in forty years service he had never witnessed any thing superior. The movements were all made in consequence of those of the enemy, who appeared to be desirous of attacking us in flank; but by always shewing a full front before he could form an attack; he never ventured to close upon us. To describe these by words without knowing the names of

the places, is next to impossible; and I shall therefore send you a plan as soon as I can prepare one. I heartily wish you health and happiness, and am,

“*Tripassore,*
18th January, 1782.”

Dear Sir, &c.
T. D. PEARSE.”

On his return from this service in which he had acquitted himself so well, Colonel Pearse, who felt himself severely hurt by Colonel Lang's being allowed to rejoin after having sent in his resignation, addressed the following letter to Sir Eyre Coote.

To Sir Eyre Coote, K. B. &c. &c.

“SIR,

“I beg your permission to go to Madras during the stay which the Army may make in the environs of it, in fact, until you are pleased to take the field again. Many causes urge me to make this request, but amongst these, I own none is so weighty as the indignity lately shewn me by Lord Macartney, by his Lordship's sending out Colonel Lang, upon hearing of your indisposition, although that Officer did not choose to march with the Army when you took the field at its head.”

“I assure you, Sir, that I am ready by day or night, to do any service in my power, but my feelings are deeply wounded by the circumstance abovementioned, and by finding myself in a situation where I am considered so totally unworthy of trust. As a further reason, I am destitute of every necessary, and wish for a few days relaxation, after having been for one year incessantly in the field.”

“*Tripassore,*
19th January, 1782.”

“I am, &c. &c.
T. D. PEARSE.”

“ P. S. I beg permission to take my Staff, and Mr. Gillies my Surgeon; and purpose to set out with the first public escort, unless you should honour me by ordering one to attend me.”

General Coote refused Colonel Pearse leave to go to Madras, in the following *handsome* manner.

To Colonel Pearse. &c. &c.

“ SIR,

“ I have had the honour to receive your letter of yesterday; desirous as I am at all times, and upon all occasions to make things agreeable to Officers in general serving under my command, and to endeavour to accommodate them in all their wishes, I need hardly assure a person of Colonel Pearse’s merit and pretensions, how much I am, from inclination, led to comply with his desire of coming to the Presidency during the time I may be absent from the Army: nor would I hesitate a moment in giving you my permission, did I not see the necessity of your being with the Army in the field, at a time when an emergency may happen to require the cooperation of those able services, which I had particular satisfaction in observing ever so zealously exerted, in our last march to the relief of Vellore.”

“ Impressed with these sentiments, I cannot but express my regret, that any thing should have occurred in the course of service, to create uneasiness in your mind; or that could be brought forward as an additional plea in favour of your desire of coming to Madras. But, in the present unsettled and uncertain state of our affairs, we ought not only to expect to meet with disappointment, but to be prepared to reconcile ourselves to any temporary impediment that may obtrude to the preclusion of

our views. I hope some future arrangements may yet be found expedient, which may prove to be more accordant to your prospects."

"After what I have said, and knowing, as I do, the laudable spirit with which you are actuated in all cases when the good of the service is concerned, it is scarcely necessary that I should add, that your continuation for the present in the field, will afford me pleasure."

"I am,
with esteem, and regard,
Sir,
Your most obedient humble servant,
(Signed,) EYRE COOTE."

To this letter Colonel Pearse returned the following answer:

To Sir Eyre Coote, K. B. &c. &c.
"SIR,

"I was this morning honoured with your letter of the 20th, and I beg to return my sincerest acknowledgments for the honourable mention which you are pleased to make, of my endeavours to acquit myself of the duty which I owed to you and to the service; and I shall ever consider it as one of the happiest events of my life, that I had an opportunity of using the means towards meriting your approbation, and that I was so successful."

"Give me leave Sir, to assure you, that as it is my duty, so it shall be even more my inclination, at all times, and on all occasions, to do that which you are pleased to require of me in my station, according to the best of my abilities."

"I am, &c. &c.
T. D. PEARSE."

"Pondamalee,
22d January, 1782."

To Mr. Hastings, Colonel Pearse writes as follows, enclosing a copy of the above letter—

“As General Coote’s letter, *if sincere*, is a very full answer to mine, and very honourable to myself, it will, I hope, afford you some pleasure to receive such a testimony concerning a man, for whom you certainly had, and I hope still have a good opinion and esteem.”

“*What arrangements Coote will make, I am at a loss to guess; but I shall now wait the event patiently. I suppose you know officially of the expected arrival of a French fleet with troops**; if they come, we must fight hard to keep our ground, for one defeat will do our business as effectually as twenty.”

Colonel Pearse became so seriously unwell during the latter part of the month, that he obtained leave of absence from Sir Eyre Coote, and purposed to return to Bengal, with the hope, by his presence, of obtaining a settlement of his accounts, and the restoration of his allowances, and probably to avoid excessive mortification; as Sir E. Coote, notwithstanding he had intimated to Colonel Pearse, that *arrangements might be made, which could be more accordant to his prospects*, had solicited the return to camp of General Stuart and Colonel Lang, and had thus again deprived Colonel Pearse of all command.

It appears that the Court of Directors had sent out orders, that their Artillery Officers were not to hold Staff commands: the illiberality and impolicy of which act, can hardly require to be commented upon.

Mr. Hastings also, by his neglect in not returning any answers to Colonel Pearse’s frequent letters, had increased the anxiety of his mind to such a degree, that the con-

* This was Admiral Suffren’s fleet, with 2000 troops, who afterwards joined Hyder.

sciousness of not having deserved such wanton neglect, could alone have supported him. To Mr. Hastings Colonel Pearse looked for support, but he was so much hurt by his silence, that he came to the resolution of not forwarding another line to him, unsolicited on his part: and he addressed a set of questions to a particular friend in Calcutta, (a Mr. Keble), to be shewn to Mr. Hastings, demanding answers to them.

These were :

1. "Whether Mr. Hastings has received my letters of the following dates, 2nd, 8th, 11th, 16th, 20th and 27th December: also, the 4th, 19th and 22nd January?"

2. "Whether he has been pleased to take my case under consideration, and whether any thing has been done in consequence?"

3. "What act of mine has offended him?—From not obtaining relief, I conclude that some part of my conduct, whilst I was in command, was exceptionable."

4. "What part of my conduct was so?"

5. "Whether I am to continue to serve on the Coast, or to be recalled?"

6. "If to serve—in what capacity am I to be continued on this service, and with what allowances?"

7. "If to be recalled—whether the order is passed and sent, or not?"

On the 29th of April, intelligence of the conclusion of peace with the Mahrattas was announced at Madras, to the great joy of the British inhabitants.

Colonel Pearse returned to Bengal in May; as his friend Mr. Petrie, who had arrived at Madras on his way to England, found it necessary to return to Calcutta.

On his arrival in Bengal, Colonel Pearse found that Mr. Hastings was still his warm friend, and he pro-

mised all his interest, 'public and private,' to endeavour to settle matters to Colonel Pearce's satisfaction.

After having effected the principal object of his voyage, the settlement of his accounts, and finding his health greatly re-established, Colonel Pearce set out on his return to Madras. He sailed from the Hooghly in a snow, in charge of 20,000 pagodas, with which he was directed to land at Ganjam; he reached that place on the 31st of August 1782, and after some unavoidable detentions, proceeded by land, with the money in charge.

On the 25th of October, Colonel Pearce was at Masulipatam; on the 16th November at Ongole; on the 25th at Nellore; and on the 5th of December, he arrived at the Mount.

During Colonel Pearce's absence, nothing effectual had been accomplished by the Army in the Carnatic; but some very important changes and events had taken place.

Madras has been visited with a dreadful famine, and thousands of the wretched inhabitants of the Carnatic, who had fled for protection to the British flag, perished from absolute hunger.

A violent storm had destroyed the shipping in the roads, and the British at Madras were under the awful alarm of being cut off from all supplies by sea.

Sir Eyre Coote, completely worn down by sickness, having suffered two paralytic attacks, had sailed for Bengal, leaving the command to General Stuart, whose well known disputes with the Government of Madras had now commenced.

Colonel Pearce on rejoining the Army, was declared in orders, 'second in command.'

The welcome intelligence of the death of Hyder Ali, the inveterate and formidable foe of the British was

received during this month. Hyder died at Chittore at the advanced age of 86 years.

General Stuart would not avail himself of this favorable opportunity for striking a formidable blow with the Army, but remained, in obstinate opposition to the earnest entreaties and absolute commands of Lord Macartney, *in a state of inactivity*, disputing the right of any controuling power in the Company's Civil or Military Officers over those of His Majesty.

Tippoo Sahib, availing himself of this supineness, arrived at Chittore, and securely seated himself in his deceased father's authority.

In February however, General Stuart moved with the Army towards Wandewash and Carangoly, and withdrawing the garrisons from them, destroyed both places, it being considered impossible to retain them.

The able and successful operations of General Matthews, just at this time, on the Malabar Coast, attracted Tippoo Sahib's sole attention; and he allowed the British Army to move without any molestation to Vellore, retreating before it.

On the 5th of March, Colonel Pearse writes to Admiral Mann as follows:

To, Admiral Mann.

“ MY DEAR FRIEND,

“ I got to Madras from Bengal in December. We are just returned from an expedition to Wandewash, which we destroyed, and brought away its garrison; in the same trip we destroyed Carangoly, so that of all our possessions in the Carnatic, only Vellore remains out of the limits of the Jagheer; and within them, only Trippasore, Chingleput, Poonamalee, and Madras. But do not

think we are therefore ruined ; one brisk campaign will put all to rights. If I could get hold of the command now, I could be master of the whole in six weeks time ; but under Coote or Stuart, we shall never do more than *creep from one hole to another*, to feed garrisons, or to destroy them. We are now going to supply Vellore with grain again. I wish it may turn out as much to my honour as the trip in January 1782. I am now second in command, and Stuart is so mutilated, that I must have a very considerable share in any action ; though I am of opinion there will not be any.—For first, we know Tippoo is treating, and he has reason enough for so doing. His own country is invaded, and the capital of his richest province is taken by General Mathews ; and what is most extraordinary, he has taken five sail of the line, which were in part, though not quite finished ; and he now intends going against Mangalore, Tippoo's grand post, and as we do not doubt of his succeeding, (for he is a most able and enterprising Officer,) this will so far overthrow Tippoo, that he will be under the necessity of making peace *on any terms.*"

" My dear Friend, I have been most cruelly used by General Coote in his dispatches to Europe, he has most basely attributed all his successes to Captain Owen, *called Lieutenant Colonel*, and begged His Majesty to make him a Colonel, and the King has done so. He wrote me a letter, most highly complimentary on my conduct in saving his convoy, and securing success to the expedition to Vellore ; yet he did not even mention me in his dispatches, and I am not promoted. If we meet, I must now submit to be commanded by a Captain of the Madras establishment, *who has hitherto failed in every thing he has undertaken, as this whole army will bear testimony.*

Owen was rewarded with a profusion of thanks for being defeated and escaping being cut to pieces: and he owed that good fortune to the exertions of Captain Moore, who at the head of 50 Bengal grenadiers, retook a gun which the enemy had taken, and covered the retreat of the detachment; *and what ought to be noticed*, the foot had time enough to have sent off the whole of his baggage, and to have taken so strong a post, that nothing but an army of Europeans could have dislodged him. In this state, it behoves me to struggle hard. Mr. Hastings has assured me of his whole interest, public and private. Lord Macartney has made honorable mention of me in his letters to his connections; and I hope if you either have any interest, or can form any, or can *buy* any, that you will use the means to serve me. I have written to Darell also, and to him I have sent besides a letter addressed to you both; and to Petrie a private letter, and a narrative of the Vellore trip, and I am ready to attest the truth of every word I relate *concerning myself*, upon oath: nay, it might safely include every word of it, *to the best of my knowledge*; and as I was principally concerned in the first and last, and materially so, in the other day's business, I know that I have related the simple matter of fact, without addition or subtraction of any thing of moment. To this I have subjoined Coote's letter to me, as the strongest affirmative of the truth of the whole. My letter to you as my friend and attorney, I send to Darell, because he is one, and is more likely to get it immediately. This letter makes the same request, and contains authority *to use money on the occasion*, and likewise to buy me qualifications in the India House, to give me some weight there; for by the purchase, I shall take off three inimical votes, and secure a favor-

able one, which will be equal to four; and if you have not a vote, and will employ part of my money to qualify, provided there will remain enough to bring interest, what will be so laid out will be just as secure to me, if you please to make it so, as if purchased in my own name—you and Darell know the extent of my present small fortune. I have not added to it by my command: I am rather out of pocket by it. I live in hopes, if I can manage to overcome Owen; but if he prevails, there is an end of my expectations, because if he comes above me, it amounts to my dismissal from the service. I have troubled you with a very long letter in addition to what I have before sent; but your kindness to me has been so very great, during fifteen years, that I must not suppose you will deem any service you can render me a trouble, and therefore I write in full confidence."

"I flatter myself that I shall hear from you, when our daily expected fleet arrives: if your letter tells me you are well and happy, it will make me so. God grant you long life, with every comfort that you can enjoy; may you live to receive my thanks in person; if you do however, I think you will be so far advanced, that you will not wish for a much longer life, for I must make a fortune to revisit England with, and that I fear will require much time: I shall hope so however, and if I could be then sure of having the extreme pleasure of seeing you alive and well, it would greatly add to the energy of my exertions. Adieu, my best of friends, and believe me to be most gratefully and most affectionately, your kinsman and sincere friend,

"*Cotlar River,*
5th March, 1783."

T. D. PEARSE."

“ P. S. You may be sure all the Colonels will remonstrate against Owen: Smith will be active for Ironside; Barwell for Morgan; Wedderburn for Cummings; and so of others; if all succeed, the man must fall.”

Colonel Pearse seems to have been impatient of General Stuart's inactivity; and writes as follows from Vellore, 11th March 1783, to Mr. Darell:

“ We are now at Vellore; we did not see one of the enemy on the way. Tippoo is gone off; Mathews's success has drawn him away, and as the whole force of the enemy may be too much for Mathews's detachment, reduced as it is by garrisoning his conquests, *and as he recommends our doing something vigorous here*, I wrote to Lord Macartney on the 9th instant, offering my services to go *and seize the passes and to enter Tippoo's country*, with such force as might be thought sufficient. I have not received any answer yet. I hope my offer will be accepted, and if so, I trust that you will hear of a Mathews on this side,—at least, of one who will be as active when he has the power.”

If Colonel Pearse's offer had been accepted at this time, it is probable that the *unfortunate fate* of General Mathews and his small garrison at Bednore, which surrendered to Tippoo on the 30th of April, about seven weeks from the time the offer was made, might have been averted. But it appears that the projected attack upon Cuddalore, *required the presence of all the forces which could be collected*: and thus the miserable system of dividing the operations of the Armies into distant and unconnected attacks, instead of concentrating them on the dominion of Tippoo, was an error, which has nearly proved fatal to the British arms in southern India. Peace with France warded off the catastrophe; and the intelli-

gence of the treaty arrived at such an important moment, that *it may justly be allowed to have been a providential interference*. A few days later, and doubtless the British Army before Cuddalore, would have been annihilated. It is evident that Colonel Pearse, had he been in command of the Army, would have seized with a propitious promptness, the opportunity which Hyder's death afforded of striking a decisive blow. His offer to act in support of General Mathews's operations, evinced his opinion of the necessity and advantage of cooperation; but when General Stuart marched the Army back to the Mount, he still endeavoured to forward the intentions of Lord Macartney, by laying before the Council a plan for a prompt attack upon Cuddalore.

To General Pattison.

“MY DEAR FRIEND,

“How happy should I be, had I never gone away from your command; but Satan filled me with pride and ambition, and fate, in the shape of Coote, has punished me for my folly or wickedness, in entertaining two such nearly related vices.”

“At last you are at the head of us*: *us* I say, for I still claim a right to enrol myself in the Royal Regiment, which, and its commander, God preserve! I heartily rejoice at your exaltation; for though I have lost some friends who were dear to me, yet it is all paid, and with interest, in the success of that friend who was and is deservedly the dearest.”

“Your letter acknowledges the receipt of mine of the 25th of November, 1781, as the last; but I trust some

* General Pattison, having succeeded to the command of the Royal Artillery.

of later date have since arrived, having written to you on the 29th March 1781, it was a short letter from Itchappoor; on the 10th December 1781, a long letter, and narrative of all our proceedings down to that period: and another narrative from the last period to our return from Vellore, dated 21st January or 24th March 1782, but the Letter Book containing those letters, is in Bengal: the narrative was long, the other I think was a short letter."

"A duplicate of the narrative, or rather a new one of the Vellore trip I now send enclosed, and sorry am I to say, that it has become necessary for me to do so, lest you should see, with regret, that Lieutenant Colonel Owen was *the only man who helped* Sir Eyre Coote. I am sorry that Sir Eyre Coote should, in so advanced a period of his life, meanly condescend to write home absolute falsehoods to his Majesty, for the base purpose of forcing forward a very undeserving man, whose sole merit consists in having been beaten in every thing in which he was concerned as principal. In the Polloms he was absolutely surprised in camp, yet had time enough to have secured a retreat for his troops and all his baggage, into a woody and mountainous country, where Hyder could not have followed, and where he did not pursue Owen when he did get into it; that good fortune however *Mr. Oxen* owed to Captain Moore, whose merit is yet unrewarded. The rear battalion being thrown into confusion, the enemy pushed on and took the rear gun; an Artillery soldier ran up, and told Captain Moore of it, who instantly, with 50 European Bengal grenadiers, returned to the gun, gave them a close fire, and charged bayonets; by which *he retook the gun, checked the enemy, and covered the retreat.*"

“The first narrative I sent you mentioned this slightly; I have been more particular now, because Coote has been pleased to attribute to *this very Owen* all his successes, and has obtained from the King a brevet, to give him the rank of Colonel. What share he had in the 27th of August, and the 27th of September, the same narrative told. You will find that it was your unfortunate friend who had the command in the second line, where Owen was posted, and who, when he did act, *acted under my orders*; and the narrative I now send will shew, that Owen had not any share in the 11th of January, where your humble servant had the whole brunt of the day in two different parts, *and Mr. Owen was not even near the scene of action*. On the 16th of January the whole business of the day was performed by the second line under my command; I send you this for your information, because this Owen, who is but a Captain on the Madras establishment, *and Lieutenant Colonel pro tempore, during Coote’s stay in India*, to whom he was Adjutant General, is now made a Colonel by the King; and I, who am a Colonel in the Company’s Army, shall be driven out of the field to avoid this cruel and unjust supersession.”

“I left the Army in May 1782. Soon after Perma-coil surrendered to the enemy under Coote’s *very nose*. He *muddled away* the summer, and at last went to attack Arnee; but he waited, eating up his stock of provisions in Wandewash, until it was reduced to ten days supply, and then set off. Hyder marched to prevent the fall of Arnee, a fight ensued, and our troops beat Hyder; and had they had any leaders instead of Coote and Owen, they would have taken all his guns, and thus have ended the war. *But that was the thing dreaded*: accordingly, *the well contrived want of rice*, carried the Army back

to Madras. After this they went to Pondicherry on their way to Cuddalore, where they were almost relieved from Coote by his falling sick—the successor was not much better, and very much hated—however fortune has done for us what we could not do for ourselves. Coote being obliged to go away, the Committee sent a reinforcement to the Malabar Coast; and that act has freed the Carnatic of the enemy. General Mathews, by means of the troops he found there and carried from Bombay, penetrated into the Bednore country, took the capital, and so obliged Tippoo, (the eldest son of Hyder and his successor), to quit the Carnatic for the defence of his own dominions, and has thus verified what I told Coote, and what others told Coote repeatedly. But he never would have suffered this experiment to have been tried, if he had had as much use of his understanding left as to know what was going on, which happily was not the case: though now, to the misfortune of the country and Company, he is so much recovered as to be enabled to injure them with his services a little longer.”

“ I rejoined the Army from Bengal, (to which Presidency I had been during my temporary absence,) on the 5th of December: Hyder died during this month. Our Army was in cantonments at the Mount, and Stuart had so disabled it, by dismissing the followers, and scattering the whole, by ordering the troops to one place, the cattle to another, and the followers to a third, that it could not move till the latter end of January. Then, *instead of going to seek Tippoo*, we went to blow up Wandewash and Carangoly: this we effected in February. Tippoo lay about 18 miles from Wandewash; there was a river between us; part of his troops crossed to our side, and so we marched to attack

them; they fell back, and we returned to Wandewash. It was expected Tippoo would have crossed to meet us; but we now know that he received news of Mathews's having taken the Bednore country, either the night before, or that morning, viz. 13th of February. After this expedition, we went to throw grain into Vellore; on the 4th of March we heard the confirmation of Mathews's success, and fired a royal salute for it. The news had reached Madras on the 3rd, which demonstrates that Tippoo had heard of it about the time abovementioned, if not earlier; for by his own dawk, he would receive the intelligence in a very short time; whereas, we got our news by single messengers. On the 9th of March we got to Maimundilum, where we had the two fights mentioned in the narrative; and there we learnt that Tippoo had retreated from the Carnatic. I immediately made an offer to proceed towards Bangalore, to secure the Dalmajeeree pass, and either pass it or keep possession; *but it could not be carried into execution, as our Army was wanted for Cuddalore.* On the 12th we got close to Arcot, found it was evacuated, and our troops entered. I went in the next day, and found the place demolished, *root and branch*; the citadel indeed had been only breached by ill-contrived mines on one side, and may be soon repaired. Why it was given up, I own I cannot discover? Troops which would suffice to defend five or six miles of ramparts of the city, when they could hardly mount a gun to return the fire, might have defended the citadel at least, as long again as they did the city, according to my ideas. You are to understand that the citadel is a fort standing in the middle of the city, and the esplanade round it, was 300 yards wide at least, and in some parts it extended to the city ramparts. The ramparts of the

citadel were thicker and better than those of the town. The ditch was a great deal broader and deeper, and infinitely better flanked. There was not a house of the old town left, but a new one was rising, laid out according to Hyder's magnificence, in fine broad streets; and had he lived and kept possession of it, Arcot would have been a magnificent place in a few years."

"We are now preparing to go against Cuddalore, and I hope we shall be away before Coote returns: nay, I hope we shall take it, before we see him. In that case I will serve, but not if Owen comes, or if the King's brevets are published by authority, and the officers take rank. The case is this, there will only be two Majors of the King's service who will not command me; first, because they got brevets as Lieutenant Colonels, and now those brevets have been held out as original commissions; and a second brevet rank makes all who were *Lieutenant Colonels in India*, Colonels, including Captain Owen. I hear Lang, of the Coast establishment, has obtained a brevet from the King, above them all: but for want of money and friends I stand fast, and of course must retire, to prevent shame and disgrace. You tell me to turn my thoughts towards England, but my good friend, were I there just now, you would turn your back on me. I hardly think you will believe my narratives, or my assurances that to the best of my knowledge, they contain an account of the whole of the transactions, *and the very truth*; and you will not find any thing dishonourable there; yet you find me dishonoured, disgraced, superseded; not mentioned by the Commander in Chief, who recommended Owen as the officer *to whom he owes all his success*, which is so contrary to the narrative, that if you do not believe me, I cannot blame you. However,

if I live, I will endeavour to set the matter right, and struggle for redress; but I am so chagrined now, that I do assure you I do not wish to live long."

"A Hanoverian Lieutenant Colonel came over here, with the rank of *Colonel in India*; his name is Reinbelt. General Stuart took him with part of his regiment into the field in February. This offended me very much; for, first, if Stuart had fallen, I believe it is illegal that a foreigner should command:—secondly, the Company had ordered that one of their own Officers should always be at the head of their own Armies;—thirdly, he was ignorant of the manners and customs of the English, and but very indifferently acquainted with our language:—and fourthly, he was utterly unacquainted with the language, manners, and customs of the Indians. This knowledge is so materially necessary, that our troops cannot be kept together, without the minutest attention to it. I accordingly wrote to our Board for redress, which was the only way I could ask for a brevet for superior rank. I sent the letter away the 6th of January; it was accompanied by another, under cover, to my Attornies; in which, I requested, that if after considering my letter of the same date, the Board could not grant me redress, they would permit me to resign the command of the detachment, and be pleased to appoint some other officer to take charge of it."

"My Attornies would not have presented this at all, for they did not deem the injury so great as I did; but, on the 20th of January the news of Owen's promotion and the brevets reached Calcutta, and then they sent it in. We got the same news here on the 1st of February, in consequence of which, I wrote more pressingly to my Attornies to urge the Governor to stir for me, being

determined not to serve *under any of them*: but most positively not under Owen. Yesterday I got a letter, dated 28th of February, which says, my recall is *recorded*; which, being an unusual term, confuses me very much. Owen's promotion appears in our Bengal newspapers. If it is issued in orders, there is an end of my serving here. If we can get away before it appears, or Coote arrives, then I go to the siege of Cuddalore, but if the order of promotion is sent, then I shall proceed to Bengal by the first conveyance, and most likely to the burying ground soon after.* With such a load upon my mind, I am a very fit person to sit down and make my peace with your good lady. If I can muster up courage enough, I will try; but if I fail, plead in my behalf that I most faithfully replied to her kind letter, received by Miss Fraser in October 1781. Miss Fraser went to Bengal and is married; and I again did myself the honor to write to her, on the 21st of January 1782. Adieu, my good friend, Adieu!"

" I am most faithfully
and humbly your's,

" *Madras,*
21st March 1783."

T. D. PEARSE."

A letter appears at this time written to Sir Robert Barker. The first part of the letter recapitulates grievances, &c. but the latter part is interesting: the letter proceeds as follows:

" Now for my models. I told you all I knew of the efforts that had been made to convey circular motion,

* General Sir Eyre Coote returned to Madras on the 23rd of April, and a third fit of apoplexy terminated his life on the 26th—*Quere*; Is there not an error in the date upon the Sarcophagus at Madras, on which, we believe, this event is recorded to have happened on the 12th of February 1783?

from a reciprocating prime mover. Keane Fitzgerald's was one, and Stuart's, the secretary of Bengal, another project. Whether mine is the first invention of the plan I proposed, or not, it is as much an invention in me, as if it had never been thought of before by any one.* Maskeylyne has suppressed all my astronomical observations, and had not the civility even to answer my letters to him, which is rude enough for a philosopher and a man of science; but I can tell you why I suppose he did so. In writing the account of observations on an occultation of α Leonis—my transit instrument, I mentioned, had been fixed but a short time before: I could not therefore be certain, whether it was correct in the meridian or not. I therefore related that I had taken transits of stars, both north and south; by which the error of the instrument, with regard to the meridian, if any, could be ascertained by means of the proper tables, which I had not. When Maskeylyne went to Scotland to ascertain the power of attraction, he made use of the same mode to adjust his instrument; and he speaks of it as his own invention—*ergo, producing my observations*, would shew a hint of the mode, prior to his using it. Again, speaking of another occultation, I said *the star first appeared to grow red, then dim, and then vanished*; which seems to denote an atmosphere round the moon, and such I think it may have: for, when we consider that the atmosphere round our earth extends only 45 miles high, and in the upper regions, it is so very rare as to be comparatively nothing; if we add this distance to the moon's semidiameter, it will only increase the visible angle a minute. Even our atmosphere may be doubted by the

* A similar invention had been made by Mr. Smeaton, or by Messers Bolton and Watts.

inhabitants of the moon. So, if Maskeylyne wants to introduce the supposition of an atmosphere to the moon, *it is better not to produce my observations.* In the Carnatic, I thought of a new method for correcting the variations of a pendulum from expansion; but I have no time to write the description now. I have made many astronomical observations to fix longitudes and latitudes of places, with a view of correcting the geography of the coast from Gaujam to this place: and I have measured some remarkable mountains by the barometer, and by a theodolite, which measurements I will send to you one of these days. Pray what became of my parabola instrument? I have a machine almost finished for grinding specula to the figure of a parabola without *Mr. Mayer's magnet touch.* As soon as I get time again, I will complete it, and send a speculum to you. Therefore, hereafter, if I live, I shall hope to divert you in the way you permit me."

"If Cropplestone is not provided for, be assured I will do the best I can, even in the midst of the *brevet business*, but this has engrossed *soul and body.*"

"*Madras,*

21st March, 1783."

The following *rhythmical* letter we present to the reader, in full assurance that the perusal of it will afford gratification to all who have felt interested in the feelings of its author. The lines contain many amiable sentiments, agreeably turned in easy verse, and as such are honourable to the writer of them; not from the excellence of the poetry, but from a higher and a worthier merit.

The lady they are addressed to was the amiable consort of General Pattison, of the Royal Artillery, Colonel

Pearse's earliest and kindest benefactor, and constant friend.

“ Think not, dear Madam, that I can,
Tho' banish'd far to Hindoostan,
Forget the rights which friendships claim,
And by such act disgrace my fame.
Friendship's a chain which hearts unites,
And well preserved, affords delights
Too great to be the sport of time—
Too great for me to treat in rhyme :
Yet, what it dictates I must write,
Because I deem it good and right.
When young, I felt the gen'rous flame,
Now older, still I feel the same,
And gratitude will make it due
To all I must esteem like you.
You and the General first laid
The plan by which my fortune's made ;
His patronage first led me forth,
His guidance gave me all my worth,
If any I may claim; and you
Presented virtue to my view,
In colours so refin'd and bright,
My eyes were dazzled at the sight.
At first surprised, I knew not why,
Kind nature prompted me to try,
By imitating what I saw,
To find the force of virtue's law.
Insensibly I thus was led,
In the same blessed paths to tread,
And with the progress of my mind,
To closer union was inclin'd,

And persevering to that end,
 As a reward, found you my friend.
 On such a solid basis rais'd,
 Sweet friendship must be ever prais'd.
 And in full strength and splendour last,
 'Till the last hour of life be past.
 Now let me plead,—it was not fair
 To think that I could ever dare
 To shew neglect to what you wrote,
 Whether 'twere letter, card or note:
 Much less so, when you condescend,
 In absence of my worthy friend,
 His place to fill, and cheer my heart
 With the good news you did impart,
 That he was far removed from home
 In honour's gladsome paths to roam,
 To wrest the laurels from the brows
 Of rebels in Americ's snows,
 To serve his Country and his King,
 Sweet peace restore, and glory bring
 To Albion's shores; and there enjoy
 Repose and bliss without alloy.—
 That you yourself were blest with health,
 Wished me that comfort, and much wealth,
 And kindly bade me soon return
 From India's shores, which ever burn,
 To climes more mild, and friends sincere,
 Who kindly wish to have me near.
 Such gen'rous sentiments as these,
 Could not do otherwise than please;
 And to neglect them were a crime,
 That could not be effac'd by time.

Then seek the cause of the delay
In the misfortunes of the day ;
For horrid war with fiercest rage,
Doth ev'ry British son engage,
From east to west, nor sea nor land,
Can for a moment peace command.
The merchant dares not venture far,
Lest he should suffer by the war ;
Friends to all parties can't escape,
If they presume to turn the Cape :
For one wants copper, medicine, wine ;
The other wants a hook and line ;
So be there much or little cause,
The want supplies the place of laws,
And every ship that bears supplies,
Becomes, of course, an useful prize.
The dangers thus you see increase,
And letters cannot pass 'till peace.
By such mischance, I now lament,
That numbers which I wrote and sent
Have missed their way, and you complain,
That though you write, you write in vain.
So Pearse, the General too accus'd,
Till he your friendly lines perus'd,
And then first learnt that privateers,
Had made the gap of several years.
But since I know one ship arriv'd,
I hope your friendship is reviv'd.
The Swallow safely reached your shore,
And to yourself one letter bore ;
The Gen'ral too, by her would hear,
That I was safe, and he was dear.

Whilst thus I write to ease my mind,
 Oppressed with cares of ev'ry kind,
 And strive to conquer foreign foes,
 Coote furnishes a source of woes.
 His enmity will never cease,
 But daily with his years increase—
 Of this enough!—the Gen'ral knows
 Both what I mean and whence it rose.
 And now good Lady, I'll explain
 Why I shall never cross the main;
 Though you invite, it cannot be,
 The contrary is my fate's decree.
 The stories travellers have told,
 That India's soil is made of gold;
 Its hills of diamonds, sparkling bright,
 Tho' they deceive, afford delight;
 But we, who now defend the coast,
 Find bare subsistence there, at most;
 And Pearse, who fifteen years has tri'd
 What could be done in India's pride,
 Can only make a shift to live,
 With scarce an anna left to give.
 No superfluity appears
 To raise a fund for latter years;
 No friend to wave a magic wand,
 And make wealth roll at my command;
 Whilst Coote agrees to keep me poor,
 And thrust me back from fortune's door.
 Hence it is plain I ne'er shall spy,
 The joyful Land of Liberty.
 For surely it would be a curse,
 To meet you there with empty purse,

Without the means to live at ease,
 And being pleas'd, to strive to please.
 Now I must end this rant in rhyme,
 Lest you lament your loss of time,
 Spent in perusing what I write,
 Mere trash! unfit to bear the sight,
 But which I hope will serve to shew,
 The gratitude with which I glow.
 As such, accept what I rehearse,
 I am, your faithful T. D. PEARSE."

"Madras, 22d January, 1783."

The following letter to Lionel Darell, Esq. contains a short statement of the business at Cuddalore; and is interesting and important as a document.

"MY DEAR FRIEND,

"I had applied to the Supreme Council for a brevet, they did not grant it; they did not even answer my letter. I staid with the Army however, and was at the attack of the *bound hedge*. Lieutenant Colonel Kelly with his brigade and the Madras Europeans carried the works on the left, without loss or trouble; by manœuvre—the grenadiers under Lieutenant Colonel Cathcart were repulsed in an attack they made on the next work, which was a redoubt. The 1st battalion of the 13th regiment of Bengal sepoy's; and the Carnatic battalion, commanded by Captain Trent, covered the retreat of the defeated Europeans; the whole line then attacked the same redoubt except Kelly, (who was out of the way), and the body on the right was opposed to other works. The Hanoverians, 101st and 25th Bengal regiment, and part of Muirhead's Carnatic battalion, formed an attack in front of it; the grenadiers and the troops under Colonel Stuart were to have moved up at

the same time, on the left, but the signal was not understood, so the front attack was made: the 101st broke, the Hanoverians, within 20 yards of the parapet, did so too, and the 25th followed.* I got a severe wound in my thigh, having advanced with the Hanoverians, and was obliged to move off. The French quitted their trenches to pursue; Lieutenant Diss who commanded Muirhead's companies, having rallied his men, went round by the left, got into the redoubt and fired upon the enemy. The French returned from the pursuit, and endeavoured to drive away Diss, but the grenadiers and troops from the left came up, and so secured the works."

"I tell you all this, because General Stuart has done all he can to suppress any knowledge of the good conduct of the Company's troops or officers, on purpose to bring forward the King's as having *done all, which is not true*: for they were *repulsed* every where, and the first impression was made by the Company's. But we are under a cloud, and have no friend to help us."

"Cuddalore,
8th July, 1783."

To Sir Robert Barker.

"DEAR SIR,

"As the papers will inform you that I was wounded, I must tell you that I am very nearly recovered; and

* Captain Durie of the 25th Regiment was killed in this redoubt: and Colonel Pease in a letter to General Stibbert, writes— "Captain Durie's body being slightly covered with earth, in the place where he fell, was left there.—The sepoys went, uncovered the body, and transported it to Camp, and there buried it in proper form: and thus gave such a proof of their attachment to their deceased Officer, as can hardly be equalled in the annals of any Corps."

in a week more expect to be as well as ever I was. The wound was in my right thigh; the ball could not be found, and as I rode a considerable distance afterwards and the hole was very large, perhaps it is not in the thigh now; but if it is, it does not signify, as I do not feel any pain from it."

"I sent to you by a Portuguese ship the attested copy of a letter of thanks from Coote, written just before his death; also a narrative of our trip to Vellore in 1782, to counteract any thing that he may have done to my prejudice."

"I have had so much writing to-day, having heard by accident of the opportunity of a dispatch, and having been obliged to write to my Attornies, that you must excuse me from sending you a history of the present expedition. I sent a sketch to Darell, because General Stuart's orders of thanks are *founded on falsehood, intentionally to conceal the disgrace of the King's troops, who were defeated every where and saved by the sepoy's, who covered their retreat*: I dare say he will shew it to you."

"What think you of our sepoy's now?—On the 13th, covering defeated European grenadiers—steady, when unsupported by others: rallying, and returning to the charge with bayonets against Frenchmen? On the 25th of June, the 24th Bengal regiment defeated the enemy's attack on our trenches; killed many with their bayonets only; took two colours, and recovered the other pair which had been lost; sustaining the fire of the enemy in front, and that of our own troops in the rear, and took prisoner the Colonel who commanded the attack. The French acknowledge 350 Europeans lost that day, and only the 24th regiment was engaged; for the Euro-

peans behind them, ran away full speed, which threw a Carnatic battalion into disorder, and occasioned the confusion I speak of. I must have done now, being unable to write more. Adieu.

“ I am, Dear Sir,

“ *Cuddalore,* }
 “ *6th July, 1783.*” }

Your truly obedient servant,
 T. D. PEARSE.”

“ P. S. Captain A. K. Dickson desires his best respects to you.”

[*To be continued.*]

ARTICLE II.

Observations on the Honourable Company's Military Seminary of Addiscombe.

THIS Institution, the establishment of which is highly honourable to the East India Company, is so intimately connected with *our Service*, that it justly claims the attention of all those who feel an interest in the future character of a great portion of the Indian Army.

The statements which we have now the pleasure to lay before our readers, will no doubt be gratifying to all those who are desirous of information regarding this important establishment; and we sincerely trust that the observations which we have subjoined, will be thought deserving of attention.

Our remarks arise *from circumstances* which have fallen under our personal observation, during a stationary residence at the Head Quarters of the Bengal Artillery; where that portion of Addiscombe Cadets, who are destined for this corps are assembled on their arrival in India, and where they enter upon the first *grade* of their profession as Officers. If it falls to our lot to incur the sentence of presumption, for attempting to point out what we consider defective in the system of instruction prevailing at Addiscombe, we shall feel it a misfortune, only because such an adjudication may tend to weaken the force of our observations in the minds of our readers; but by silence, we should be culpable in proportion to the extent of any good which *may*, and we trust *will* be effected by partial changes in the Institution.

The history of this Military Seminary is familiar to most of our readers; we shall however just glance over the circumstances which led to its establishment.

Towards the latter end of the last century, the Honourable Court of Directors obtained permission from the Master General of the Ordnance, to send a certain number of young men to join the Company of Gentlemen Cadets at Woolwich, for the purpose of receiving an education, on the same footing, and exactly to the same extent as those intended to fill the ranks of Officers in His Majesty's Artillery and Engineer corps; these young men being destined for similar service, in the employ of the Honourable East India Company in India.

The number of *Indian* Cadets allowed to join and be present with the Company at Woolwich, at one time, was however limited; and of later years we believe never exceeded the number of twelve or fourteen.

From the year 1802 until the establishment of the Seminary at Addiscombe in 1809, the India Cadets were sent in the first instance, to the Royal Military College at Marlow; many were also admitted to this excellent institution, who were primarily destined for the Cavalry and Infantry corps in India; and those *specialiy for the Artillery or Engineers*, were drafted from Marlow to Woolwich, as vacancies in the latter establishment occurred by the departure of Cadets for India.

The Honourable Court of Directors, however, soon found that the demands for their Artillery and Engineer departments, greatly exceeded the supply of Cadets which this limited number of *instructed* furnished, and a further number of young men were allowed to educate themselves *privately*; and these upon obtaining *certain certificates* from Woolwich Professors, who were named

for that purpose by the Honourable Court, were allowed to proceed to India, receiving 200 guineas each in Leadenhall Street, as a compensation for the expenses of their self-obtained education.

The inconveniences and defects resulting from this two-fold and heterogeneous system of education, were soon experienced; and with that spirit of liberality and munificence, becoming the managing members of the East India Company's affairs, the plan of an Institution, *exclusively their own*, was projected and perfected. Such we believe was the history of the establishment of the Military Seminary of Addiscombe; and we sincerely hope that its prosperity will be such, that it will prove as advantageous to the interests of our Honourable Employers, as it is worthy of the exalted station which they hold in the commonwealth of Great Britain.

We should have experienced much gratification, if we could have adduced any proofs from our own observation, that the advantages resulting from this Institution had at present been, in any degree commensurate with the expense incurred; or even if we could assert that the *intent* of the Institution had so far succeeded, that the "Addiscombe" could be distinguished from the "self-educated Cadet" by any superiority in *professional acquirements*.

From the papers *ordered to be printed* by the House of Commons, 18th of February 1822, it appears that the following number of Cadets have been educated and sent to India, from the establishment of the Seminary, (January 1809,) to 1820, inclusive.

	Number of Pupils under Education.	Sent from the Seminary.
Viz. January 1809 to Dec. 1809,	57	14
" 1810 — " 1810,	82	28
" 1811 — " 1811,	81	32
" 1812 — " 1812,	70	23
" 1813 — " 1813,	83	23
" 1814 — " 1814,	58	18
" 1815 — " 1815,	55	15
" 1816 — " 1816,	62	31
" 1817 — " 1817,	65	36
" 1818 — " 1818,	66	45
" 1819 — " 1819,	98	25
" 1820 — " 1820,	110	65
Making the total number of Cadets under education,	498	
Ditto ditto sent from the Seminary,	—	355

The net expenditure on the Seminary by the Honourable East India Company, for the above period, appears to have been £136,998:5.

The annual expense of the present Establishment of Addiscombe, is stated to be £4,622:9:3.*

The following Gentlemen hold offices at the Military Seminary:

* The Civil College of Haileybury appears to have sent out 438 writers from 1808 to 1820 inclusive; and the net expenditure is stated to have been £217,595:5:10. The annual expenditure of the present Establishment of the civil college is stated to be £8,446:18.

Major General Sir Howard Douglas, Bart. C.B.* Public Examiner, with a salary of Charles Wilkins, Esq. F.R.S. L.L.D. Visitor and Public Examiner in the Oriental Department.—Receives no salary.	<i>Per Annum.</i> £500
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Resident Professors, Masters, &c.

Dr. James Andrew, Professor of Mathematics and head Classical Master.—Salary	1,100
Mr. Alexander Anderson, M.A. Mathematical assistant,	180
Mr. Samuel Parlour, ditto.	150
Mr. Peter Oger, French Master,	150
Mr. John Jones, Classical assistant.	150

Non-Resident Professors, &c.

Joseph Bordwine, Esq. Professor of Fortifications and Artillery,	Salary 500
Charles Chapline, Esq. Professor of Topographical drawing, and Military Surveying,	300
John Shakespear, Esq. Professor of Hindoostanee,	600
Richard Haughton, Esq. Assistant ditto. ...	250
H. Angelo, Jun. Esq. Broad Sword Master,	100
Dr. McCulloch, Chemical Lecturer,	250

It appears from the statements given in these papers, that from the year 1814 to 1820 inclusive, in addition to the number of Cadets educated for the Artillery and Engineer corps, for which this Seminary is principally intended, that two hundred and thirty-six Cadets, who have been educated and *instructed in the Hindoostanee Language* at Addiscombe, have been sent out for the Cavalry and Infantry of the three Presidencies, viz.

*It is with pleasure that we observe the name of Sir Howard Douglas at the head of this list; and we anticipate from this appointment, *the most happy results.*

one hundred and twenty-two to Bengal, fifty to Madras, and sixty-four to Bombay.*

We shall preface the remarks which we have to offer upon this Institution, by setting forth, that we conceive that *a habit of subordination, and military obedience, in the strictest sense of the word*, must ever be considered as a necessary principle in a soldier's character.

To establish this habit *in early years*, just as the boy starts into man, should be the first task of the tutor, and the first lesson of the pupil:—at this early day, the one will be sure in his teaching, the other in his learning the important lesson—how to *part with a portion of liberty*, and at the *same time make happiness consist in*, as it will assuredly depend upon, *doing so*.

It is not by coercion that so great a mastery is to be obtained over the human will; the *mind* of the Cadet must be *convinced of the necessity of obedience to superior rank*—that self-estimation which is probably more necessary in a soldier's, than in any other line of life, must be worked upon—the individual must be taught to *feel* that the soul of discipline, and all that he can claim of pride and honour, in belonging to the profession of arms, is grounded upon *this obedience*—he must be taught, that while the power of a superior officer *on the parade*, is despotic,—he may expect to meet with the brother or the friend in his commanding officer, when the hour of obedience ceases; and this lesson must be taught early, and should be fully understood before the Cadet is made an Officer, otherwise the task will be heavy and irksome to all parties.

* In addition to this number, and within the same period, 475 Cadets have been sent out to Bengal; 596 to Madras, and 309 to Bombay, to join Cavalry and Infantry corps, *who have educated themselves*.

We cannot therefore but observe, with feelings of regret and surprise, that in the list of *Residents* at the Seminary, there is not a single Military man holding a commission.—For it is not by Robert Armour, Artillery Serjeant, or Robert Dodd, Artillery Corporal, whose names we observe in the list of *Residents*, that the important lesson above alluded to, can be conveyed to the Cadet.—These men may be excellent in their character, examples by their conduct, and useful by their instruction as far as it extends; but we must look for *abler instruments* in the execution of a difficult task.

Surely from the number of Officers of the Indian Armies, of those who served their Honourable Employers *well*, who have bled, or worn down their constitutions in their service, selections might be made of individuals qualified to fill almost every *necessary situation* in the Institution: and we ardently hope, that as vacancies occur in the present Establishment, *if a more speedy change is not thought desirable*, that the Honourable Court will be pleased to take this subject into their serious consideration.

One Officer at least, from *each Presidency* ought to be employed; and with all respect and deference to Dr. Andrew, we trust the day will come, when an opportunity may offer, for placing an Officer of rank and known respectability, *who has served his allotted time in India*, at the head of the RESIDENT ESTABLISHMENT.*

We shall proceed to point out the advantages which may result from this supposed change of the Establishment.—

* Mathematical, and other Masters, may of course be employed, but the discipline should be purely Military, and strictly enforced.

By placing Officers *who have served in India*, at the Institution, the Cadets will have an opportunity of gaining some knowledge of the *nature of the country and of the service*, which they are destined for: not only in the course of their studies and exercises, but in more familiar intercourse; and this would not be a *book learning*, but derived from sources of undoubted authority.

Again, those Cadets who were most deserving, who distinguished themselves by their good conduct while at the Seminary, would have the best opportunity, through the Officers *who had served in India*, placed over them, of furnishing themselves with *really useful introductions*; and thus forming connections on their first arrival in India, which in many instances would be *of incalculable future benefit to them*.

Their instructors, *being themselves immediately connected* with the Indian service, would have an interest in their pupils, which from the present individuals who fill the Establishment, cannot be expected:--and having been Officers in the service, *and practised obedience* themselves, they would possess qualifications to *command*, and to teach that habit of mind so necessary to a soldier, which experience alone can afford a knowledge of, and which should in our opinion be amongst the earliest instruction given to young men destined for a military life; but as far as we can judge from observation, this lesson is at present *absolutely neglected* at Addiscombe.

From the present Establishment, the students cannot derive any knowledge of *Indian Fortifications*, or the modes of attack and defence peculiar to the native powers. Instruction in the *European Continental Systems*, appears to be all that is at present thought necessary: but where is there a single fort in the possession of any Native power, that verges upon these constructions?

The Continental System of Fortification may very properly be taught, but a knowledge of those of India, which *alone the pupils will have to deal with in their career as Officers*, should be considered as of greater consequence.

By having one Officer present at the Institution, from each Presidency, a knowledge of the varieties in the constructions of the native Fortresses in each quarter of this vast Indian continent, could be obtained.

We can safely say, as far as has come under our observation, that not one Cadet from Addiscombe who has joined the Bengal Artillery, *has received any useful instruction on this important head*; and that generally they learn to despise the plans of *European fortification*, which have cost them so much labour, and in the execution of which so much of their time has been expended, when they find the *utter uselessness* of them in India. We entirely except from this observation, all the Cadets who have received instructions under Colonel Pasley, at Chatham. The Engineer Cadets learn under that distinguished Officer, what they will have *to practise in India*, when called upon on service as military Engineers. Under Colonel Pasley, military officers only are employed as instructors, and the strictest system of discipline is maintained; and happy would it be for all Cadets, if such were the practice at Addiscombe, from the day of their joining the Establishment.

If each Cadet were instructed in the *Indian modes of fortification, and attack and defence*;—if their Portfolios were furnished with plans of those *native places of Arms*, which have been captured by British prowess, and they were obliged to make accompanying MSS. from descriptive accounts of the different sieges, they

would feel an interest in the preservation of them, and would land in India with a stock of materials of *real worth*.

The value of *intelligent Indian Officers*, as instructors in this department, would be great. It is evident that without employing such means, the Honourable Company can never expect to send out Cadets of Artillery and Engineers qualified for *Indian service*. The Students may be in some degree fit for an *European* campaign or siege, but further than this cannot be expected; for those who have *not served in India*, cannot teach that which they have no knowledge of themselves.

While we touch upon this subject, we shall state our opinion upon the styles of drawing which are taught at Addiscombe; and shall venture to assert on the experience of a service of sixteen years, that the practice of *free sketching from nature, combined with neatness and accuracy in plan drawing,** is *all* that ought to be taught to the students in the way of drawing, as they are undoubtedly the *only styles* which will ultimately prove useful to themselves, and to their Honourable Employers.

The systems of *teaching the art of drawing*, by a series of unmeaning mouths, ears, eyes, and noses; and the fiddling, cramping, time-wasting practice of the *reed pen*, and what is still worse the goose or crow quill *line drawing in imitation of engravings*, are not fitted for a military student, and should be altogether exploded.

Those Cadets, who have *a taste for these descriptions of drawing*, may by all means practise them in their hours of recreation; but they ought to be instructed

*This department ought to embrace sketches of *Military reconnaissance*.

only in those styles which will prove of *real use and value* in their future service, and they *ought to know which are so*. We have heard Addiscombe Cadets, who have been in high repute amongst their companions as draughtsmen, upon being asked to take a sketch of some interesting object, exclaim, "Oh! I cannot draw from nature—we were not taught at Addiscombe,—we do not understand the rules of perspective." Yet, if furnished with a drawing or print *as a copy*; they evince all the requisite talents necessary for draughtsmen of the highest order.

We cannot but regret to observe also, that the young men *generally* seem to set very little value upon their portfolios of drawings, plans, &c. which they have made at Addiscombe. The fact is, that the execution of them has been *a labour*, in the accomplishment of which they have felt little interest; and they soon learn to despise a collection of plans, which are absolutely useless in India. Some Cadets do not even bring out their drawings, while others complain of a practice, which we sincerely trust will be abolished.

It appears that at the several examinations, when the drawings are displayed, if there are any which appear to merit particular attention from the superiority of their execution, *that they are taken away*, either for deposit at the India House, or in some private collection—no matter where—the drawings disappear, and the Cadet sails for India without hearing any more of them.

Now this is not only impolitic, but it is really an hardship on the young Cadet, who will naturally wish to preserve those drawings by him, which he can shew with most satisfaction to himself; and he is actually robbed of those praises, which would otherwise have

been bestowed upon these proofs of a successful application of his talents in India, where alone he can benefit by their being known.

It would probably be an excellent regulation, when an alteration in this department does take place, (*for the best of their drawings are of little value now,*) if each Cadet was obliged to produce his portfolio before his respective Commandant, on his arrival in India; accompanied by a certificate of the number executed at the Seminary; while at the same time every argument should be made use of, to induce the individual to study the plans of Indian forts and sieges which he was provided with, on his voyage;* and they should be informed that their brother Officers in India, will delight in seeing proofs of the accumulation of talent, in their respective corps. Even those whose natural talents may not have fitted them to draw in the best style, can always exhibit proofs of industry, accuracy, and neatness, which have their due value, and will meet with just estimation; and these would be the best letters of recommendation which a young man could bring out with him.

We have dwelt rather longer on this part of the education of the Cadets than we had intended, but we have good reason to know that the ability of *free sketching from nature, accompanied with a neatness and accuracy of hand in plan drawing,* are accomplishments of *great value* to any young man destined for the Artillery or Engineers.

The acquisition of any depth of classical knowledge, *if it interferes with more necessary attainments,* is rather

*These might in the first instance, be obtained from the Chief Engineer's, Surveyor's, and Quarter Master General's Offices at the three Presidencies.

to be avoided in the education of a young Military man. We cannot therefore comprehend the use of having an *Assistant Classical Professor*; while Dr. Andrew, whose salary engrosses so much of the apparent outlay for Professors, is in the situation of *Head Classical Master*.

In Mathematics, which is the widest, and most important field of necessary instruction, we should have been glad to have observed a greater number of professors. We sincerely hope that the higher branches of Mathematics, *beyond mere arithmetic*, the knowledge of which are peculiarly valuable to an Artillerist or Engineer, are fully attended to.—These are, Geometry and Mechanics, rational and practical, including the theories of Statics and Dynamics, Hydrostatics, and Hydrodynamics.

Instruction in these branches of Mathematics is of incalculable value to the Cadet; because they excite an interest in the pursuit of them, and awaken a love of study in the mind, and this of studies *immediately professional*; so that pleasure and improvement go hand in hand, and the value of the individual to the State which employs him is in constant increase.

What value is to be attached to the Artillery or Engineer Officer, who may be a first rate Classical or Hindoostanee scholar, and yet remains ignorant in *professional science*? The individual may be of use in other situations in the service, but *in his profession*, he never can advance in value, until he possesses *professional acquirements*.

Compared to India, (notwithstanding what idlers say to the contrary), if an individual possesses good health, there is no country in the world more fitted for sedentary pursuits. The mornings and evenings present cool and pleasant hours of out-door recreation and exercise;

but retirement to the house, during the day, must be the practice of those, who desire health and its attendant happiness.

If the mind of the Cadet can therefore be led to imbibe a taste for study, and *these studies are professional*, he cannot bring with him a greater blessing from his native land—truly may we say of this disposition of mind, as our immortal Poet says of Mercy—

—————It is twice bless'd ;

It blesseth him that gives, and him that takes.

A knowledge of Civil and Military Architecture, particularly the former, is from the nature of this service, equally important to the Cadet, and to the Government which employs him. The Engineer Officers, when called to duty as Architects, are generally employed on Civil buildings ; in his absence the Artillery Officer, or the Officer of Cavalry and Infantry ; while few Military buildings, (from the nature of our possessions in this country,) are erected.—*The utmost extent of instruction* that the Cadet can *possibly receive* in Architecture, in all its branches, will be well repaid by the advantages ultimately resulting from such instruction, to the Officer, and to the service.—Is any instruction now given to the Cadets at Addiscombe in Architecture ? Yet when they commence their career as Officers they are called upon to erect Light Houses, Bridges, Churches, Hospitals, &c. in the performance of which duties, all the abilities and information of able Architects are required.

Some knowledge of the principles of Military Tactics should of course be conveyed to the pupils at Addiscombe ; and a knowledge of Military Law, as well as a *perfect knowledge* of the “Articles of War,” before the Cadets leave the Institution :—are these points attended to now ?

With regard to the study of the Hindoostance language, we are of opinion that it might with advantage be "*let alone*" until the Cadet arrives in India, when he will have the best means of obtaining the necessary proficiency.

At any rate, if the attempt to teach this language is continued at Addiscombe, the Artillery and Engineer Cadets should *certainly be excepted*, and the time which is at present thus *uselessly expended*, should be devoted to the acquirement of a knowledge of their profession. We have not yet met with any Addiscombe Cadet who has joined the Bengal Artillery Regiment; who could, on his first landing, express himself intelligibly to his servants—therefore *cui bono?* and great is the sacrifice of time and advantages, which can never be replaced, by pursuing a study of so *secondary a consideration*, and neglecting others of the greatest import. We now appeal to our brother Officers, with some degree of assurance that their sentiments will accord *in most particulars*, with what we have written. The welfare of those who are to succeed us, can only be effected by the changes which may take place in the system at Addiscombe, but our children, and children's children, may be amongst the number,—and in this anticipation, what can be more decidedly interesting? May we not venture to pronounce, that until an early system of discipline is taught at Addiscombe; until the studies pursued, are more homogeneous with the duties which the students are called upon to fulfil in India; and until some respectable *Indian Officer of Rank* is at the head of the Institution, supported by intelligent Officers, who have undergone *the experience of an Indian Service*, Addiscombe will not attain that perfection of which it

is capable, which we sincerely wish it, and which we feel convinced it must have been and is now the earnest desire of the Honourable Court of Directors to effect.

* * * Since this article was prepared for the press, we have observed that Charles Chaplin, Esq. who is on the establishment of the Seminary as a Non-Resident Professor, is appointed a Captain (by brevet), the appointment is worded as follows :—

Brevet Rank.

“ Charles Chaplin, Esq. Professor of Military Drawings at the East India Company’s Military Seminary at Addiscombe, to have the local rank of Captain and Adjutant during the period of his being employed with the Company of Cadets there, dated February 28th, 1822.”

This is *better than it was*, as we suppose that *Captain Chaplin* is now a *Resident* at the College; but, as he is *Captain and Adjutant*, who is to command?

We trust that even amongst these of our Readers who were Addiscombe Cadets, the general sentiment will be in some degree accordant with our own. They have each of them had the experience of a greater or less number of years service in India, and we are ready to pay all deference to their opinions, and would happily record them. It is far from our intention to reflect upon them or upon any one else; and we trust they will impute all we have said to an earnest desire to produce a *beneficial change* in the system of education pursued in this interesting and expensive establishment.

ARTICLE III.

Description of a Fuze for bursting a Shell on its striking the ground, or any object against which it is directed, and at indefinite Ranges.

The construction of this fuze is very simple, it being only a common fuze, altered as described below.

AB, CD, Plate 9, are side views of a common fuze, completed with the alterations necessary to make it burst a shell on its striking the ground.

EF is a section of the same, as placed in the position represented in *CD*.

To make this fuze, the wood of a common one is cut away, (about the depth of half its thickness,) on two opposite sides, to receive *a* and *b*, which are two small pieces of brass or gun metal, of such a thickness as not to project beyond the exterior line of the fuze:

The shape of these pieces is shewn separately at *d, d, d*; which exhibit the forms of the front, side, and upper end. These pieces of brass are each perforated with a small hole, and this is slightly countersunk on the exterior surface of the metal.

A hole is then to be drilled through the wood of the fuze, passing through the middle of the composition; a patch of thin leather is to be placed under each piece of brass; and a piece of copper or brass wire *e*, is to be passed through the holes, and rivetted in the countersinks of the pieces *a* and *b*, until the whole are brought into firm contact. The fuze is then complete.

This simple apparatus effects its purpose from the following causes:—

When brass or copper wire is red hot, it is, if possible, more brittle than glass: the inflammation of the fuze composition during the flight of the shell, produces this necessary ignition of the wire; and, on the shock which the shell receives on its striking the ground, the weights *a* and *b* fall off into the shell, carrying with each of them the end of the wire which was rivetted into it. The fire of the fuze then finds vent at the two lateral orifices left open by the wire, and the explosion of the shell takes place.

Care must be taken that the pieces of brass *a* and *b*, are placed at such a distance from the cup of the fuze, that they will be below the thickness of metal of the fuze hole, when driven into the shell; and in very short ranges, the composition of the fuze may be drilled out from the top, to within one-tenth of an inch of the wire, to ensure the ignition of the wire before the shell reaches its object.

If these fuzes are carefully made, they may always be depended upon; several trials have been made with them at Dum Dum, by the Editor of this work; and not one has failed. They are perfectly safe; and when the vast importance that is to be attached to the bursting of a shell at the time of its striking, in many, we may say in most situations, is considered, the wonder is, why they should have been neglected. Some argue, that as in bombardment, both by land and sea, it is desirable that the shells should penetrate a building or ship before they burst, any fuze which would take effect *before penetration* would not be desirable.—This is true, but the remark does not apply to these fuzes; for the communication of

the fire which causes the explosion is not *quite instantaneous*, and with all those which were fired at Dum Dum, it was evident that the shell had penetrated before the fuze took effect upon the bursting powder.*

The celebrated Dr. Hutton, (in his "Theory and Practice of Gunnery" published in his Tracts, Vol. III.) computes the time in which a 1-pound ball, projected with a velocity of 1200 feet per second, penetrates 15 inches deep into dry sound elm, to be only the 480th part of a second! and though few shells have this velocity when they strike, yet the knowledge that this circumstance has been clearly ascertained by the experiments of that great philosopher, may serve to check any assertion against the supposition, that a shell furnished with the above fuze, can be exploded before it has made a desirable penetration. As these fuzes are fired without cutting them to any precise lengths, of course much time is saved by using them; as, if the range is long or short, the same fuze equally answers to it.

An Englishman, of the name of William Wilton, so long ago as the year 1784, produced these fuzes as his invention, and they were ordered to be tried by a Committee of Artillery Officers on Woolwich Common in that year. We happen to have obtained a copy of the results of the experiments during^o our late furlough to England, which we give below. We also brought out one of the original fuzes, having the following slight variations to that which we have described, viz. four small *leaden* studs are driven into the wood of the fuze, and are clenched down upon the pieces of brass; with the view, as it appears to us, of securing them from falling off, in case the brass wire should break, or be melted

* No live shells were fired.

by the heat of the burning composition previous to the shell's striking the ground—no pieces of leather are used. We have tried both these plans, and are perfectly satisfied with that which we have above detailed; and we conceive that making four additional holes in the wood of the fuze, to receive the leaden pins, is objectionable; and that by slightly increasing the thickness of the wire for the larger nature of shells, that the object of securing the brasses to the fuze, until some violent concussion takes place, is attained. We shall just mention, that this description of fuze was brought to Bengal many years ago; by whom, or at what precise time, is not now ascertainable. A fuze, similar to Mr. Wilton's with the *leaden pins*, was produced by the Conductor of the Expense Magazine, *amongst several other kinds*, said to have been invented by the late Colonel Hill, of the Bengal Artillery.—These specimens are now in the Model Room at Dum Dum, but we have never seen any invention for the purpose, more simple, or more perfect than *Mr Wilton's fuze*.*

Result of an experiment with Mr. Wilton's fuzes, before a Committee of Artillery Officers on Woolwich Common, 1784.

	<i>yards.</i>	
1st round, range	924	{ The Fuze was blown out the instant the shell struck.
2nd — —	1026	{ Ditto ditto.
3rd — —	800	{ The Fuze was blown out 4 seconds before the shell struck.
4th — —	856	{ The Fuze was blown out the instant the shell struck.

*The alterations which we have made, are of too trifling a nature to deserve that the name of the original inventor of the fuze should be forgotten.

5th	—	—	561	{	The Fuze was blown out 4 seconds before the shell struck.
6th	—	—	694	{	The Fuze was blown out the instant the shell struck.
7th	—	—	511		Ditto ditto.
8th	—	—	586		Ditto ditto.

Here the 3rd and 5th rounds, it appears, were defective, from what cause we cannot pretend to say, though we conceive that the pieces of leather which we propose, may greatly serve to prevent any fire from escaping during the flight of the shell. If this fuze is not known at the other Presidencies, we trust our brother Officers will give it a trial; and any results communicated to us, favourable or unfavourable, will be thankfully recorded.

N. B. This is the fuze of which we promised our Readers a description in our first Volume, page 114.

ARTICLE IV.

Description of a Portable Perspective Instrument.

(See Plate 9.)

The plan of the simple instrument we are now about to describe, which we can only claim the merit of having improved, (at least we believe we have done so by our additions), is taken from a description of a nearly similar one in the 1st volume of Nicholson's Journal, page 284, which is given after an account of an instrument "*for determining the Position of Objects, in taking a Picture from the Life,*" by R. L. Edgeworth, Esq.

The description of Mr. Edgeworth's Instrument is, however, preceded by some valuable extracts from Maria Edgeworth's work "On Practical Education;" and we shall, we assure ourselves, be readily excused transferring them to our own pages, in treating on the present subject.

"To understand prints of Machines," says Miss Edgeworth, "a previous knowledge of what is meant by an elevation, a profile, a section, a perspective view, and a (*vue d'oiseau*) bird's eye view, is necessary. To obtain distinct ideas of sections, a few models of common furniture, as chests of drawers, bellows, grates, &c. may be provided, and cut asunder in different directions. Children easily comprehend this part of drawing, and its uses, which may be pointed out in books of Architecture; its application to the common business of life is so various and immediate, as to fix it for ever in the

memory: besides, the *habit of abstraction*, which is acquired by drawing the sections of complicated architecture or machinery, is *highly advantageous to the mind*.* The parts which we wish to express are concealed, (*behind others*) and are suggested partly by the elevation or profile of the figure, and partly by the connection between the end proposed in the construction of the building, machine, &c. and the means which are adapted to effect it."

"A knowledge of perspective is to be acquired by an operation of the mind, directly opposite to what is necessary in delineating the sections of bodies; the mind must here be intent only upon the objects that are delineated upon the retina, exactly what we see; it must forget or suspend the knowledge it has acquired from experience, and must see with the eye of childhood no further than the surface. Every person who is accustomed to draw in perspective, sees external nature, when he pleases, merely as a picture: this habit contributes much to form a taste for the fine arts; it may, however, be carried to excess. There are *improvers* who prefer the most dreary ruin to an elegant and convenient mansion, and who prefer a blasted stump to the glorious foliage of the oak."

"Perspective is not, however, recommended merely as a means of improving the taste, but as it is useful in facilitating the knowledge of Mechanics. When once children are familiarly acquainted with perspective, and with the representations of Machines, by elevations,

* In this sentiment we most cordially join the amiable Authoress. Too much importance cannot be attached to it in the education of youth, and we trust the Professors at Addiscombe will take a hint from her pages, if they will not from our own.

sections, &c. prints will supply them with an extensive variety of information; and when they see real machines, their structure and use will be easily comprehended. The noise, the seeming confusion, and the size of the several machines, make it difficult to comprehend, and combine their various parts, without much time, and repeated examination; the reduced size of prints lays the whole at once before the eye, and tends to facilitate not only comprehension but contrivance. Whoever can delineate progressively as he invents, saves much labour, much time, and the hazard of confusion."

After describing Edgworth's Machine, Mr. Nicholson proceeds as follows:—

"The above machine affords a delineation which is strictly accurate: but I take this opportunity of mentioning one still more portable, though less exact, which may be used in taking small sketches in the field; where the table, and fixed sheet of paper cannot always be supposed to be at hand. I do not know the contriver. It is merely a straight flat ruler, having a division of inches and small parts, (or any other division) on its edge. A string is fastened to the middle of the ruler by passing it through a hole, and tying a knot on the other side, and at the other end of the string there is a small bead or knot to be held in the mouth. The length of the string may be adjusted at pleasure; and when the ruler is used, it is held up at right angles to the stretched string, so that its edge, as seen by one eye, may apply to any two objects; between which it will shew the distance to be afterwards transferred upon the paper by a scale, or by estimate."

"In this use of a graduated rule, it is most convenient and accurate to select some one object in the pic-

ture for the point of sight, and to measure all the distances from thence, from the middle or beginning of the divisions where the direction of the sight is at right angles to the rule. And as this simple instrument *does not give the inclinations*, it may be best always to measure parallel or perpendicular to the horizon, and *estimate the rest.*"

It will be immediately seen that the instrument described above by Mr. Nicholson, nearly approaches to that one delineated in Plate 9. Our ideas in forming it, were indeed entirely taken from the above; and our readers will judge for themselves, whether our additions have been judicious or not.

A B, Plate 9, represents a thin ruler, made of a strip of light wood, and either painted with white oil paint, and divided into divisions by marks which can be washed out, or covered with a strip of drawing paper, and divided with ink or pencil lines. In the middle of this ruler is screwed the small brass semicircle *D*, divided into degrees, having the diameter of the semicircle in a line with a small pin, fixed exactly in the middle of the rule; on this pin is suspended a small brass pendulum *C*. *EE* is a thin cord which fastens into notches cut at *A* and *B*, and can be lengthened or shortened at pleasure. *F* is a small ivory ball, fixed on the cord *EE*, so as not to slide along it.

The intention of these alterations is to make the instrument capable of *giving the inclinations*, which will be exactly determined by the pendulum point. And by having the cord *EE* fastened to each end of *AB*, if the cord is properly adjusted, so as to preserve the ball *F* at equal distances from *A* and *B*, the ruler will be with certainty held at right angles to the line of vision, which is important to accurate delineation.

Suppose the string fastened at *B*; lay the ball *F* upon any division of the rule taken from the pendulum towards *A*, stretching the part of the cord *FB* tight; if the ball *E* is then removed to the same number of a division, on those taken between the Pendulum and *B*, and the cord from *F* to *A* is drawn tight and fastened at *A*, the ball *E* will then be equally distant from *A* and *B*. If the ruler is now held up with the ball in the mouth, and the cord stretched tight, and the sight is then directed over the edge, to objects which are to be delineated, the line of sight will be certain of being perpendicular to it.*

We are of opinion that this Instrument, simple as it is, may be found extremely useful in all branches of *Military sketching in the field*; a subject which we purpose to enlarge upon in a future number of our work. At present we must refrain, as the succeeding Articles demand all the space we can now afford.

* Any kind of handle or support may be placed at the back of the rule, attached at one end to the axis of the Pendulum *C*, for the greater convenience in using the Instrument.

ARTICLE V.

On the Establishment of a Depot and Riding School for Recruits for the Horse Artillery, at the Head Quarters of the Bengal Artillery.

To the Editor of the British Indian Military Repository.

SIR,

I do not know whether it be within the bounds laid down for your useful Miscellany, to agitate questions on the efficiency of any branch of the Army, or to publish suggestions for the improvement of them; but sure I am that the spirit which induces me to offer these, can be called in question by no man. It is an enthusiastic love for that part of the Army to which I belong, and an earnest desire to see it carried as near to perfection as possible. I shall therefore, without more ado, take up my subject, leaving it entirely to your better judgment to give to the world, or otherwise, the following remarks on the present constitution of the Bengal Horse Artillery.

2. Since the first day, almost, on which I joined the mounted branch of the Regiment of Artillery, the subject of its very unprepared state to undertake a series of campaigns against an active and vigilant enemy—one who would keep a force constantly and sharply employed to oppose him—from the simple fact of there being no provision for supplying men to recruit it, has

often and strongly been presented to my mind. You will observe that my arguments will hinge on other kinds of contests than those we generally have been involved in with the Native powers, in which it usually has been *one blow*, and a return to our cantonments. I am now speculating on far different ones—on continued operations, accompanied by frequent rencounters with the enemy, and I ask, in this case, from whence would the Horse Artillery Men be supplied to fill up casualties? At present it requires nearly a year, with all the adventitious aids to be met with in cantonments, to prepare and finish a young man for the Horse Artillery duties; but if the recruit be at all advanced in years, (which sometimes happens), that period is much extended, and at last, after great expenditure of time and trouble, with consequent working of the horses, he is found incapable. Transfer this to the field, and suppose the Brigade of Horse Artillery employed 500 miles from its present Head Quarters, (or 1500 from the source from whence it draws its recruits at present, Dum Dum,) and, for the sake of argument, say the casualties in a single troop average monthly at five men. An European troop consists of 105 men; and it has six guns and ten waggons to bring into action: for this purpose, eighty-six men, to ride the horses in draft, are constantly required. There are six serjeants, two trumpeters, and one farrier, whose peculiar duties prevent them from being available for manning the guns or waggons; this makes a total of ninety-five men, whose services are in constant request, and leaves but ten to cover the deductions from sickness or a hundred other causes. But it is essentially necessary that each gun and waggon, should have *at least*, one spare rider with it to meet any exigen-

cy that may arise from any man or horse in draft being lamed or knocked up. This then would swallow up the remaining ten, *with six more to boot*, leaving no allowance for patients in the Hospital. I have perhaps rated the casualties per troop too high, and, as I wish to advance nothing extravagantly, I will reduce them two-fifths and make them three instead of five—but pray keep in mind that my argument turns on spirited operations. In six months then, or at the close of one campaign, when we will suppose the Army has huddled itself for the rains, eighteen men would be required to enable the troop to take the field on the recommencement of hostilities; but from the *impossibility* of procuring them, or if we could get the mere men, from not having either time or means of educating them within our grasp, one gun and two waggons, or two guns and one waggon, (there is little to choose between,) would be thrown *hors de combat*!

3. The above calculation is for one troop, but suppose the three acting together, then would the loss amount to $18 \times 3 = 54$ men, or to nearly one-fifth of your European Horse Artillery!

4. It will be thought but proper, that when a man sets about finding fault with things as they are, he should be prepar'd with some feasible plan for changing them to what, he deems, they ought to be; and this I shall proceed to do with every deference to my superiors in judgment and experience.

5. In looking for any improvement in our Army in general, we cannot have a better model than that which the King's presents; but an Artillery man, more especially, will cast his eyes over the "Great waters" to see what his noble parent Woolwich has done in a similar predicament. The British Ordnance Department is uni-

versally allowed to be the first in the world; and, when I mention the Riding troops, which are a component part of the Regiment of Artillery, and by which so much good service was effected by our brother Blues on the Peninsula and elsewhere, your readers will see at once the purport of this letter. What would have become of the Horse Artillery under Lord Wellington, if it had not had some such source to draw from? How could it have supplied its wants in men, and have appeared foremost in all the brilliant actions of the day?—but by the care and vigilance of the *head* which nourished and protected the various members of *its body*. Drafts were constantly required, and as constantly sent, but they were not of the description which we should get in like case, raw, untaught men—no—they were such drafts as occupied immediately, and were as much at home in the saddle, as their predecessors who had been dislodged from it by the chances of war. No training—no drilling were requisite. Indeed if there had been, I suspect His Grace of Wellington would rather have dispensed with half a dozen guns, than have been clogged with so many useless beings. And how, pray, was this brought about? Why merely by observing the same system for recruiting the detached Horse Artillery Troops, with efficient men, as is done in respect to the foot companies of the same Regiment. Would it not be deemed preposterous in the extreme, were men to be sent to fill up vacancies in companies of Artillery serving actively in the field, who had never seen a gun, or who knew much more of a quarter-staff than of a sponge-staff? And yet, such actually is the case at present in regard to supplying the Horse Artillery with men! The lads, fine enough young fellows in general, arrived here, many of

them scarcely knowing what a Horse is—very few having ever crossed one. The deficiencies of the present plan have *never been experienced*, but the time may not be far distant when they will shew forth in all their strength, and when the remedy may be applied *too late!*

6. It will, perhaps, be objected that we *never have been* employed as I have supposed above. In answer I say, but we *may*; and surely it is wise to be prepared to meet any extreme rather than, when the time *does* come, to be found *wanting in efficiency!* But I will even put the case of Lord Hastings's campaign, against the Mahrattas, of 1817 and 18, where the Horse Artillery was all in camp in the Centre Division of the Grand Army, (I am speaking only of the European part of the Brigade). Suppose that instead of a campaign of watching and coupling with Scindeah, it had been a campaign of active operations. In plain words, suppose that we had come to blows with that gallant chief, and that his fate, or rather that of the Mahratta empire, had not been settled by one blow, but that a succession of hard knocks had been requisite ere the folly of his conduct should have become apparent to him. I say then, (always keeping in mind that casualties must happen,) how were the guns of the Horse Artillery to have been supplied with efficient men?—It is true that in this very campaign from 20 to 30 Recruits were received from Dum Dum, and advantage was taken of our numerous and long halts to put them in a course of training, but, besides the extra work hereby entailed on the horses, *not one of these men was available for any part of the time we remained in Camp.*—Nor was their education completed, until they had received the finishing polish at Meerut. Of what use then, were these men, as Horse

Artillerymen? With a musquet in their hands, they might have done something; for I have no doubt but most of them could pull a trigger, and come to the charge; but the famed tailor of Brentford was an accomplished horseman, compared with them when they first joined us! To meet this evil, and that it is one, I hope there is none will dispute, I submit that a Riding, or Drill (or whatever other name may be more appropriate) troop should be formed at the Presidency, consisting of from 100 to 150 young lads, who should be selected *immediately on their landing in the country*, posted at once to the Horse Artillery, and forwarded to supply vacancies, in troops in the Field, as such occur, and their progress and *efficiency* in the discipline of their corps should warrant. By this means a constant supply of good Horsemen would be insured to the Horse Artillery, in whatever quarter of India it might be employed. But this would not be the *only* benefit to be derived from a Riding troop,—another great desideratum would be the prevention, (of what at present exists in regard to the young men drafted from Companies at Dum Dum and sent to Meerut,) of all misunderstanding about clothing and accounts. There is scarcely one young man who does not arrive here, with long bills against him for the purchase of necessaries and articles of equipment, which cease to be of the slightest use to him on his joining the Horse Artillery, and which it requires the savings of the first six months from his pay to liquidate. This is, on many accounts, injurious to the soldier; it not only precludes him from providing himself with that part of his dress, which necessarily comes from his own pocket, but it also hinders him from furnishing himself with those smaller articles of comfort

and enjoyment, which it is so pleasing to observe a good soldier have about him, and which tend considerably to attach him to the Service that affords them. These young men, being from the first intended for the Horse Artillery, ought to be clothed and equipped at once, after the fashion of that corps.

7. Another very great advantage, (although of a very secondary nature to the above,) to be expected from the institution of a riding troop, at the Head Quarters of the Regiment of Artillery, would be the opportunity thereby afforded to all the young Officers, of making themselves good horsemen; and I hope I shall have all unprejudiced men on my side, when I say that such an accomplishment is essentially necessary to all Artillery Officers. I contend that no Foot Artillery Officer can do the duty at present required of him *efficiently*, without being mounted; and in support of this position, I will instance what has frequently happened to myself, and which is indeed of daily recurrence, viz. such an Officer having charge of a long line of battering guns and carriages, with orders to bring them all up. I say no Officer can do this duty on foot. The frequent stoppages caused by the breaking and the entanglement of the *tackling*, (for it cannot be called harness,)—the obstinacy of the bullocks, and the many other accidents, too numerous to be here recorded, which oblige him to be constantly on the move along a line, (to speak within bounds,) of a quarter of a mile in length, call, not only for his being mounted, and that too on an excellent horse, but also that he should be a good rider. Look even to an Officer in command of a field battery,—if it be required that he should be able to do something, after a change of position, and take advantage of circumstances

as they occur, it will be necessary that he should adopt some other mode of keeping up with the battery when on the move, than by attempting to run along with it on foot.

The necessity for all Artillery Officers being horsemen is so well understood at Woolwich, that those of the Royal Regiment, on their joining, are obliged to go through a series of riding school lessons; and it will, I think, in regard to the Bengal Artillery, be deemed a matter of no little importance, when it is remembered that no less than *ten* mounted troops and companies, forming component parts of it, are all officered from the Foot Artillery. Can any one deny, then, the benefit that would most assuredly arise, from a general course of instruction in horsemanship, to that body from whence we look for efficient Officers for the mounted branches of it? Or will any one contend that the present system, by which an Officer may at once be sent from a Foot Company to a detached Horse Artillery Troop, without any previous instruction to fit him for his duty, is a good one? I cannot strengthen my argument more than by quoting the words of a most excellent Officer and judge in these matters, nor better show how essential it is to a Horse Artillery Officer, to be a good horseman; not only that he may be enabled to do his duty properly, but actually for the preservation of his life: I allude to the words of Colonel Pennington, contained in the Standing Orders of the Horse Artillery: he says, addressing his Officers, "Every Officer that may join the corps, will be directed to attend the Riding School; and the Riding Master will exert his utmost endeavours, not only to teach them to sit well on horseback, but to make them particularly adroit in the

management of their horses; a qualification peculiarly necessary in the Horse Artillery, for though nothing is worse, or indeed more absurd, than the incapacity of a Cavalry Officer to perform his duty, from mere inability to preserve his seat, or manage his horse: yet in a Horse Artillery Officer, such incapacity is something more than absurd, inasmuch as he is thereby exposed, on every sudden wheel of the guns, to the danger of being upset and crushed to death. No Officer therefore will be allowed to fall in with the corps at exercise, until he shall have received his regular discharge from the School."

9. Another, and my last argument in favour of a Riding Troop at Dum Dum, is, that it might be made available as a Horse Artillery Troop in any disturbance in the Lower Provinces, where such an arm might heretofore have been desirable, but not easily procurable, from the distance at which it is placed. It would be necessary to have six light guns attached to it, in order to break the men in to the very different kind of riding required, of one man of six, riding horses in draft, to that of a single and independant horseman; and also to instruct them in the exercise of the Guns, in a few changes of position, and formations of Battery. Thus, not only would a constant supply of efficient men be insured to the Horse Artillery, but a Troop, would also be ready to take the Field in the Lower Provinces in time of need or peril.

10. The expense attending the measure, would assuredly be nothing in the scale, when weighed against the positive benefits that would ensue; and I feel confident that Government would not hesitate a moment in adopting it, were it brought to its notice in a tangible shape, and supported by abler heads and better pens than mine,

or by men of rank in the Regiment. The first description of horse is not required. The animal known under the name of Toorkee, which is generally procurable for 300 Rupees or 350 Rupees, would be the horse best adapted to the purpose. It is, with very few, if any exceptions, a tractable, good tempered beast,---*very material qualifications*, as they serve to inspire the novice with confidence in his first attempts to acquire the art of horsemanship. That it may one day be carried into execution, is "a consummation devoutly to be wished" by all good Artillerymen; and if it be the lot of this letter to meet the eye of some "Great Man," and to cause a discussion on the *pro's* and *con's* of the subject, happy will be my future reflections, should the result be what I anticipate.

I must beg for your indulgence. Mr. Editor, to the length I have been led into: it is the fault of most men who submit, for the first time, their lucubrations to public scrutiny, and I feel that I may be condemned as being superfluously verbose, or needlessly minute, in my anxiety to place my argument in the strongest light; but I hope to correct these failings in time, and, (if you *can* encourage me,) at a future day to offer some further remarks on matters connected with the mounted Battalion of the Regiment of Artillery.

I am, Sir,

Your very obedient Servant,

A HORSE ARTILLERYMAN.

Meerut,

10th October, 1822.

ARTICLE VI.

Observations upon "*A Concise Account of the Origin and Principles of the new Class of 24-pounder Medium Guns, of reduced length and weight, proposed by Sir William Congreve, in 1813, and adopted in His Majesty's Navy. With a variety of Experiments and other Documents, proving the excellence of that Construction of Ordnance:*" also an Exposition of the Errors into which Sir William Congreve has fallen in the above Experiments, and of the erroneous conclusions drawn from them.

WE have thought it right, in fulfilling the promise made to our readers in the first number of the Repository, to place before them *Sir William Congreve's own works*, by giving detached portions of his work, and making our observations separately. Our object is to set forth in the clearest manner, that we are far from wishing any of our readers to form an opinion or pronounce a judgment, without having both sides of the question before them; and we will therefore, as far as the extent of our pages allow us, lay before them such complete parts of the work as we intend to remark upon. We wish to deal courteously towards Sir William, as becoming members of civilized Society, in the discussion of a scientific question; and we trust that when these pages meet his eye, that he will attribute our intention solely to a desire of *holding up the truth, and explaining away error*. If we are proved to be on the

wrong side of the argument, we shall be ready to make any proper apology hereafter, and an open confession of our mistake.

Sir William commences his Book with the following

“ *INTRODUCTION.*”

“ I shall preface this account by very briefly stating, that the result of all the discussions which have taken place on the subject of this new mode of constructing Ordnance, and the subsequent researches which I have made into the principles upon which I originally determined that construction, have convinced me that I was correct; and that I am now fully persuaded of the truth of the two leading propositions of this theory:—

1st—That the propelling or reacting power of a piece of Ordnance may be increased by increasing the quantity of metal about the charge, though it be taken away from the other parts; and consequently that a lighter gun may have greater propellent power than a heavier gun, by a more judicious application of the metal of which it is composed.

2nd—That the length of a gun may be decreased in a due proportion, as the strength of the powder used is increased.

On the first of these propositions it was, that I determined to give the increased diameter to the breech of my guns, and I have since proved that this principle holds good in the communication of motion from one mass of matter to another in all cases—as well in the indirect communication of motion from a gun to its shot, by the intermediate action of the charge, as in the direct communication from one body impinging against another. Thus I have ascertained by a series of experiments which will be found at the end of this volume, that the same quantity of matter gives a very different impulse, according to the form in which it exists; as for instance, that the impulse given by a cone is very different to that given by a cylinder of equal weight, and so of all other forms. That a similar law to that which rules the impulsive power of matter, must govern its power of reaction, cannot be doubted; and it follows, therefore, that if the form or shape of a mass of matter is found, and it is by experiment, to influence its properties in one of these respects, it must in the other; and, consequently, that the propelling or reacting power of a gun, is

connected with its external form or shape, as much as the direct impulsive power of a hammer or pile driver. It is therefore with the greatest satisfaction that I have thus found those principles, which led me to increase the diameter of the breech of my Medium 24-pounder of 40 cwt. when I diminished its weight, as compared with the long 24-pounder of 50 cwt. not only established as a common property of matter by collateral experiments, but by the actual practice contained in the following tables; since it will be seen in the following analysis of the practice carried on by the new construction, that the first graze of my gun at point blank, is to that of the heavy 24-pounder, in the increased ratio of nearly 5 to 3.

The proposition thus worked out as to Gunnery is certainly a new one,* though a general opinion or prejudice in favour of a heavy breech, seems constantly to have prevailed, without any specific reasoning on the subject. Certainly there cannot be a proposition of more importance promulgated and investigated, as connected with the improved science of Gunnery, nor indeed one more reasonable on the face of it, than that there must be a *best possible shape* or *figure*, for a piece of Ordnance, formed of any *given mass* of matter, as connected with its powers of propelling the shot.

The second of these propositions, on which I have reduced the length of my gun was, that there must also be a best length for a gun, due to the strength of the powder employed. This proposition was not new—on the contrary, it has been treated by some of the most celebrated Mathematicians who had considered these subjects: and Euler himself had published certain Tables as to the true proportions between the lengths of guns and their charges. It had not, however, been acted upon by those who have regulated these matters in this country; and indeed, from the opposition that was made to my proposition for reducing the length of the guns in question, it

* The same thing indeed, may be said of the novelty of the results elicited by the experiments at the end of this volume, as to the effect of form in the direct impact of matter: for although every workman using a maul must have been sensible that in driving a bolt, a material difference of effect is produced by using the large end instead of the small one, and *vice versa*, still the details of this principle seem to have been entirely passed over, though of very great importance in various practical operations, until I was thus induced to go into a series of experiments on the subject.

should seem not to have been known, or at least, not to have been duly appreciated.

In Euler's tables the length of the bore of the gun is regulated with reference to the quantity of powder necessary to be used for its charge, and this charge is given in certain proportions of the weight of the shot, that is, by taking the charge as *one half* or as *one third* of the weight of the shot, or any other proportion. Thus he assigns about 20 calibres as the length of the bore when the charge of powder necessary is *one half* the weight of the shot, which gives about 9 feet 6, for the 24-pounder, and he assigns 15 calibres when the charge is but *one third* the weight of the shot, which gives exactly 7 feet 6, for a 24-pounder: that is to say, when the strength or velocity of the inflammation of the powder is so increased, that only one third the weight of the shot in powder is required for the charge, instead of one half; then, according to Euler, only 15 calibres instead of 20 are required for the length of the tube, sufficient to give time to inflame the whole of the charge so reduced in quantity and increased in velocity of inflammation. Now it cannot be denied that this proposition is sufficiently simple, though it is one of the utmost importance in Gunnery, as there can be no greater desideratum than the reduction of the length of a gun, provided its efficiency be preserved undiminished.

It so happened, however, that some few years since, from the great improvements made in our gunpowder, the charge of powder for our heavy ordnance was reduced from *one half* the weight of the shot to *one third* of the weight, *but without any change whatever being made in the length of the gun!* so that, according to Euler, when this reduction in our charges took place, owing to the increased strength of the powder, our heavy ordnance was left *two feet too long*. Hence, therefore, when I was called upon to turn my thoughts to this subject, as will be seen in the following account, I took the liberty of proposing to make the 24-pounder only 7 feet 6, instead of 9 feet 6, that is to say, only 15 calibres, instead of 20; and must maintain that no improvement more important, or founded on more reasonable grounds, could be suggested.

Indeed the following account will shew that, independent of all the more scientific considerations here alluded to, I was borne out in my proposition by the experience of facts, as regarded the different guns already used in the service: and that in the alterations proposed for a new 24-pounder for the Frigates, I was at all events certain of giving them as good a gun as the heavy 32-pounder, which had so

long been the principal arm of the Line of Battle Ships, and which had always been used double shotted, and without apprehension as to the charge. At all events, therefore, there was evidently nothing risked by my proposition; while a variety of most important practical improvements, both as to the management of the gun, and as to the ease and security of the Ship, were involved in the reduction of the weight and length of a Ship Gun, which reduction, by the most obvious rule of comparison with the 32-pounder, could not require any reduction of the charge, and could not in any other respect cripple the powers of the gun. That the powers and ranges of these guns are not diminished by the new construction; on the contrary, it is proved by the following Tables, that their reaction to the charge, and their full capability of resisting it, are not impaired, will be sufficiently proved by reference to the Log Book of the "Pactolus," commanded by Captain Aylmer, which ship was armed with a still lighter description of these guns, than that abovementioned, weighing only 37 cwt., instead of 40 cwt.; from one of which he fired *twenty* rounds, *double shotted*, in *twenty-five* minutes: the first eight rounds with the *full charge* of powder, 8 lbs., the last 12 with 6 lbs. without the least strain or inconvenience either to the gun, the carriage, or to the breeching.

I do not hesitate, therefore, on the proofs adduced, both theoretical and practical, to assert that the 24-pounders of my construction, proposed for the Frigates, is as serviceable a gun, in every respect, as any in the Ordnance, although it is 10 cwt. lighter and two feet shorter than the long 24-pounder.

The following is the Extract from the Log Book of the "Pactolus," above mentioned.

" His Majesty's Ship Pactolus, at Sea,

• • February 2d, 1814.

" Fired twenty rounds from one of the Main-deck guns, double shotted, to try the effect on breeching and gun, in twenty-five minutes; the first eight rounds at full allowance of eight pounds, and twelve at the reduced allowance of six pounds.

" Found the gun not warm at the breech, but a degree of warmth was perceptible about three feet from the muzzle outwards, and not recoiling near so much as was expected.

" The Gun weighed 37 cwt. and some odd pounds.

" P. AYLMEER, Captain.

" NATHL. GOODWIN, Gunner."

More than 700 of these 24-pounder guns have now been cast; some with the trunnions in the axis of the piece, some as usual, and some with loops similar to the carronade loop; in addition to which they are so constructed, that the breeching passes through the *centre* of the *casable* to equalize the shock of the recoil, and to obviate the blow upon the coin created by the old construction. These guns are now also become, by Admiralty order, the regular arm of the upper decks of our Line of Battle Ships, and were found most completely to answer in that situation on board the Queen Charlotte, which was so armed with them in the attack upon Algiers; where it is supposed that every gun must have been fired at least 100 rounds, without the least failure or disappointment whatever. It may indeed be added, as an admission of the truth of this principle of construction, that Sir Thomas Bloomfield, the Inspector of Artillery, has since the first construction of his 24-pounders, which were cast of the same length and weight as mine, adopted also the *more conical form* of my construction in those subsequently cast. Other pieces have likewise still more recently been constructed, in which the abovementioned principles have been attended to."

W. CONGREVE.

1st October, 1820.

The remarks which we have to make upon certain passages in this introduction, will be found amongst our observations upon the series of experiments: and we therefore proceed to lay before our readers, the history of Sir William's project, given in his own words, under the head of,

"A concise Account of the origin of the new class of the 24-pounder Medium Guns, of reduced length and weight, proposed by Colonel Congreve, for the arming of frigates."

In January 1813, Admiral Hope, one of the Lord's Commissioners of the Admiralty, sent me the account of the practice which had then lately been carried on with the light 24-pounder gun of 33 cwt. and which had been found to be quite insufficient to the firing of two shot. He at the same time expressed a wish that I would turn the subject in my mind, and consider whether it might not be possible to construct 24-pounders considerably lighter than the long 24-pounders,

and which might still be of sufficient weight to be capable of firing two shot. I accordingly transmitted to him, a few days afterwards, a plan for casting 24-pounder guns of 7 feet 6 inches in length, and weighing 41 cwt.—stating that this weight was determined according to the ratio of the weight of the heavy 32-pounder to its shot; the 32-pounder of 55 cwt. being 193 times the weight of its shot; and that a 24-pounder of 41 cwt. 1qr. 12lb. would be also 193 times the weight of its shot, and, consequently, that as it was known that the 32-pounder of 55 cwt. was a sufficient gun for firing two shots, so there could be no doubt of the equal sufficiency of the 24-pounder of 41 cwt. I stated, moreover, that no reason to the contrary should be drawn from our heavy 24-pounder's having, in fact, a greater ratio of metal in proportion to their shot than the 32-pounder, because that was not determined by any reference to their charges, but arose merely from the practice of making the 18 and 24-pounders of the same length as the 32 and 42-pounders: so that as the calibres of the less natures do not decrease in the same ratio as the weight of their shot, the smaller guns must necessarily be heavier in proportion to the weight of the shot, while their lengths remain the same.

I stated also, that if 170, the ratio of the 42-pounder to its shot, might be taken as the standard, that in that case, a 32-pounder might be cast of 48 cwt. and a 24-pounder of 36 cwt.; but that this would probably be too low a ratio, not knowing the sufficiency of the 42-pounder for firing two shots; but, that I thought by taking the mean of the 42 and 32-pounder as a standard, or 181 times the weight of the shot, a 32-pounder of about 50 cwt. and a 24-pounder of about 38 cwt. might be very serviceable guns.

In laying down these proportions as to the *weights*, I had evidently assumed no arbitrary rules, but had adhered to certain fixed and established principles, and to a very simple theory, that the resistance to recoil in different guns, arising from the weight of the gun, varied in the direct ratio of the quantities of metal in them, compared to the weight of their shot; nor could there be any doubt of the truth of this proposition, which determined in fact the point to which my attention was expressly called.

I did not, however, rest here, for I was convinced that, from a distinct cause, the same quantity of metal might, by a judicious distribution of it, be made much more efficient; and the reacting power of the gun be greatly increased by a greater accumulation of metal about the charge than in the ordinary construction: while the conse-

quent diminution of metal in front of the trunnions would, at the same time, by throwing back the centre of gravity, afford the utmost projection of muzzle with a given length of gun; and thereby remove a great objection to reducing the ordinary length of guns. Of the truth of this point, at all events, there could be no doubt; and although with respect to the effect of the increased metal about the charge, in increasing the power of the gun, great caution is unquestionably incumbent, both in stating and receiving theories on matters of this description, still I felt every rational confidence on the subject; and urged, in confirmation of my opinion, both at the Admiralty and to the Surveyor General of the Ordnance, the generally received fact of the increased effect in reacting upon and propelling the charge produced by the thickened breech in fowling pieces and small arms, which, I conceived, must apply with equal force to Ordnance. On these grounds, therefore, I was induced to propose to give the *new form* in question to these 24-pounders, fixing the weight of the whole mass on the principle first laid down, of taking the ratio of the proportion of the 32-pounder and its shot, as the standard.

Finally I proposed, that a proportion of these guns should be cast with trunnions, and a proportion with loops, hoping that I might ultimately be able not only to establish a mode of increasing the powers of the gun itself, but of reducing two-thirds of the labour of working it also.

The considerations thus proposed appearing to the Lords Commissioners of the Admiralty to warrant the casting of a certain number of guns on this principle, their Lordships communicated their wishes on the subject to the Board of Ordnance, and *on the 17th of February, 1813*, the Board of Ordnance ordered the Carron Company to cast two sets of these Medium 24-pounder guns, of twenty-eight in each set, on the principles which I had here laid down, both as to weight and to form, and according to drawings which I had prepared; one set with trunnions, and one set with loops.

It appears also, that General Sir Thomas Bloomfield, the Inspector of the Artillery, approved of the ratio of weight, and of the length which I had thus introduced, as he subsequently proposed to have a number of 24-pounders cast of the same length, and very nearly of the same weight, scarcely differing in any thing, but in the form, the General preferring to retain the old form. And *on the 3d of April*, accordingly the Board of Ordnance ordered a number of guns to be cast agreeably to his plan. The General further proposed to the Board

to cast a number of 8 feet 24-pounders, of 43 cwt. and of the old form, which was also done.

As soon as these guns were cast, I caused the annexed plate to be engraved,* and drew up the following comparative observations, confining myself merely to such points as were obvious on inspection.

1st.—That the Medium 24-pounder of the new form or Colonel Congreve's pattern has nearly two inches more diameter of metal about the charge, than the Medium 24 of the old form, or General Bloomfield's pattern; and that although of the same length, namely 7 feet 6 inches, it has nearly 6 inches more projection of muzzle.

2nd.—That compared with the short 24-pounder, 6 feet 6 inches in length, commonly called the Gover gun, the Medium 24-pounder of the new form, or of my construction, 7 feet 6 inches in length, has *the whole* increase of length (one foot) thrown into the projection of the muzzle; whereas the Medium 24-pounder of the old form, has little more than half the additional length, thrown into the projection of the muzzle.

3rd.—That compared with the heavy 24-pounder of 9 feet 6 inches, the new form, although only 7 feet 6 inches long, has, within 9 inches the same projection of muzzle, a much greater strength of metal about the charge, as well as in the mean diameter of the chase, the carriage muzzle being the only slighter part, and consequently that the new form must be at least equally calculated to bear the full charge of powder.

4th.—It will be seen by reference to the plate, that Colonel Congreve's 7 feet 6 inches gun, has *more* projection of muzzle even than Sir Thomas Bloomfield's gun of 8 feet.

5th.—The new form is so constructed, that the carriages in existence for the short 24-pounders are equally applicable to it; whereas the 7 feet 6 inches gun, of the common pattern, requires a new description of carriage to be expressly constructed for it, which takes up more room on deck.

6th.—The dispart cast on the reinforce ring gives three different sights, viz. at point blank, at 2 $\frac{1}{2}$ °, and at 5° elevation, as below.

* We have not engraved this Plate, as our present purpose is not to make any comparison between the different constructions exhibited in it. We shall probably do this in some future number. Ed.

From *E* to *x*, † point blank; from *E* to *y*, through the dispart along the line of metal, $2\frac{1}{2}^{\circ}$ elevation; and from *e* taking the sight along the points *x* and *z*, gives 5° elevation.

7th.—The carronade muzzle not only gives more traverse without wooding against the side of the port, but the cup at the end of the bore facilitates the loading.

8th.—The pieces cast with the loop are exactly the same as those with the trunnions in all other respects; and the object of the loop is for mounting the piece on a carriage, which will give greater facility in working.

This new form, therefore, evidently combines the advantages likely to arise from having greater *strength of metal about the charge*, than any other description of 24-pounder gun, *even the heaviest*; and more projection of muzzle from the side, than any other gun of equal length; while by occupying less space on board, and requiring a *lighter and shorter* carriage, it gives more room, and greater facility for fighting the guns, than the old form can do, weight for weight. To which must be added, the advantages of the fixed triple sight, giving in the most simple way, the three principal levels required in the sea service.

W. CONGREVE.

Our remarks upon this “concise account” will appear amongst our concluding observations upon the experiments.

A Series of experiments with guns of different natures which was made upon Sutton Heath, near Colchester are followed by the observations of Sir William Congreve. These we now lay before our readers, and we shall proceed to offer some remarks upon them.

1st January, 1814.

A Series of experiments has now been tried at Sutton Heath, near Colchester, by a Committee of Naval and Ordnance Officers, by which it has been ascertained, as the following Analysis of those experiments will prove, that all the points on which I had calculated have been realized; and, indeed, even to an extent which I did not venture to anticipate.

Analysis of the late practice at Sutton Heath, shewing the great general superiority of the Ranges of Colonel Congreve's new pattern

† See Plate X. Fig 1.

gun of 7 feet 6 inches in length, and weighing 40 cwt. 2qrs. 21 lbs. compared with those of the long 24-pounder gun of 9 feet 6 inches in length, and weighing 50 cwt. 7lb. and with those of Sir Thomas Bloomfield's 24-pounders of 8 feet, and 7 feet 6 inches in length: the first weighing 43 cwt. 12 lbs. and the last 40 cwt. 24 lbs. at point blank, 2½°, 5°, 8°, and 10°, elevation, single and double shotted, with the full charges of powder to all the guns, the windage in all being exactly the same."

Mean of three Rounds of each Gun, single shotted.

P. B.	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
	Col. Congreve's gun, 505	835	1773
	Long gun, 368	761	2093
	yards 137	yards 71	yards 320
	In favour of Col. Congreve's gun; being more than one third the point blank of the long 24-pounder.	In favor of Col. Congreve's gun.	In favor of the long gun.
P. B.	Col. Congreve's gun, 505	835	1773
	Sir T. Bloomfield's 8 feet gun, 360	713	2178
	145	92	405
	In favour of Col. Congreve's gun; more than one third.	In favor of Col. Congreve's gun.	In favor of the 8 feet gun.
P. B.	Col. Congreve's gun, 505	835	1773
	Sir T. Bloomfield's 7 feet 6 inch gun, 370	843	1970
	135	8	197
	In favour of Col. Congreve's gun, more than one third.	In favor of the 7 feet 6 inch gun.	In favor of the 7 feet 6 inch gun.

Best Ranges of each Gun.

P. B.	Col. Congreve's gun, 610	985	2075
	Long gun, 370	803	2280
	270	182	205
	In favour of Col. Congreve's gun: his point blank being within one seventh double that of the long gun.	In favor of Col. Congreve's gun.	In favor of the long gun.

Best Ranges of each Gun.

P. B.	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
	Col. Congreve's gun, 640	985	2075
	Sir T. Bloomfield's 8 feet gun, 405	875	2325
	235	110	250
	In favour of Col. Congreve's gun.	In favor of Col. Congreve's gun.	In favor of the 8 feet gun.
P. B.	Col. Congreve's gun, 640	985	2075
	Sir T. Bloomfield's 7 feet 6 inch gun, 410	975	2165
	230	10	90
	In favour of Col. Congreve's gun, his point blank being about half as much again as General Bloomfield's.	In favor of Col. Congreve's gun.	In favor of the 7 feet 6 inch gun.

Elevation.

Mean of three Rounds of each Gun.

2½°	Col. Congreve's gun, 1220	1630	2103
	Long gun, 1232	No Mean.	No Mean.
	12		
	In favour of the long gun.		
2½°	Col. Congreve's gun, 1220	1630	2103
	Sir T. Bloomfield's 8 feet gun, 1192	No Mean.	No Mean.
	28		
	In favour of Col. Congreve's gun.		
2½°	Col. Congreve's gun, 1220	1630	2103
	Sir T. Bloomfield's 7 feet 6 inch gun, .. 1165	1490	1933
	55	140	470
	In favour of Col. Congreve's gun.	In favor of Col. Congreve's.	In favor of Col. Congreve's.

Best Ranges of each Gun.

$2\frac{1}{2}^{\circ}$	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
	Col. Congreve's gun, 1285	1850	2190
	Long gun, 1250	1850	2320
	yards 35	Equal Ranges.	yards 130
	In favour of Col. Congreve's gun.		In favour of the long gun.
$2\frac{1}{2}^{\circ}$	Col. Congreve's gun, 1285	1850	2190
	Sir T. Blomefield's 8 feet gun, 1223	1805	1970
	62	45	220
	In favour of Col. Congreve's gun.	In favour of Col. Congreve's gun.	In favour of Col. Congreve's gun.
$2\frac{1}{2}^{\circ}$	Col. Congreve's gun, 1285	1850	2190
	Sir T. Blomefield's 7 feet 6 inch gun, .. 1240	1800	2070
	45	50	120
	In favour of Col. Congreve's gun.	In favour of Col. Congreve's gun.	In favour of Col. Congreve.

Mean of three Rounds of each Gun.

6°	Col. Congreve's gun, 1776	2065	2233
	Long gun, 1763	2045	2365
	13	40	132
	In favour of Col. Congreve's gun.	In favour of Col. Congreve's gun.	In favour of the long gun.
6°	Col. Congreve's gun, 1776	2085	2233
	Sir T. Blomefield's 8 feet gun, 1850	No mean.	2115
	74		118
	In favour of General Blomefield's 8 feet gun.		In favour of Col. Congreve.

N.B. Read General Sir T. Blomefield in the preceding pages, instead of Blomefield.

Observations upon the new Class of

Mean of three Rounds of each Gun.

5°	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
	Col. Congreve's gun, 1776	2085	2233
	Sir T. Blomefield's 7		
	feet 6 inch gun, .. 1703	2023	2208
	yards 73	yards 62	yards 25
	In favour of Col. Congreve.	In favour of Col. Congreve's gun.	In favour of Col. Congreve.

Best Ranges of each Gun.

5°	Col. Congreve's gun, 1880	2180	2400
	Long gun, 1800	2075	2775
	80	105	375
	In favour of Col. Congreve.	In favour of Col. Congreve's gun.	In favour of the long gun.
5°	Col. Congreve's gun, 1880	2180	2400
	Sir T. Blomefield's 8		
	feet gun, 1975	2125	2320
	95	55	80
	In favour of Gen. Blomefield.	In favour of Col. Congreve.	In favour of Col. Congreve.
5°	Col. Congreve's gun, 1880	2180	2400
	Sir T. Blomefield's 8		
	feet gun, 1750	2025	2275
	130	155	25
	In favour of Col. Congreve.	In favour of Col. Congreve.	In favour of Col. Congreve.

One Round of each only given.

5°	Col. Congreve's gun, 2300	2350	2425
	Long gun, 2200	No graze.	No graze.
	100		
	In favor of Col. Congreve.		

One Round of each only given.

8°	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
	Col. Congreve's gun, 2300	2350	2425
	Sir T. Blomefield's 7		
	feet 6 inch gun, .. 2270	2325	2400
	yards 30	yards 25	yards 25
	In favour of Col. Congreve.	In favour of Col. Congreve.	In favour of Col. Congreve.
8°	Col. Congreve's gun, 2300	2350	2425
	Sir T. Blomefield's 7		
	feet 6 inch gun, *2470	One graze only being given, and it being stated to have lodged at the second graze.	
	* It is presumed this should have been given as the second graze.		

Continuation of Practice with two Shot.—

Mean of three Rounds of each Gun, with the Mean Ranges of the two Shot.

P.B.	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
	Col. Congreve's gun, 316	835	1612
	Long gun, 390	873	1906
	74	38	91
	In favour of the long gun.	In favour of the long gun.	In favour of the long gun.
P.B.	Col. Congreve's gun, 316	835	1612
	Sir T. Blomefield's 8		
	feet gun, 294	925	1854
	22	90	43
	In favour of Col. Congreve.	In favour of the 8 feet gun.	In favour of the 8 feet gun.
P.B.	Col. Congreve's gun, .. 316	835	1612
	Sir T. Blomefield's 7		
	feet 6 inch gun, 319	897	1619
	3	62	7
	In favour of Gen. Blomefield.	In favour of the 7 feet 6 inch gun.	In favour of the 7 feet 6 inch gun.

One Round of each Gun, with the Mean Ranges of the two Shot.

Elevation.	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
2½°	Col. Congreve's gun, .. 072	1350	1877
	Long gun, 935	1212	1826
	yards 37	yards 138	yards 51
	In favour of Col. Congreve.	In favour of Col. Congreve.	In favour of Col. Congreve.
2½°	Col. Congreve's gun, .. 072	1350	1877
	Sir T. Blomefield's 8 feet gun, 862	1432	2085
	110	82	208
	In favour of Col. Congreve.	In favour of the 8 feet gun.	In favour of the 8 feet gun.
2½°	Col. Congreve's gun, .. 972	1350	1877
	Sir T. Blomefield's 7 feet 6 inch gun, 935	1387	1877
	37	37	Equal Ranges
	In favour of Col. Congreve.	In favour of the 7 feet 6 inch gun.	
5°	Col. Congreve's gun, .. 1649	1915	2037
	Long gun, 1550	1720	1914
	96	195	123
	In favour of Col. Congreve.	In favour of Col. Congreve.	In favour of Col. Congreve.
5°	Col. Congreve's gun, .. 1646	1915	2037
	Sir T. Blomefield's 8 feet gun, 1500	1690	1837
	146	225	200
	In favour of Col. Congreve.	In favour of Col. Congreve.	In favour of Col. Congreve.
5°	Col. Congreve's gun, .. 1046	1015	2037
	Sir T. Blomefield's 7 feet 6 inch gun, .. 1575	1707	2000
	71	118	37
	In favour of Col. Congreve.	In favour of Col. Congreve.	In favour of Col. Congreve.

One Round of each, with the Mean Ranges of the two Shot.

Elevation.	FIRST GRAZE.	SECOND GRAZE.	EXTREME ROLL.
10°	Col. Congreve's gun, 2355 Long gun, 2187 yards 68 In favour of Col. Congreve.	Lodged.	Lodged.
10°	Col. Congreve's gun, 2255 Sir T. Blomefield's 8 feet gun, 2445 190 In favour of Gen. Blomefield.	Lodged.	Lodged.
10°	Col. Congreve's gun, 2255 Sir T. Blomefield's 7 feet 6 inch gun, 2420 171 In favour of the 7 feet 6 inch gun.	Lodged.	Lodged.

N. B. These calculations have been examined and compared with the original document at the Ordnance Office.

The guns were carefully laid with a spirit level quadrant, and the charges accurately weighed.

It is also to be observed that the ground was not an uniform level, but consisted of descending and ascending slopes, which might considerably affect the Ranges after the first graze.

Observations on the foregoing Results.

From the above points of comparison, single shotted, it appears that with the *same windage*, and *charges of powder*, the first grazes of Colonel Congreve's gun, at point blank, have in every case exceeded, those of three 24-pounders tried against it; in some instances nearly double, and in none less than one-third more than the point blank range of the other three; and that the ranges of its second grazes at point blank, are greater than those of all the other three, except in one instance, where it was exceeded by Sir T. Blomefield's 7 feet 6 inch gun, by 28 yards only.

That at 2½° elevation the ranges of the first graze from Colonel Congreve's gun, had the advantage in every instance but one, where

the long gun beat it by 12 yards only; that at the same elevation, in *one* instance only, are its second grazes exceeded.

That at 5° elevation, the *first* grazes had very greatly the advantage in all the comparisons except in *two* cases.

That at 5° elevation, the *second* grazes also are very considerably in favour of Colonel Congreve's gun.

It must be observed, however, that in the foregoing single shotted practice, the extreme roll of the shot seems generally in favour of the long gun; but it is self-evident that this extreme roll is of very little importance, even on shore, and certainly means nothing in sea practice, where in fact the first graze only is of any use whatever after $2\frac{1}{2}^{\circ}$ of elevation.

With regard to the double shotted practice it must be remarked, that the advantage also continues in favour of Colonel Congreve's gun; and although the great excess of the weight of the long gun tells with the double shotted charges, in the point blank ranges, and in the point blank ranges *only*, still the advantage derived from it is not so great as might have been expected; the mean difference of the first grazes being only 74 yards; that of the second, 37; and that of the extreme, 94, in favour of the long gun; and here it must be observed, that Colonel Congreve's gun in casting has turned out lighter than was intended; his calculation giving 41 cwt. 1 qr. 12 lbs. and the gun actually weighing only 40 cwt. 2 qrs. 21 lbs.

In all other points, the advantage gained is evidently, without reference to weight, as the heavy and light guns are alike proved, most decidedly inferior, on the average of all this practice. As, therefore, the charge and windage were the same in all the cases, it is clearly demonstrated, *as the grand result of this practice*, that the superiority of Colonel Congreve's gun, depends on *its form*, and on *its form alone*; that is, on the *additional quantity of metal applied to the breech*, by making the muzzle taper, a principle, the establishment of which appears to be one of the most important events that has occurred in the science of Gunnery for many years, as realizing by *formation only*, even with a *diminution of weight*, not only a variety of points peculiarly desirable for sea service, but an average increase of range, the most valuable and extraordinary; sufficient, I trust, to establish the importance of those guns, as a very superior arm for our frigates, more especially as their recoil and general action are declared also to be most manageable, notwithstanding their great increase of powers.

it was ascertained to be *greatly in favour* of the long gun.

We wish our readers particularly to notice this circumstance, because we conceive it to be an *undeniable proof* that the shot from the long gun were propelled with *greater force* than those from Sir William Congreve's; and the circumstance is strong in favour of the supposition which we shall advance below; more especially when it is taken into consideration, that the distances of the *first grazes* of Sir William's shot, so far exceeded those of the long gun at *point blank*, where the differences in the mean of the *extreme rolls* are most remarkable.

Secondly—With Sir T. Blomefield's guns, one weighing only 2 cwt. 1 qr. 21 lbs. more, and the other, (of the same length as Sir William Congreve's gun), and weighing less by 1 qr. 25 lbs., we find that when fired at *point blank*, the mean of the *extreme rolls* of their shot, in every instance exceeds that of the shot from Sir William Congreve's gun, notwithstanding that the first grazes of the latter were so much more extended.

Thirdly—With the practice with two shot, which must, however, always be extremely uncertain, especially on such ground as the range is described to have been, we find that Sir William Congreve's gun has nothing to boast of in the way of superiority.

The first three rounds, at *point blank*, with two shot, exhibit a mean very much in favour of the long gun, both in the first graze, second graze, and extreme roll; and we observe in the third experiment with two shot, at *point blank*, that the 7 feet 6-inch gun of Sir Thomas Blomefield, exceeds Sir William Congreve's gun, in the means of the first graze, second graze, and extreme roll.

In the last Experiments in the series with *two shot*, at an elevation of 10° , we also find that the shot from the 8 feet gun, exceeded those from Sir William's gun in the first graze, (where they lodged,) by a mean of 190 yards; and the 7 feet 6 inch gun, of the same length as Sir William Congreve's gun, *but weighing less*, also takes the lead to the first graze, (where they lodged,) by a mean of 171 yards.

Now Sir William Congreve, in his observations given above, remarks, that "*although the great excess of the weight of the long gun tells with the double shotted charges, in the point blank ranges, and in the point blank ranges only, still the advantage derived from it is not so great as might have been expected:*" but he does not pretend to account for the results of the two last experiments, where the weight of one gun only exceeded that of his, the other being lighter, and they had not the benefit of his *judicious increase* of metal about the breech.

With regard to the two last paragraphs of Sir William Congreve's "Observations," we will forbear any remarks upon them; and we leave our readers to decide by an impartial judgment of the case, whether there are any grounds for the *superiority* which is so *earnestly* asserted.

We shall confine some further remarks, (which otherwise would have found a place here) upon the probable cause of the *inequalities* of the *first grazes*, to our observations upon the next part of Sir William Congreve's work.

We cannot however refrain from expressing our surprise, that Sir William Congreve should have neglected resorting to what Dr. Hutton terms, "a beautiful military experiment, invented by Mr. Robins, for determin-

ing the true degrees of velocity with which balls are discharged from guns, with any charges of powder."—We need hardly say, that we allude to the Ballistic Pendulum.

It certainly would have been very satisfactory to have been furnished with the results of comparative experiments with this Machine, made with Sir William Congreve's gun, and those of Sir Thomas Blomefield; because it can hardly be doubted, that from a number of 24-pounder balls propelled from various pieces of Ordnance, those are set in motion with the *greatest propellent power*, which are found to be moving with the *greatest velocity* when at *equal distances* from the points from whence they were propelled.

"Observations respecting the principle on which the increase of Metal round the charge operates, in increasing the reacting power of the gun."

Although for all practical purposes, it is generally considered, that fact itself is a sufficient foundation, still I am desirous of exhibiting those principles on which my confidence in the result of the foregoing experiments has been founded; and I feel, also, additional satisfaction in being able to shew, that various collateral facts exist, which, on comparison, will be found to coincide with these results.

Suppose two guns to be cast—the one,* *a b c d*, perfectly cylindrical; the other, *e f g h*, a frustrum of a cone, and each of the same weight: then, I say, that the reacting or propelling power of the conical gun must be greater than that of the cylindrical gun, and consequently ought to throw the shot much further; for all action imparted to the gun at the point *a*, where the force of explosion acts, is from thence communicated through the whole mass not *instantaneously*, but in time; it follows, therefore, that dividing these guns in two parts by the vertical line, *x y*, more matter will be acted upon, and consequently more reaction excited in a *given* time in the conical gun, *e f g h*, than in the cylindrical gun, *a b c d*, on account of the

* See Fig. 2, Plate X.

greater quantity of matter lying within a given sphere of action from the point o , in the one than in the other, $x y$ being supposed to be the limit of this sphere of action in any given time; now suppose this given time to be the time occupied by the shot in passing out of the gun at the moment of firing, it follows that, in this first moment of discharge, on which, in fact, the initial velocity entirely depends, the reaction of the gun upon the charge must be greater in the conical than in the cylindrical gun; and consequently, the force of propulsion, or initial velocity given to the shot, must also be greater.

The existence of such a limit as $x y$, is further demonstrated by the received fact, that the direction of a ball projected from a gun suspended by a pendulum is as perfectly accurate as if fired from one mounted in the ordinary mode. This proves that the ball passes out of the gun before it begins to recoil; that is, before the whole mass of matter in the gun is acted upon; the reacting or propelling power, therefore, is not as the whole mass; it must therefore, as above stated, be as that part of the whole mass, only acted upon in the first moment of discharge; and that part evidently depends on configuration or form alone. Thus, as before stated, the resistance to recoil varies as the whole mass, the reaction against the charge varies as the quantity of metal immediately about it. Neither is any additional velocity gained by altogether preventing the recoil of the gun; all these facts, therefore, confirm the foregoing proposition, and coincide with the result of the late experiments.

The application of the foregoing theorem to the form of my gun, compared with the old form, is obvious.

It follows, as a corollary to this theorem, that there is a maximum as to the proportion of increased thickness of metal for a given length of a gun; for if the quantity, $z r y x$, were unduly increased, the whole of this quantity would not be brought into action, before the matter in front of the line, $x y$, were also in reaction; but as $x y$ is, by hypothesis, the limit of all action and reaction taking effect before the shot is out of the gun, it follows, that all excess of matter about the breech of the gun, which is not affected before that in front of $x y$, is a useless weight of matter; there are, perhaps, no data, at present, exactly to determine this maximum, or the position of the line $x y$, due to different charges of powder, by which the maximum charge also will be determined, so important to the true construction and use of Ordnance; but I am in pursuit of a train of experiments to decide it.

From the foregoing proposition also is deduced, as another corollary, the principle of another fact, proved by the late experiment; namely, that after a certain point, any addition of length is useless, as to the production of initial velocity; for it is evident, that the further the muzzle is extended beyond $x y$, the more useless that mass becomes as to the reacting or propelling power of the gun.

That the advantage gained by the increased breech with the charges of powder used in the double shot practice, is not equal to that in the single shot practice, arises simply from the following circumstance, and brings with it a confirmation of the truth of this principle; viz. that as with the same charge of powder, the initial velocity given to two shot cannot be equal to that given to one, the time of the shot's quitting the gun is therefore increased, and the limit, $x y$, carried further towards the muzzle, so as more to equalize the effect of two guns, whose whole masses are equal; but if the same velocity were given to the two shot, as in the single shot practice, the same difference of range would be the consequence.

The recoil of the conical gun is said to be somewhat greater than the other patterns. If it is so, it is, in fact, another confirmation of this principle; it arises, not only from its being more direct, and not so irregular and disturbed,* as that of Sir T. Blomefield's guns is stated to be, but it is further indicative of the increased initial velocity given to the shot; whatever this increased recoil may be, however, it is admitted, on all hands, not to be such as at all to strain the breeching; but if it did, it is obvious, that in my gun the quantity of powder might be reduced, if desirable, and yet give greater ranges; so that where range is not the object, a saving of powder may be obtained with any required diminution of recoil.

WILLIAM CONGRÈVE.

* It is stated, in the report of this experiment, that both Sir T. Blomefield's guns, when fired with the breeching on, had a constant tendency to fall on their muzzles, and that the 8-foot gun did actually so fall at the third round double shot; now this action, though it may check the direct recoil, has, evidently, tendencies much more mischievous. In fact, the obviating this very evil, the pitching and jumping of the common gun in its recoil, is another great desideratum accomplished by the new form—much more than counterbalancing any little difference in the liveliness of recoil, that recoil being steady and direct.

Though we are of opinion that few, if any, of our readers will attempt to defend the *extraordinary* hypothesis which Sir William Congreve has here assumed, yet we feel it necessary to take some notice of it.

The existence of a fanciful line $x y$, in the middle of a piece of Ordnance, as the limit of the sphere of action of the elastic fluid upon the metal of a gun, during the time a shot is passing along the bore, we cannot allow, since, it is a *well established fact*, that the recoil of a gun commences before the shot has quitted the bore.

Dr. Hutton in his *Mathematical Tracts*, vol. iii, page 322, determines the quantity of recoil of an 18-pounder, while the shot is passing along the bore, to be $\frac{2}{3}$ ths of an inch nearly; estimating the weight of the gun to be 4800 lbs., that of the carriage 2400 lbs, the quantity of powder 8 lbs., the length of the cylinder 108 inches, that of the charge 13 inches, the diameter of the bore 5.13 inches, and the resistance from the friction between the platform and carriage to be 3600 lbs. In Captain Thomson's translation of Antoni, 'On the Properties of Gunpowder', we find that an experiment was made with a 32-pounder, fired horizontally, and the recoil was ascertained to be half an inch before the shot quitted the piece.

Even the celebrated Robins, who assumed the principle, "*That all the powder of the charge is fired, and converted into an elastic fluid, before the bullet is sensibly moved from its place.*" (a principle which has been clearly refuted), states, "that by a very easy computation it will be found, that in a piece 10 feet long, carrying a ball of 24 lbs., and charged with 16 lbs. of powder! the bullet will *not* be out of the piece, before the piece has recoiled half an inch."

In Sir Howard Douglas's *Naval Gunnery*, page 121, referring to the experiments of Dr. Hutton, the author says, "*The degree of recoil, corresponding to the flight of the shot along the bore, is sufficient however to explain the known fact, that any accident happening to the gun or carriage at the moment of firing, such as a bed or a quoin breaking or flying out—a truck coming off, or a trunnion breaking, sensibly affects the length, as well as the direction of the range.*"

But it is needless to search for more authorities, as surely we may from these alone assert, that Sir William was under a mistake when he wrote these '*Observations*'; and we are at a loss to conceive from whence he can gather grounds for the following reasoning—" *The existence of such a limit as $x y$, is further demonstrated by the received fact, that the direction of a ball projected from a gun suspended by (as) a pendulum, is as perfectly accurate as if fired from one mounted in the ordinary mode. This proves that the ball passes out of the gun before it begins to recoil.*"

Sir William appears to have moulded his reasoning, not by principles deduced from facts, but by those which *would* be applicable to his strange hypothesis, and we consider that it would be a waste of time, and an idle encroachment upon the patience of our readers, to take any further notice of these '*Observations*,' especially as we shall soon, we trust, remove the support of *collateral facts*, which Sir William so confidently advances the existence of.

We must say something however on the subject of the difference in the first grazes of Sir William's gun and the others, when fired at point blank.

We beg the reader, who is an Artillerist, to consider in what manner the action of the inflamed powder is exerted upon the chamber of a gun at the moment of the discharge, and we shall explain this for the benefit of those who are not familiar with the circumstances.

When any portion of an elastic fluid is condensed within a close vessel, it exerts an equal force upon every point in the interior surface of that vessel; now, supposing that several of these points are removed, and an opening is made in any part of the vessel, the resistance in that spot being removed, the fluid rushes out through it with a force proportional to its density; an *excess* of pressure is now felt on the opposite side of the vessel to the orifice, proportionate to the size of that orifice, and the density of the fluid. Thus in firing a piece of cannon, a considerable portion of the elastic fluid, generated by the powder, escapes by the vent *upwards*, the breech, therefore, is at the same moment pressed *downwards*, where there is no vent; and as the breech itself is elastic, and it rests upon a support generally of iron or wood, which is also elastic, there is a reaction produced from the effect of the blow: hence the breech is thrown up and the muzzle down at every discharge. If any one will take the trouble to watch this action, in the recoil of a long battering gun, they will find it plainly discernible. With guns having equal charges and equal vents, the quantity of the pressure downwards will be uniform at every discharge; but *the quantity of the reaction* will vary, as the centres of gravity of the different guns are nearer to, or further from the trunnions; and indeed by making the breech very massy, the centre of gravity may be brought so far back, that the breech will so much preponderate, as to resist the reaction, and

it will not rise from the quoin supporting it ; but if the latter is loose, the shock will very likely displace it, and *throw up* the muzzle.

Sir William Congreve mentions in his 'Introduction,' that some of his guns have been cast with the trunnions in the axis of the piece, some with the trunnions *as usual*, and some with loops similar to the carronade loop. Now, we are not informed which description of gun was used in the experiments, and we can therefore only *surmise*, that it was not one of those guns which had the trunnions in a line with the axis of the bore: and if this was the case, we make no doubt but the circumstance contributed much to throw up the muzzle at every discharge.

The proper place for the trunnions is certainly that in which their axes are in a line which intersects the axis of the bore. In this case, the pressure of the expanding fluid of the powder upon the breech, acts in a direct line from the trunnions, and neither tends to throw the muzzle up or down; but when the trunnions are below the axis of the bore, the pressure of the powder urges the breech strongly against the screw or quoin which supports it, and if the gun is long, and the centre of gravity near the trunnions, the reaction from the blow will throw the muzzle down before the shot has quitted it, but in a short gun, having the centre of gravity near the breech, the preponderance of the breech will in a great degree overcome the reaction from the quoin, and the rising of the muzzle only will be experienced.

It is to these causes we attribute the difference between the first grazes of the three guns which were tried; that of Sir William Congreve, evidently having *had its muzzle thrown up* from the greater mass of metal about

the breech; and in fact, the note which Sir William has recorded, indicates that this was the case, as Sir T. Blomefield's guns are stated to have had a tendency to fall upon their muzzles, and the long gun actually did so.

The recoil of Sir William's *carronade gun*, (as we shall take the liberty of naming it,) was found to be greater than that of the heavy gun, as, having an equal charge, and an equal weight of shot to propel with the heavier gun, the laws of motion would determine its recoil to be greater than that of the other, notwithstanding any supposed nicety in the arrangement of its particles of matter.

In this *thickening of the breech*, there is this advantage, that as the centre of gravity of a gun is brought nearer to the base ring and further from the trunnions, a gun will lie steadier on its carriage in the recoil, than another of the same weight and length, having a more cylindrical form. This however is supposing that the trunnions in all cases are placed equally distant from the base ring, and in line with the axis of the bore; but if Sir William Congreve brings back his trunnions, as he proposes, so as to give his short guns an equal projection of muzzle with the longer ones, he will do away with the only advantage, which in our opinion, his gun possesses over the old patterns.—For, as to expecting a greater propelling power from the mere arrangement of the particles of matter, we deem the expectation vain!

And even this advantage of steadiness in the recoil, would be gained with long guns, by moving the trunnions rather more forward, and thus the advantage of a more extended range possessed by the long guns, would be retained.

It is probable however, that Sailors would not willingly allow any new description of gun to be introduced into the Navy, which would still further encroach upon their decks than the old patterns; and with this idea in view, *seamen* may prefer Sir William's gun, as taking up less room than the old ordnance. We sincerely hope however, that the recollection of *the effect of American long-shot from heavy and long guns*, is too recent to allow of Sir William's innovation being carried to any dangerous extent, even in the Navy.

An Appendix now follows in Sir William's work, containing—

No. I.—Report of the practice at Sutton Heath.

No. II.—Report of the Naval Officers, to the Lords Commissioners of the Admiralty.

No. III.—A Letter from Captain Phillimore, Royal Navy, Commanding H. M.'s Ship, 'Eurotas.'—These relate to points in the recoil and working of the guns, generally favourable to Sir William Congreve's gun. But as these points are considered in other parts of the work, we conceive it unnecessary to give those parts of the Appendix here, referring the reader to the book itself if he wishes for the information it contains. Sir William in the beginning of page 23 of the Appendix, expresses himself, however, in a *very singular manner*; and we think it proper that our readers should have the sentence to which we allude before them. It is as follows:

There remains only to be added, that in consequence of further favourable reports of these guns, 300 more of them are now ordered to be cast for sea service; and *I feel confident* not only that the Board of Ordnance will see sufficient ground to allow me to prosecute to the utmost perfection this *important discovery*, but that they will *secure to me the merit of it by not permitting this principle of construction to be garbled* by any approximation or imitation of the form which I have thus had the *honour to promulgate*.

We now proceed to lay before our readers that part of Sir William Congreve's work which contains, in his opinion, proofs of the validity of *his Theory*.

APPENDIX.

Experiments relative to the effects produced by the external forms of Bodies in the communication of motion, so as to determine the best form of any given mass of matter for the communication of motion by direct impact; and by analogy also to show that in the construction of Ordnance, there exists a best external form or distribution of any given mass of metal, as connected with the projection of the shot.

Description of the Apparatus used in these Experiments for determining the difference of impulsive power, given to the same mass of matter, by varying its external form.

A B C D,* the frame work, supporting the two pendulous bodies E and X, whereof E is always the same, being a sphere of 9 lbs. weight; and X is variable as to form, but in all cases exactly of the same weight.

E is suspended in the centre of the arc FG, furnished with a slide and index, to show the vibration of E, on the application of any blow that may be given to it. X is suspended on a variable centre, which can be so adjusted that the bodies shall be exactly brought in contact when the two rods hang parallel and perpendicularly. The body X is then brought up into the dotted and horizontal position X,† so that it shall always fall through an arc of 90° when discharged by the trigger T. The rods of suspension pass in all cases through the centres of gravity of the bodies. • •

In many of the foregoing experiments,‡ as for example, in No. I, and No. II, No. 2 and No. 12, &c. the blow has been struck with the same body, in different positions; and whenever this occurs, the identity of the mass is marked by the same letter on the body, in the

* See Plate X. Fig. 3.

† In the Wood Cut in Sir William Congreve's book, there is a mistake in not having represented the body X at a proper distance from the point B. We have done this by the dotted lines at W, and have shewn the curve lines of descent and ascent.

‡ See Plate XI.

different cases. Thus, in No. I and No. II., the letter A shews that the same body has been used: in No. 2 and No. 12, the letter B denotes the same thing.

Observations on the foregoing experiments.

From a general comparison of the foregoing experiments, it will be observed, that the frustrum of a cone appears to be the most efficient form of any here experimented: and it further appears that this effect is diminished by giving too great a length to the frustrum, or by bringing it too much to a point; and on the other hand also by too great a reduction of length, and too great a breadth of diameter, so that in the cone it is evident, that the best form is, Experiment 4, lies between the two extremes E and G, Experiments 6 and 8.

A still more remarkable difference will be observed to exist in the efficiency of the same cone, or frustrum, at its opposite ends; an experiment, which alone would be sufficient to establish the important principle here involved—as to the great effect produced by the variation of configuration in the communication of motion from one body to another. Thus there is no less a difference than $7^{\circ} 36'$ arc, in the arc described by E, when struck by the point of the cone G, Experiment 13, and when struck by the base of the same cone G, Experiment 8. A similar effect is also observed in the frustrum D, Experiment 5 and 15, though in a less degree.

This is still further established by the Experiments tried with the same cylinders differently applied, so as to compare the effect of the same cylinder impinging with its end and with its side. Thus in Experiments 1, 2, and 11, 12, the same cylinders, impinging end on, produce from 10 to 11° more range in the ball E, than when striking it with their sides.

Equally extraordinary results are afforded by comparing the effect of the aggregation of different bodies with those of single masses of the same weight; and again by comparing their effects when placed in different combinations as to general configuration. Thus between the effect of the best single mass, viz. the frustrum C, Experiment 4, and the effect of the best action of three balls combined to be equal in weight to C, Experiment 9, there exists a difference of $15^{\circ} 8'$; and compared to the worst effect of the three balls when striking laterally, no less a difference than 22° in the arc. Such differences cer-

tainly could not have been anticipated ; but fortunately their magnitude leaves no doubt as to the full operation of the principle.

It is extraordinary also to observe, by comparison of Experiments 18 and 19, with Experiment 4, that the sphere and cube, the most compact forms, are not the most effective ; and this proves beyond a doubt, that a certain length in the direction of the motion to be communicated is indispensably necessary ; though as we have already seen, that length must not extend beyond due limits. It is evident, therefore, that the sphere and cube, as compared with the frustrum of the cone, lose a part of their power by their too great extension at right angles to the direction of motion to be communicated ; as is indeed confirmed in several others of the cases.

From all that is here seen, therefore, I apprehend no doubt can remain as to the following points in this interesting and important problem :—

1st That, *ceteris paribus*, an increased quantity of motion is communicated from the action or reaction of a given mass of matter on a given body, by a certain increased accumulation of matter about the point of impact, or impulse.

2ndly. That this increase of motion requires, that the accumulation of matter should be placed within a certain sphere of action or reaction from this point ; not extending too far as to length in the direction of the motion communicated, nor in breadth at right angles to that direction, but in a due proportion of each.

3dly. That from this it follows, that there are due limits to this accumulation, and that there must therefore exist forms of the greatest efficiency for the communication of motion.

What these precise forms may be, it will be the object of future Experiments to determine ; and these it is my intention to pursue with all possible accuracy and attention.

And here I must call the attention of the reader to the extraordinary coincidence of these results with those of the Sutton Heath Experiments. In the one case we find a gun, having an increased quantity of metal about its charge or centre of action, projecting its ball further at point blank than the cylindrical gun, of the same weight, or even than a much heavier gun, by increasing the metal about the breech, so as to assume a very decided conical form (*vide the Plate*) ; in the other we find a cone, having the accumulated quantity of metal about its point of impulse, projecting the ball by direct impact further than a cylinder of the same weight, moving with equal velo-

city.* The analogy therefore is direct; the results confirm each other; and it cannot be denied that there exists in this difference of the configuration of matter, some principle, which in the first case of the *intermediate* action of the bodies upon each other, by the expansion of the charge of powder between them, prevents the loss of action in the communication of motion. What this property is, whether it be connected with elasticity, vibration, expansion, or any other subtle quality, I do not here propose to discuss: indeed, we know but little as to the occult causes of motion in any way. I have ventured to suppose, that, as motion is not communicated *instantaneously*, but *in time*, the excitement of action must be greatest where the greatest quantity of matter is brought within a given distance of the centre of action; and I cannot but think that, in conformity to one of the first laws of nature, that same property, whatever it may be, which is, by these experiments, so decidedly shewn to operate in the direct action of one body upon another, must be presumed to operate also by reaction, as the cause of the increased effect observed in the conical gun.

I have only here to add, in anticipation of such objection as may perhaps be alleged against these Experiments, that, although no allowance is made for the resistance of the air, the velocity is so small as to render it insignificant; and indeed, in the cases from which I have drawn the most important results, as in that abovementioned, its tendency has been to diminish the results instead of increasing them; and still more especially in that experiment which shews the difference of motion communicated by the base of a cone, and by its vertex, the result would evidently have been increased, had the experiment been tried *in vacuo*.

It may be said, also, that no allowance is here made for change of position in the centres of percussion.—

To this, I answer, that no such allowance is made, because I conceive, from the circumstances under which these experiments are made, there are none of them in which this change of position in the centre of percussion can produce any sensible effect, or at all

* I have assumed the velocities equal; there can be no great difference; and what there is must be in favour of the cylinder, from the resistance of the air being less on its base, than on that of the cone; the experiment must, therefore, at all events, be admitted to be a fair one.

events no effect at all commensurate to the actual differences observed in the results; while in others of the Experiments, where the same body is used, no change of position whatever takes place as to the centre of percussion, though the most striking difference of effect is observed in the impulse given. Thus in Experiments I. and II., where the same cylinder is used, in one case striking end on, and in the other, when turned round, *horizontally*, so as to strike with its side—it is evident that no change of position takes place in the centre of percussion, though there exists a difference of 9° in the arc described by the ball E: the same in Experiments 2 and 12, 9 and 10, 5 and 15, &c. It is clear, therefore, that the effects observed are not produced by any change in the centres of percussion, but must be referred, as above, to some principle or property of matter connected with its accumulation, under certain limits, about the point of impulse.

The importance of these results in a variety of practical applications is obvious; and it is somewhat extraordinary that they do not appear hitherto to have been regularly investigated; although a variety of workmen must have had occasion frequently to observe the existence of such a property; nor can it, I think, be denied that enough is here shewn to prove that the prejudice in favour of a gun with a heavy breech, derived no doubt from frequent though unexplained observation, is not without a real foundation in the properties of matter.

W. CONGREVE.

“ *Error* is a mistake of our judgment giving assent to that which is not true.” — *Locke.*

On the above ‘Experiments’ and the accompanying ‘Observations’, we must remark that, the Operator does not appear to have been aware that he was making use of pendulums of *different lengths*, and that the percussion was by *oblique*, not *direct impact*.

We cannot but feel surprised that Sir William Congreve, who, from his situation enjoys an unlimited com-

mand of *materiel*, and lives in the noblest school of the mechanical arts, as applied to war; should have published a series of Experiments, both *unscientifically conducted*, and *inapplicable* to the problem which he boasts the merit of having solved.

We are aware that these are strong expressions, and they require to be supported by proofs as to the justice of them.

We shall endeavour to do so, and in the task we pledge before the public the character of our little stock of information, acquired certainly under great disadvantages during the often interrupted progress of self-directed industry.

We have asserted,—

First, That the Experiments were made with pendulums of *different lengths*.

Secondly, That the percussion was by *oblique*, not *direct impact*.

Thirdly, That the Experiments were *unscientifically conducted*, and that they are *inapplicable* to the problem in question.

Previous to entering upon the grounds on which we found these assertions, as some of our readers may not be aware of the laws of pendulous bodies, we shall endeavour to explain them; and we feel assured that the best informed of our readers will be the first to allow the advantages which this knowledge is of to every individual, high or low, civil or military, in some of the commonest daily occurrences of life.—Every one who makes use of a sword or a walking stick, a cricket or a racket-bat, a hammer or a mallet, will find his advantage in making himself master of the properties of a pendulum.

Moreover, it is actually necessary that every reader of our pages on the present subject, should know these properties, in order that he may understand the force of our arguments: we shall not, therefore, make any apology for the present digression.

1. A Pendulum, in mechanics, is any heavy body, so suspended, that it may swing backwards and forwards, about some fixed point, *by the force of gravity*.

2. This swinging motion of a pendulum is termed its *oscillation* or *vibration*, the whole extent of one swing, being considered one vibration or one oscillation.

3. The fixed point about which a pendulum vibrates, and from whence it is suspended, is termed the *centre of motion* or the *point of suspension*; and a right line drawn through the centre of motion, parallel to the horizon, and perpendicular to the plane in which the pendulum vibrates, is termed the *axis of vibration*, or the *axis of oscillation*.

4. There is also another very important point to be considered in a pendulum, which is called the *centre of oscillation*. Every *solid* body, it is well known, has a certain point within its substance, which is called the centre of gravity; and the centre of oscillation, in all pendulous bodies, will always be found below their centres of gravity; and in some part of a right line passing from the point of suspension, through the centre of gravity.

5. It may so happen, from the peculiar shape of the pendulous mass, that the centre of oscillation may not lie within its substance, but be below the body altogether. It will however always be found in some part of a line, drawn from the point of suspension through the centre of gravity of the body.

6. It is of the utmost consequence that the position of the centre of oscillation in every body used for a pendulum, should be correctly ascertained: for it is of such a nature, that if all the particles of matter composing the pendulous mass, were assembled and condensed at this point, the pendulum would still vibrate in equal times, whatever its former shape might have been.

7. It is therefore the distance of this point from the point of suspension, which determines the lengths of pendulums; for, all pendulums, of whatever shapes, and light or heavy, having their centres of oscillation equally distant from the points of suspension, will *vibrate in equal times*, and are considered to be *equal pendulums*.

8. Now the whole momentum or force of a pendulous body, when in motion, is, as it were, accumulated at the point of the centre of oscillation, and consequently a blow from any pendulum, will have most force, when the point of impact, the direction of the motion, and the centre of oscillation are in one line.

9. The *point of impact*, is that point on the exterior surface of a mass of matter which comes into contact with another body in striking a blow.

10. It is evident therefore, that many shapes of bodies are *unfit* to be used as pendulums, when percussion is an object; for, when the centre of oscillation does not lie within a body, it is vain to attempt to strike a blow with it, which shall have equal force with that from another body of equal weight, which has its centre of oscillation within the mass, and has its point of impact in the same line with the centre of oscillation, and the direction of the motion.

11. Again, the form of a body may be such, that when it vibrates as a pendulum, the point of impact

must be either above or below the centre of oscillation though the latter lies within the mass of matter used; the consequence of which will be, that the blow from such a pendulum, will not only exert less force upon the body on which it strikes, but the circumstance will produce serious irregularities of motion, which may prove either injurious to the hands of the operator (if the pendulum is suspended from the hand,) or destructive to the machinery in which the pendulum may be employed. All these circumstances, together with others connected with the subject, we will endeavour to explain to our readers with the assistance of the Diagrams in Plate XII.

12. As there is nothing of greater consequence to be rightly understood in all mechanic arts, than the doctrine of *Moments and Forces* of moving bodies, and as some of the investigations of the Theories are extremely intricate, we do not presume in the present instance to attempt any thing further than the explanation of what is necessary to be understood, in connection with the present subject of discussion; trusting that those of our readers who feel inclined to pursue this interesting department of Science, will refer to the writings of the many celebrated authors who have treated upon these subjects.

13. Let AB, Fig. 2, Plate XII, be supposed to be a pendulous bar, (of any homogeneous matter, and of the same proportions from end to end) suspended with extreme nicety at the fixed point A, about which it is made to vibrate. There will then be found within the bar AB, a certain point C, opposite to which, if the surface of the bar impinges upon any body as M, it will exert upon that body all its momentum, or moving

force, and if the point M is immoveable, the bar AB, will be *motionless* for an instant after the moment of impact, although perfectly disengaged from the point of suspension A : that is, (supposing the force of cohesion between the particles of matter forming the bar AB, is not dissolved by the shock of the blow,) the whole momenta or striking force of the particles of the bar, will be overcome at the instant after impact upon the point M. We do not take into consideration here the properties of *hardness, softness, and elasticity*, we know of no matter which the materials of this world afford, that is either perfectly hard, perfectly soft, or perfectly elastic. In Theory we must however imagine *this perfection*, and it rests with the operators upon natural bodies, to make due allowance for their deviations from it.

14. The Bar AB, is then a Pendulum (1), but it is not a *simple Pendulum*, which we shall explain hereafter.

e f is the arc of oscillation. (2.)

A, is the point of suspension. (3.)

a c, is the plane of the axis of oscillation. (3.)

The dot at C, is the centre of oscillation. (4.)

AC, is the length of the pendulum. (7.)

The point on the surface of the bar AB, which is opposite to C, and which comes into contact with the body M, is the point of impact. (9.)

The Reader therefore has now before him a pendulum, and its several parts clearly defined ; but, as we said before, the bar AB, is not a simple pendulum ; we will now explain this.

15. Mathematicians divide all pendulums into two kinds, simple and compound.

16. A simple Pendulum, in Theory, consists of a single weight, as D Fig. 2, considered as a point, and

an inflexible right line AD, supposed void of gravity or weight, and suspended from a fixed point or centre A, about which the weight vibrates.

17. The nearest approach to this which we can form from natural bodies, is made by suspending a small leaden ball as D, by an extremely fine thread from the point of suspension A.

18. A Compound Pendulum, in Theory, is a body consisting of many particles of matter as AB, moveable about one common centre of motion, but connected together so as to retain the same distance both from one another, and from the centre about which they vibrate.

19. The shapes of Compound pendulums are therefore of infinite variety; and a body of uniform dimensions, such as the bar AB, is one of the simplest kind of compound pendulums.

20. Now, if the Pendulums AB and D, are set in motion together, it will be found that they will vibrate in equal arcs, and in equal times, because they are pendulums of equal lengths. (6.) *

21. The striking, or percussive force of a Pendulum, is found from the sum of the weight of the particles of the body used, multiplied into their velocities. A blow therefore from a pendulum, will be of the greatest force, when the pendulum is at the lowest point of its arc of vibration, because then the velocity is greatest, the weight of the particles of the same pendulum always remaining constant. It is evident that in proportion to the distance

* This is, as long as both pendulums continue to vibrate, for the bar AB will come to rest first, in consequence of the greater resistance from the air which its extended surface will meet with, and also a small portion of friction in the bar at the point of suspension A: these circumstances, however, we do not consider now.

of the particles of matter from the centre of suspension, so will their velocities be; but in a mass in which the particles of matter are connected by the force of cohesion, we must consider their several velocities as compounded, and we must examine which point in the body is so situated, that half the moving force of the particles (compounded from their weights and velocities) is above, and half below the said particle; as in this point the whole force of the pendulum will be exerted in one direction. This point is called the *centre of percussion*, and in a regular body will be the same point as the centre of oscillation. The point C therefore in the bar AB, being the *centre of oscillation*, is also its *centre of percussion**.

22. If therefore the bar AB is made to impinge upon the immoveable point M, it will strike with its *greatest force* when the point of impact is opposite to the point C, which is its centre of oscillation and percussion, because the whole of the particles of the body AB will exert their force to move forward in one direction, as the sum of the percussive force of the particles of the pendulum is equally divided at the point C.

23. This point C, in the body AB, will be found at exactly $\frac{2}{3}$ rds of its length from the point of suspension

* Mathematicians, since the time of Mr. Huygens, (who first shewed how to find the centre of oscillation,) have laid down rules by which this point can be found without difficulty, in bodies of regular shapes: but in irregular bodies, the computations of the various velocities of the particles of matter become extremely intricate. But the distances of the centre of oscillation from the points of suspension of any pendulums, however irregular in shape, may be found practically, by counting the number of vibrations of the pendulums, in small arcs, in a given time; and then observing the exact length at which a small simple pendulum as D, will pass through the same number of vibrations in the same time.

A, where, by the rules which Mathematicians have laid down, it will be found that the point exists at which the sum of the moving force of all the particles in AB is equally divided.

24. The centres of oscillation for various regular figures have been laid down in several works as follows:—

In a cylinder, or uniform rod, suspended at one end, at $\frac{2}{3}$ rds of the whole length from the point of suspension.—
 In an Isoscele's triangle, suspended by the vertex, and vibrating flatways, $\frac{2}{3}$ of its altitude.—In a common parabola, suspended by the vertex, and vibrating flatways $\frac{2}{3}$ of its altitude.

In figures which move sideways, that is, in a plane of vibration parallel to their own planes, Huygens determined the distances of the centres of oscillation below the points of suspension in the following figures, to be—

In a circle, $\frac{2}{3}$ of the diameter.—

In a rectangle suspended by an angle, to be $\frac{2}{3}$ of the diagonal.—

In a sector of a circle, $\frac{3 \text{ arc} \times \text{radius}}{4 \text{ chord}}$.

In a cone, $\frac{1}{5} \text{ axis} + \frac{\text{radius base}^2}{5 \text{ axis}}$.

In a sphere, $g + \frac{2r^2}{5g}$ where r is the radius,

and $g = a + r$, the radius, added to the length of the thread by which it is suspended.

Our readers will perceive from these calculations, how variable in distance, from the point of suspension, is the situation of the centre of oscillation in bodies of different forms.

25. If the pendulum AB, was made to impinge upon some other immoveable point, as m, the sum of the per-

cussive force of the particles of the pendulum would be unequally divided; and if, at the instant of impact, the pendulum was disengaged from the point A, the bar AB, would move round the point m, in the manner represented by the dotted lines a b.

Or if the bar AB, was made to strike upon any other point n, below its centre of oscillation, it would then move round the point n, as represented by the dotted lines c d.

Now in these cases, let us examine what would happen.—

26. The percussive forces not being equally divided, the particles, on which ever side there is an excess, will endeavour to continue to move forwards, instead of expending their force upon the bodies m or n, on which the bar AB impinges; and if the latter is disengaged from the point A, at the instant of the stroke, it will turn upon either of these bodies as a new centre of motion; but before the bar AB can turn round this new centre of motion, the motion of the particles on the *minus* side of the point of impact, must be destroyed, and they must be made to move in a contrary direction to that in which they were moving at the instant of impact. Hence, there is a decrease in the force of the blow of the pendulum AB, upon the body m or n, on which it is made to impinge, proportionate to the quantity of percussive force of the particles, which are in excess, on either side of the points m or n, on which the bar is made to impinge.

27. In case the bar AB, is held in the hand at the instant of impact, the same will happen; and if the bar is strongly grasped at the end A, a sensation of a wrench will be felt on striking a blow, more or less

painful or injurious, as the point of impact is further from, or nearer to the centre of oscillation C.

28. If the point A remains attached to Machinery, the portion of force lost at the point of impact will exert itself upon the point of suspension, probably in a destructive manner, if the pendulum is of weighty matter.

The reader will now perceive that in striking with a rod or bar, such as AB, the *most forcible blow* will be struck when the point of impact is at about $\frac{2}{3}$ rds. of its length from the hand.

29. With a light substance, such as a willow stick, any serious effect from a blow struck at a distance from this point will not be of much consequence; but with a heavy bar of wood or iron, any great deviation of the point of impact from the centre of oscillation may be serious; producing that painful sensation which is commonly said to be caused by a *jar*.

30. One of the properties of a compound pendulum is, that if the centre of oscillation is made the new point of suspension, the former point of suspension becomes the new centre of oscillation; thus, if the bar AB is held in the hand at C, and a blow is struck with the end A, as the point of impact, it may be done with impunity, for the point A then becomes the centre of oscillation; and in this case, if the point of impact is far distant from A, the same irregularities of motion will be felt as have already been described.

31. If the bar AB, when suspended as a pendulum at rest, is struck by another body, the same effects will be observed, as if itself was the percutient mass.

32. We will now proceed to Fig. 1, Plate XII. Here FG represents a long cylinder, suspended by a rod AB. It is an exaggerated representation of one of the bodies

used by Sir William Congreve in his 'Experiments', and is a compound pendulum, the rod AB being supposed to pass through the centre of gravity of the cylinder FG.

33. It is evident that when this pendulum is put in motion to vibrate in a plane parallel to the axis of the cylinder FG, that the particles of the cylinder, towards each end F and G, will move with considerably greater velocity than the particles about the centre of gravity, because the former particles are made to vibrate in arcs of greater radii; thus the particles above and below the centre of gravity, will move in the arcs $w w$, $w w$, but the particles at the ends, F and G, will move in a much greater arc as $r s$, and as all the particles of the cylinder move at the same time, it is evident that the particles which are adjacent to the ends F and G, as they move through a greater space than the particles about the centre of gravity, and in the same time, must move with greater velocity.

34. Now suppose the cylinder FG, turned round upon the rod AB, so that we should only see one end of it in the diagram, and that it was thus made to vibrate in a plane perpendicular to its axis: it is evident in this position that the whole of the particles of the cylinder FG, would vibrate in arcs confined between, $w w$ and $w w$. In this mode of applying the cylinder as a pendulum, therefore, the *particles towards the ends F and G*, will only vibrate with the same velocity as the particles about the centre of gravity; a velocity which is considerably less than that with which they moved in their first position. (33.)

35. We have before said (21.) that the percussive force of a pendulum, is the sum of the weight of the

particles multiplied into their velocities, or the product of the mass of the body, multiplied into its velocity. Hence, the percussive force of the cylinder FG, as applied (33.) with its axis parallel to the plane of vibration, will be *greater* than when applied (34.) with its axis perpendicular to the plane of vibration; because the velocities of most of its particles are greater when used in the first position.

36. The situation of the centre of oscillation, (or centre of percussion,) will not be the same when the cylinder is used as described (33.), as when it is used as described (34.). For the situation of this point is determined, by dividing the sum of the product of the forces of the particles multiplied by their distances from the axis of suspension, by the sum of their forces; hence the quotient will be greatest when the cylinder is applied (33.) with its axis parallel to the plane of vibration, because the distances from the axis of suspension of the particles towards each end FG of the cylinder are greatest when applied in this position.

37. But it is the distance of the centre of oscillation from the axis of suspension, which determines the length of a pendulum; (7.) it is evident, therefore, that the cylinder FG, as applied in the different positions described (33.) and (34.) must be considered as two pendulums, differing in length from each other, and consequently, having the centres of percussion *existing in different points* in the two experiments.

38. The same conclusion is equally applicable to all the bodies used in the experiments by Sir William Congreve. Thus Fig. 1. and Fig. 11.—Fig. 2 and Fig. 12—Fig. 9 and Fig. 10, were all pairs of pendulums, differing in length from each other, and therefore they have not

their centres of percussion situated in the same points when used sideways, as when used longitudinally.

39. And if the reader will consider the *varied velocities* of the particles, in the various shapes of the bodies used in the experiments, it will be evident that with a few exceptions, such as Fig. 4 and 17—Fig. 5 and 15—Fig. 6 and 16—Fig. 7 and 14,—(which, *taken in pairs*, were pendulums of the *same lengths*, but each pair differing from the other in length,) that all the other bodies used were pendulums of different lengths.

40. We have now therefore arrived at the proof of our first assertion, viz: that Sir William Congreve *made use of pendulums of different lengths*.

41. We shall now pass on to examine the nature of the percussion. We have said that it was *by oblique not direct impact*.

42. Mathematicians, define percussion to be the striking, or impact, of one body upon another, or the shock arising from the collision of two bodies.

They divide percussion into two kinds; direct, and oblique.

43. In speaking of bodies moving in right lines, *direct percussion* is defined to be that in which the impulse is made in the direction of a line perpendicular at the place of impact, and which passes through the common centre of gravity of the two bodies.

44. Oblique percussion is that which is made in the direction of a line that does not pass through the common centre of gravity of the two bodies, whether the line of direction is perpendicular to the place of impact or not.

45. In bodies which are suspended as pendulums, the *centres of percussion* answer to the centres of gravity,

and the *direction of the motion* at the instant of impact, is considered to be that of a tangent at the point of the arc of vibration at which the impact takes place.

46. In Fig. 1, Plate XII. Let CDE, and ABGF be considered as two compound pendulums each suspended from a different axis of suspension as C and A. If the pendulum ABGF is then made to vibrate, and the end F is made to impinge upon the ball E, the mutual point of impact will be x, which point is so situated in the arc r s, that the line a b will be a tangent to the arc a b at that point. But the tangent a b is the *direction of motion* of the particle of the cylinder FG, which impinges upon the ball E, (45.) at the time of impact; and it is evident that this tangent cannot pass through the common centres of percussion of the bodies E, and FG, nor is the line a b perpendicular to the place of impact. The impact of the cylinder FG upon the body E, is, therefore, *oblique percussion*.

47. There is also another circumstance to be considered in the nature of the impact of the body FG, upon the body E. As the centres of suspension of the two bodies, are apart from each other, it is evident that their component particles, must vibrate in different arcs; and at the instant of the impact of the body FG, upon the body E, the particle at F, which impinges upon the body E, will be moving in the ascending curve of its arc of vibration, while the particle of the body E, at x, upon which FG impinges, must descend in its arc of vibration, until the body E has passed through a space equal to half its diameter.

48. It is vain therefore, to expect any coincidence in the direction of the motion of the particles of the bodies E and FG, at the instant of impact, or of any other

bodies, such as those used by Sir William Congreve, made to impinge upon each other, when suspended from separate points of suspension.

49. It is also equally perceptible, that the *degrees of obliquity* of the percussion, in the bodies used by Sir William Congreve, were *various*; differing as the body was long or short, and as the points of suspension were further from, or nearer to each other. How could it be possible to expect *uniform results* with such existing differences of circumstances!

50. We have now, we trust, proved to the satisfaction of our readers, that the impact of the bodies used by Sir William Congreve, was *oblique*, and not *direct*, as he had supposed.

51. The foundation for our third assertion, viz: *that the Experiments were unscientifically conducted*, is now to be set forth.

If the proofs which we have adduced in support of our two first assertions, are allowed to have any weight, it cannot be necessary to say much more in support of the correctness of the third. The circumstances alone, of Sir William Congreve's having, inadvertently, made use of pendulums of *various lengths*, and impinging upon each other with *various degrees of obliquity of percussion*, and the *erroneous conclusions* drawn from the observed differences in the arc of ascent of the body B, are sufficient evidence that the Experiments were *unscientifically conducted*.

52. We have said, that the Experiments were *inapplicable to the problem in question*. Want of room, prevents us from entering largely upon this head: we must therefore confine ourselves now, to the mere consideration of the *extreme difference*, between the circumstance

of one hard mass striking upon another, of uniform density and homogeneous matter, as in the bodies used in the Experiments; and that of an *elastic and expanding fluid*, propelling a shot from a gun. We will venture to assure ourselves, that our readers would consider all the arguments which we could advance upon this subject, as needlessly employed, and will therefore pass on to the Experiments, themselves.

53. The average quantity of the ascent of the body E, with the various percutient bodies used in the nineteen Experiments, rather exceeds 69° . We will however consider it to be 69° .

54. In the first Experiment (Fig. 1,*) a cylinder A was placed horizontally, so as to strike the body F with its end; and we find the arc of ascent of this body caused by the percussive force of the cylinder impinging upon it, to be $68^{\circ} 23'$ or below overage $0^{\circ} 37'$.—As the points of suspension are, in this Experiment, at a considerable distance apart, the impact was *very oblique* (42.); but as the particles of the cylinder, moved in a plane of vibration parallel to its axis, the great velocities of the particles about the point of impact, (33.) had effect in increasing the percussive force, and thus in some degree compensated for the obliquity of the impact.

55. In the second Experiment (Fig. 2,) we find the arc of ascent of the body E, is $67^{\circ} 50'$ or below average $1^{\circ} 10'$.

* We have in the Engraving, Plate XII, as nearly as possible, followed the proportions of the bodies given in a *Wood Cut* in Sir William Congreve's book. The rod of suspension ought to appear attached to the middle of the cylinder, but as it was not so in the wood cut, we have followed that.

Here we observe the cylinder was rather elongated, having hemispherical ends; and in Sir William's Wood Cut, it appears to have been a cylinder of a rather smaller diameter than that used in the first Experiment; the points of suspension being, therefore, rather farther apart in this experiment, the obliquity of the percussion was increased, and we consequently find the ascent of the body e, to be rather less than in the first Experiment.

56. In the third Experiment, (Fig. 3,) we find the arc of ascent of the body e, to have been $63^{\circ} 33'$, or below average $6^{\circ} 27'$.

Here we find the points of suspension still further removed from each other, and a consequent reduction in the arc of ascent of the body E, in consequence of the *increased obliquity* of the percussion, as might have been anticipated. (49.)

57. In the fourth Experiment, (Fig. 4.)—*Sir William's climax of discovery !!!*—the ascent of the body E, of $71^{\circ} 30'$ is produced; or above average $2^{\circ} 30'$.

Here we find the points of suspension brought *considerably nearer* to each other, and the direction of the impact consequently approaching to *direct percussion* (45). This is the *true cause* of the increased ascent of the body E; because the percussive force of the percussive body, *was and must be* greater, as the centres of suspension are brought nearer to each other;* and we will venture to pronounce, that the *conical shape* of the body, had no further connection with the increased ascent of the body E, than as it was favourable towards bringing the points of suspension of the bodies nearer to each other than with the former bodies used.

* Of course, observing the proper position of the point of impact.

58. In the fifth Experiment, (Fig. 5) we find the arc of ascent of the body E to be $70^{\circ} 36'$, or above average $1^{\circ} 36'$.

Now in this Experiment, as the points of suspension were rather nearer to each other than in the last, we were inclined, on the first inspection, to anticipate that the arc of ascent of the body E should have been, in a *small proportion*, greater than in the 4th Experiment. We must therefore examine if there is not a cause for the apparent decrease; and we must here take into consideration, some circumstances, the elucidation of which will be useful in the examination of the other experiments, and the explanation of them here, will render particular examination of these unnecessary on our part.

59. In Fig. 3, Plate XII, the reader will observe representations of a cylinder A, suspended as a pendulum, with the axis of the cylinder, perpendicular to its plane of vibration; and by the dotted lines, the same cylinder is supposed to be turned round, so as to vibrate with its axis parallel to its plane of vibration. E, is supposed to be the body used by Sir William Congreve in his Experiments, to measure by its arc of ascent, the percussive force of the various percutient bodies used.

Figure 4, represents a different view of the same bodies, on a reduced scale, but taken in the plane of vibration, so that the rods supporting the bodies cover each other. The dotted lines are to represent the bodies used in the 9th and 10th Experiments. We will now endeavour to set before our readers the circumstances which attend the impact of the cylinder A upon the body E.

60. Let us suppose the cylinder A to be formed of 100 equal lamina or plates, which might be divided, (by

overcoming the force of cohesion of their particles) in a direction perpendicular to the axis, of that form which the usual mode of cutting a cucumber in slices will present a clear idea of.

61. If this cylinder, as attached to its rod, is made to vibrate as a pendulum in an arc of vibration perpendicular to its axis, it is evident that each lamina of the 100 forming the cylinder, being of equal weight, and moving with equal velocity, will have an equal percussive force.

62. We will consider the cylinder as impinging upon the body E. Then, unless the point of impact is made at a point exactly between the 50th and 51st lamina, (we do not consider now vertical depth,) the percussive force will not be maintained in equilibrio at the instant of impact; and if this is the case, the whole percussive force of the 100 lamina, will not be exerted upon the body E. For, supposing the point of impact to be between the 48th and 49th lamina there will be on one side of the point of impact, 48 lamina, and on the other side 52 lamina, or an excess of 4. Now these 4 lamina, instead of exerting their force upon the body E, will endeavour to move on in the plane of their arc of vibration, without exerting any part of their percussive force upon the body E. The force therefore exerted upon this body by the percutient cylinder, will only be that of 96 lamina; because as all the lamina of the cylinder are connected with each other by the force of cohesion, and the point of impact is made between the 48 and 49th lamina, the 48 lamina on each side of the point of impact, will balance each other, and expend their whole force upon the body E, at the instant of impact; but the 4 lamina whose force is not expended upon the body

E; (being connected with the others by the force of cohesion) will urge the 96 *motionless lamina* into motion in a new direction round the body E, as a centre of motion, and if the rod of suspension resists this motion, the force of the 4 lamina will then be expended in a violent strain upon the axis by which the pendulum is suspended.

63. But if the point of impact is between the 50th and 51st lamina, the forces of the cylinder will then be exactly ballanced, 50 being on one side, and 50 on the other of the point of impact; and if the body E, is an immovable point, (leaving the action of elasticity out of the question now,) the 100 lamina of the cylinder would expend their whole force upon the point E, and remain *motionless* after the instant of impact.

Our readers will, therefore, perceive that unless the place of the point of impact is regulated *with the utmost precision*, in every body used to strike a blow with; that is, unless it is situated exactly in that point which will maintain the forces of any percutient body *in equilibrio*; that a portion of the percussive force of the percutient body, proportionate to any irregularity in the situation of the point of impact, will expend itself in another direction from that in which the blow is struck.

64. What has been said with regard to the percutient body, is equally applicable to the body on which the impact is made. For, if the point in a body at rest, on which another impinges, is not centrally situated, so as to divide the forces of the vertical lamina of the body with the utmost exactness, a portion of the lamina, on that side where they are in excess, will at the instant of impact, *by their inertia*, endeavour to remain at rest; and by the force of cohesion acting on the

other particles of the body, will produce a rotary motion if the force is not resisted by the *axis* of suspension. Hence, though the full percussive force of the cylinder A, may be impressed upon the body E, yet, if the point of impact in the latter body is improperly situated, the quantity of the arc of ascent of the body E, will be proportionably reduced.

65. We have not taken into consideration the vertical depth of these bodies; but what we have said with regard to vertical lamina, must also be considered as equally applicable to the horizontal lamina of any body used to strike a blow with, the *same equilibrium* being required, at the point of impact, with respect to the *horizontal lamina of the body*, as with the *vertical*, to insure the full effect of impact.

66. In the ball E, Fig. 1, Plate XII, let e, be the centre of the ball. A horizontal plane passing through e, when the ball is at rest, will divide it into two equal hemispheres; and when the ball vibrates, the particles of the lower hemisphere will move with the greatest velocity, because they pass through arcs of larger radii, in the same time with those of the upper half of the ball. The proper point of impact will not, therefore, be in the central plane passing through e, but somewhere below it, and therefore in some point in the lower hemisphere.

67. This obtains only when the ball is considered as suspended by a rod having no weight in itself; but as this rod, in the 'Experiments' of Sir William Congreve, must have had considerable weight, all which is to be computed with the relative velocities, with those of the upper half of the ball; the proper point of impact, that is, the point at which the forces would be in equilibrio, would doubtless have been somewhere in the upper half

of the ball E. Hence, two balls, such as those used by Sir William Congreve in his 18th Experiment, were not proper forms for producing the *greatest effect* of percussion with a given mass of matter *when used as pendulums*; and Sir William Congreve in one of his concluding observations, has drawn a most *unfounded* and *unscientific* conclusion from this experiment. We refer the reader to the pages of Sir William's Book which we have transcribed: "*It is extraordinary also to observe,*" &c. We are indeed astonished that Sir William Congreve should have written this! Surely the study of the nature of pendulous bodies, has not to this day been neglected in the Royal Repository at Woolwich!

The two spheres, or the sphere and the cube used in the 18th and 19th Experiments, had they been moving *in right lines*, and with equal velocity with any of the other bodies, would have produced (provided the proper point of impact was observed,) a blow of equal force with any of them; but *when suspended*, and forced to move in an arc of vibration, *new circumstances are to be considered, and new laws govern the percussion!*

68. We have now supposed the existence of two planes, the one vertical and the other horizontal, dividing the lamina of the particles of any pendulous mass, so that their forces on each side, of the planes, shall balance each other. These are therefore the planes of equilibrium, and in the line of intersection of these planes, *is the true position of the point of impact*, at which the greatest force of percussion with any mass will be effected.

69. All that we have now advanced, we believe to be strictly accordant to the laws of pendulous bodies; the line of intersection of the vertical and horizontal

planes of equilibrium, is nothing more than the line of the centre of percussion: and as we have, we trust, clearly set before our readers, the *extreme nicety* and *exactness* required, in regulating the mutual point of impact of two bodies, so as to produce the greatest effect of percussion, they will readily comprehend the extreme difficulty of obtaining uniform results in the percussion of pendulous bodies by any common machinery, as well as the difficulty in striking a blow with a broad faced hammer, so as to give the *greatest possible* force with it.

70. But as the percutient bodies used by Sir William Congreve, *were pendulums of different lengths*, (38.) (39.), and the body E remained the *same* throughout the 'Experiments;' *the proper points of impact of the former*, to produce the greatest effect of percussion were at various distances from their axis of suspension, and consequently moved with different velocities, while the proper *point of impact* of the ball E, was invariably the same, and consequently at the same distance from its axis of suspension! Will any one now assert that the 'Experiment's were *not unscientifically conducted?*

71. In the 5th Experiment we find a body used, which we may justly compare to a board faced hammer; and we imagine that *the point of impact was not properly adjusted*; for had it been so, the arc of ascent of the body E, would have been in a small degree greater than in the 4th Experiment; that is, it would have been proportionate to the degree of approximation of the points of suspension in the two Experiments: -

72. It is useless to go through all the Experiments ~~We~~ will just remark, that in all those in which the points of suspension were not far distant, and conse-

quently, the percussion was not very oblique, little difference is to be observed in the arc of ascent of the body E. Thus in Figs. 4. 5. 6. 7. 8. the ascents of the body E, differ little in quantity from each other; in 13. 14. 15. 16. 17, when the same bodies are again used, but turned round, so that their centres of suspension were necessarily farther apart than in the first position, *and therefore the percussion was more oblique*, we find the bodies producing a less ascent of the body E, but nearly similar arcs, excepting Fig. 15, which from its point being in the slightest degree above or below, or to the right or left of the *true point of impact*; and from the disadvantageous shape of a point, (taking into consideration the effects of the elasticity of the particles composing the impinging bodies, may be readily accounted for.

73. In Figs. 9, and 10, we find that bodies were used, from the percussion of which, no anticipation of a large arc of ascent of the body E, ought to have been entertained. What we have said above, regarding the impact of the cylinder A, and the *exactness* required to preserve the proper point of impact, will fully bear us out in this assertion.—The obliquity of the impact in the 9th Experiment, and the *almost impossibility* in the 10th that the point of impact could be correct, so as to cause the equilibrium of the particles composing the balls a, a, a, and their connecting rod upon the body E at the instant of impact, sufficiently account for the smallness of the arc of ascent; and from the laws of reaction *by the elasticity of the particles of matter*, the two bodies used in the 6th and 10th Experiments, were extremely unfavourable towards obtaining the greatest effect of percussion with a given weight of matter.

74. We have already noticed the 18th and 19th Experiments, and have shewn why they were *not* the best forms of bodies, (though compact in themselves,) to obtain the full effect of percussion by, *when used as pendulous masses*. In Fig. 5, Plate XII, is the representation of a hammer in common use in Hindoostan, for breaking stones and bricks. It is merely a thick iron ring, with a piece of bamboo or other wood passed through it for a handle. We observe that the advantages of this form of hammer have been demonstrated by Doctor MacCulloch, in the 11th volume of the Quarterly Journal of Science and Arts; but, unless the weight of the handle, (with the two forms of masses which Doctor MacCulloch has chosen) *is regulated with the greatest nicety*, so that a line from the point of the surface on which those masses are made to impinge, (passing through the point of impact of either of the impinging bodies,) shall divide the particles of matter composing the *mass and its handle*, in equilibrio, at the point of impact, these bodies will *not* give the greatest force of percussion *with a certain mass*; either when we consider these hammers (*complete*) as moving in right lines, or in a curve of gyration. We will venture to suggest that if the forms of Doctor MacCulloch's hammers, underwent a slight alteration, so as to bring the longest vertical plane in each of the masses rather nearer to the hand, that they would be improved. A section of the body of the hammer, taken in the plane of the line of the handle, would, with this alteration, present the form of an irregular ellipse, in which the transverse axis passes through the centre of oscillation. This is considering the mass of the hammer, as moving in a curve, from the centre of which, (whether at the hand or the shoulder,) the cen-

tre of oscillation, (or rather gyration,) had been computed. But if the hammer is urged forward in a direct line, the transverse axis should be made to pass through the centre of gravity of the *whole mass of the hammer*. These advantages might also be gained with Doctor MacCulloch's hammer, by cutting off rather more of the inner polar surface of the body of the hammer, than of the outer polar surface, so as to make the transverse axis of the true ellipse coincide with the line of equilibrium, which determines the proper point of impact to obtain the greatest force of percussion with a given mass. We have thought it right to explain these circumstances, as immediately connected with the subject under discussion.

75. As the velocities were not great, the resistance of the air could not have been of much consequence, but in the 10th 11th and 12th it must not be forgotten that this resistance *was greater* than in any of the other Experiments: and in the 5th it was rather greater than in the 4th Experiment.

76. We will now, before we conclude, offer a few observations connected with the important subject under discussion.

With regard to Sir William Congreve's 1st proposition, viz: that the propelling or reacting power of a piece of Ordnance may be increased by increasing the quantity of the metal about the charge &c. &c, we presume that we have advanced *sufficient reasons* that this proposition cannot be maintained.

With regard to the 2nd proposition, we agree to it, under *certain limits*, for, as it is well known that *a portion of time is required* for the inflammation of the whole charge of a gun, consequently that powder which will inflame with the greatest rapidity, will require a less

length of bore to insure a certain quantum of inflammation, than powder which inflames with less rapidity. We know however that, in practice, this has a *limit*, and that if the *rapidity of the inflammation of powder was increased beyond a certain degree*, its force would overcome the cohesion of the particles of matter which form the gun and the shot, and would shatter both, instead of propelling the shot as a mass: the action of fulminating powders clearly explains this, and the attempts which were made in the Armies of Buonaparte, to increase the projectile force of gunpowder by a new admixture of ingredients failed, only because the cohesion of the particles of matter forming the gun and shot, gave way to an increase of impulse. We can only therefore allow Sir William Congreve's second Proposition to stand with certain limitations.

77. We need say no more upon the conclusions drawn by Sir William from his Experiments with regard to the "*communication of motion from one mass of matter to another*;" since we trust it will be as evident to our readers, as it is to ourselves, that the Science of Dynamics has been, to say the least of it, *utterly disregarded*.

78. Sir William's opinion that the prejudice in favour of a heavy breech seems constantly to have prevailed, *without any specific reasoning upon the subject*, we believe we may venture to contradict: and we need only appeal here to Captain Thomson's translation of Antoni, as a book in common circulation here and at Woolwich, in which Chapter VI, 'Treatise on Fire-arms', the thickness of the metal is determined from a calculation of *the pressures of the expanding fluid of the powder at different parts of the bore*, according to this theory a conical form regularly commencing from the breech, is not that of

the greatest resistance.* We are not sure that other circumstances, such as that of the advantage of bringing the centre of gravity further back from the trunnions; and in musquets and fowling pieces the advantage of the centres of gravity being nearer the left hand by which the pieces are steadied, have been duly appreciated; these however Sir William himself seems to have overlooked in the novelty of *his Hypothesis*.

79. It is evident that the *carronade pattern*, is the form chosen by Sir William Congreve. In our opinion, the application of trunnions to a long carronade (*these making a carronade gun*) is the extent of his merit; the sights are also judiciously managed, and we certainly prefer his *Carronade Gun*, to any carronade of the same calibre; and we have no doubt that the common forms of carronades, *only cast with trunnions in a line with the axis of the bore*, would be far more serviceable pieces of ordnance than the present ones in use.

80. Now by the Experiments of Doctor Hutton, published in his 3rd volume of Tracts, the *erroneousness of the opinion* that the heaviest guns, *cæteris paribus* give the greater velocities, was proved: also *the portion of the length of the bore*, which ought to be occupied by the charge, to obtain the greatest velocity with a shot from guns of different lengths was determined. And Dr. Hutton has laid down the following proportions for the charges which would give the greatest velocities, viz:

$\frac{3}{10}$ ths	of the length of the bore,	in a gun	15	calibres long,
$\frac{3}{12}$ ths	"	"	ditto	20 "
$\frac{3}{16}$ ths	"	"	ditto	30 "
$\frac{3}{20}$ ths	"	"	ditto	80 "

* We shall treat upon this subject in a future number.

which are quantities, which vary nearly in the reciprocal subduplicate ratio of the length of the bore, before the charge is inserted. But it appears, in the Experiments made at Sutton Heath, that the *same length of charge* was used for both the long and short guns; consequently, if the trial was meant to ascertain the comparative merits of the two guns, the long guns, which, according to Dr. Hutton's theory, required a longer charge, to give their *maxima* of propellent power, than Sir William Congreve's short gun, were tried under a decided disadvantage.

81. Surrounded as Sir William Congreve is by eminent Mathematicians, we feel assured that they cannot have been altogether silent upon the present subject. Distance has precluded us from the advantage of hearing their opinions, but we have resorted to the works of Hutton, Gregory, and Barlow, which the valuable Library of the Bengal Artillery Regiment contains; and we gratefully acknowledge the support which we have derived from them, in discussing the present subject.

82. We will conclude, with our earnest hope, that the incidents of the late war with America, are fresh in the memory of every lover of his Country; and will excite the earnest endeavours of every Briton, to oppose the introduction into the British Navy, of *a nature of gun*, which if it supersedes the use of *long guns*, will infallibly weaken our Naval Force, upon the maintaining the acknowledged superiority of which, the stability of Britain as an independent Kingdom must depend.

83. The Americans in their principal Naval actions with the British, possessed that superiority in the calibres and lengths of their guns, which in many instances *fold* with fatal effect; and we conclude this paper with

an extract from James's "Inquiry into the merits of the *principal Naval Actions between Great Britain and the United States.*"—Describing the action on Lake Champlain, in which the *Confiance*, Captain Downie, was taken by the enemy. Mr. James writes—

"The *Confiance* mounted upon her main deck, twenty seven, what they, (*the Americans,*) are pleased to call '*long guns*'; but which were in fact similar to those the Americans took in the '*Stranger*' transport; and such as we call Congreve's,—A GUN VERY LITTLE BETTER THAN A CARRONADE."

ARTICLE VII.

Native Invalid Establishment—Military Evolutions.

To the Editor of the Military Repository,

SIR,

Having lately met with the second number of your *Military Repository*, permit me to congratulate you upon its getting on so well; the number and respectability of your Subscribers, encourages the hope, that ere long, many who are fully equal to the task, will contribute to a work, which if properly supported, cannot fail to be attended with every advantage to the Army and the State.

The observations of a 'Bengal Adjutant' on our *Native Invalid Establishment*, are excellent, and in perfect unison with the sentiments long since entertained by many of our most experienced Officers; and it is certainly devoutly to be wished, that at no great distance of time, some such measure may be sanctioned by Authority.

In addition to what the 'Adjutant' recommends, may be noticed a plan some time ago touched upon, of employing some of the most intelligent of our worn-out *Native Soldiery*, at the head of the different *Police Establishments*, so widely scattered over India.

It may be said that Government would not willingly force a worn-out Soldier to quit his corps, for either a *Veteran Battalion* or a *Police Thanadership*; and yet those men who are completely worn out, are not asked,

if they will be invalidated. But if the Provincial Corps were to be re-organized in the way recommended by the 'Bengal Adjutant,' and called Veteran Battalions, more than one half of our worn-out soldiers would most cheerfully avail themselves of the offer;—only let it be tried, and we shall have ample occasion, and so would the Government to rejoice at the result.—The Regular Army would benefit beyond all description by such a measure; whilst on the other hand, the present great expense of our Native Invalid Establishment, would gradually fall off to little or nothing.

The solid square (or rather oblong) which has been offered to notice in your second Number, appears to have two defects, First—No clear front can be shewn to the enemy during the movement; consequently he cannot be arrested in his progress by a well directed fire. Secondly—If a single corps was to form such an oblong, well directed Cavalry would wheel, and attack on either flank, where the whole extent of fire to be thrown upon them, is from a sub-division four deep.

The first is to be obviated by forming the oblong on the two Centre Companies, Nos. 3 and 8, file into quarter distance, and wheel up in sections, whilst the remaining Companies file close up in rear of those they are to form upon. The second may be remedied by making a similar Square, and in the same way, by Sub-divisions on the two centre ones, by which means the front of each face will be a company four deep, with two in reserve.

The usual modes of Battalions, Brigades, or larger bodies, throwing themselves into Squares from Line, has been by a *direct Echellon*, which is admirably adapted for retreats in an open country, before a formidable bo-

dy of well appointed Cavalry: but not so when an Army or Detachment is "IN POSITION," where to lose ground would, in many cases, be to lose the day; as will perhaps be clearly seen by the following plan of both movements. I am indebted to a friend for the last of them. See Plate XIII.

Supposing each corps to consist of ten companies, there will be two in each face, with two in reserve, or if deemed prudent, the Flank Companies may be thrown out at the Angles, as they could instantly file into the Squares, and would then form a fifth rank. By wheeling back the two Centre Companies four paces, and filing all the rest in double quick time, the Square is formed in an incredibly short time, and the line is equally soon resumed.

With every wish for the success of your undertaking, I beg to subscribe myself,

Your obedient Servant,
A BENGAL OFFICER.

Note. *Oblong* is certainly the proper name of the 'Formation' of which a Plate is given in our 2nd No., page 270, and we return our sincere thanks to our unknown correspondent for his present communication. It is our earnest desire that the 'Repository' may prove interesting and useful to all branches of the Army. We therefore solicit communications from those alluded to in the first paragraph of this letter; as we can promise no more on our own part, than such a portion of industry, as the kind encouragement which our undertaking has met with, at the three Presidencies, calls upon us to exert.

As our Correspondent has used the word 'squares' in the last paragraph of his letter, we trust therefore that the diagrams are such as he intended, square, not losenge-shaped; we have also represented the lines of fire perpendicular to each front, which is the general practice.

Es.

NOTICES.

The Editor of the British Indian Military Repository requests that all applications for the Work may be made to Mr. Thacker, St. Andrew's Library, Calcutta, who is appointed Agent for the distribution of the Work.

All communications intended for publication in the Work, to be addressed to Captain Parby, Bengal Artillery, Dum Dum.

☞ *At Page 37 of the present No., allusion is made to the substance of a Paper on the subject of "Carrying Ammunition," which was intended to have been the VIIth Article of the present No. It is, however, necessarily omitted, and it will be the IIInd Article of No. IV.*

** * * No. IV, will be published on the 1st of July next.*

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Subscriptions Discontinued.

	Groby,	Captain 18th Regiment.
	McWherter,	Surgeon Calcutta.

Plate 1

Fig. 1

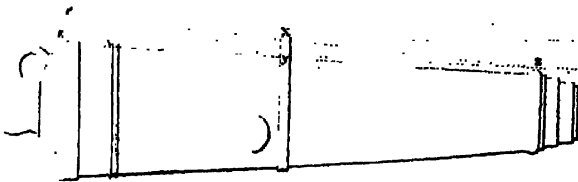


Fig. 2

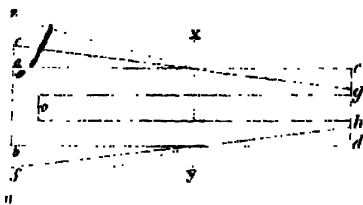


Fig. 3

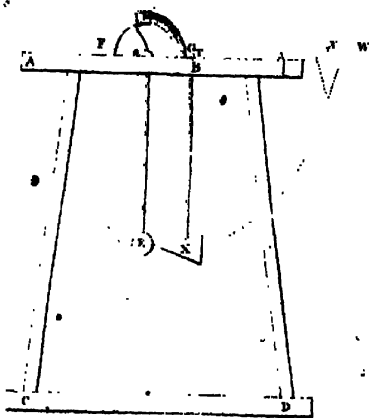
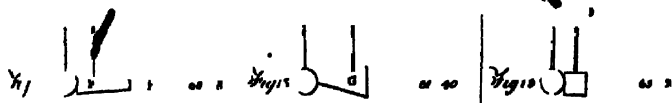
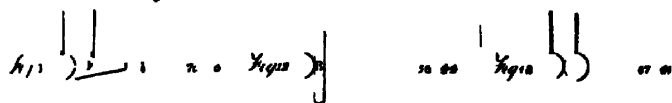
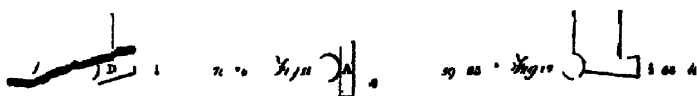
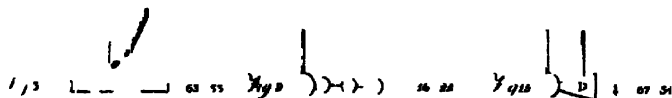


Plate XI

RESULTS OF EXPERIMENTS WITH THE FOLLOWING DIFFERENT DIES TRIPPED BY THE RECEIVING APPARATUS GIVING THE WEIGHT OF COMPRESSIONS WITH EACH BODY



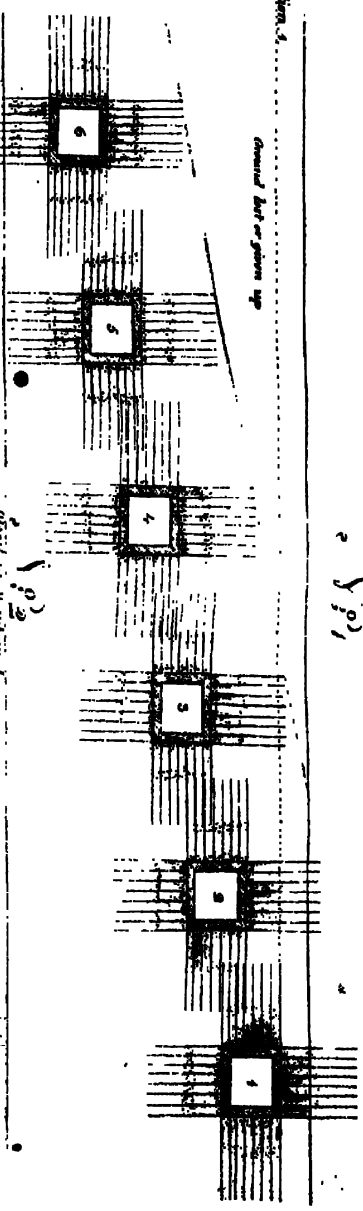
² Implies that the small end of the Instrum was one half the base, and so on

Plaf. XIII

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Position 4

Ground level or ground up



Position 8

Position 10



THE
BRITISH INDIAN
Military Repository.

No. IV.

JULY.

1823.

ARTICLE I.

Memoir of Colonel T. D. Pearse.

(Continued from page 144, Vol. II.)

AFTER the unsuccessful affair of Cuddalore, and the promulgation of the terms of peace with France, Colonel Pearse obtained leave of absence from the Army. The following letter in some degree explains the circumstances attending this application.

To L. Darrell, Esq.

“MY DEAR FRIEND,

“I had the great pleasure to receive your kind letters of the 26th and 31st of January, they came to hand on the 31st July at Chingleput, where I arrived the day before in my way to Madras, being driven away from the army by the *King's Brevets*: for General Stuart had been recalled, Major General Bruce was going away to save his life, and the command would then have devolved upon a Lieutenant Colonel Gordon, *who has a brevet.*”

VOL. II.

B

“ I am quite recovered, that is, my wound, as such is entirely healed ; but I am emaciated and worn down, and am not likely to get better : most likely I shall not ever recover the shock it has given my constitution, but I must bear it out as well as I can.”

It appears from one of Colonel Pearse's letters to his Sister, that his Father's mother was one of the daughters of the celebrated Chancellor Hyde, whose other daughter was married to King James. As this is a curious circumstance in the history of Colonel Pearse's family, we give it a place without any apology to our readers, many of whom have given us the most convincing proofs that they feel the deepest interest in all the anecdotes connected with the subject of the present memoir. The same letter also mentions that the second wife of Col. Pearse's father was a daughter of Best, the brewer, of Rochester ; another of whose daughters says Colonel Pearse, “ was married to Admiral Vernon ; and a third to one Miles or Mills, by which I believe came the Swanton connection.”

To L. Darrell, Esq.

“ MY DEAREST FRIEND,

“ Since my last, General Stuart has been dismissed from the service by the Government here, and is closely confined to prevent a civil war, by his designs to get at the head of the King's troops and to set the Government at defiance. The King's Generals sent in a remonstrance, and declared that they would not obey any body but Stuart, and they would not obey Lang when the Government had promoted him to be a Lieutenant General, in conformity to an order from the Court, which was concealed from us, till it was by necessity published, to convince

the Army of the propriety of the promotion and its legality, to establish the dependance of the King's troops on the Government here, and to enforce obedience to Lang."

"Major General Burgoyne was at this time at the head of the army; Lieutenant Colonel Floyd, of the Light Dragoons, was second in command, as he is a Colonel in India only, and all the other Lieutenant Colonels are so.—This Major General who joined the Army after its return from Cuddalore, after the war was over, and this brevetted Lieutenant Colonel, found the promotion of Lang *so disgraceful* to them, that they *deserted* from camp, to avoid taking the posts he had assigned them in the order of march for the next day."

"I had been banished from camp to avoid the brevets, that is, *I went in to recover from my wound*, and I would not have joined again under Burgoyne, who is any thing but a soldier."

"Report said that the King's troops meant to refuse to obey, and to stand to their arms. I then flew to camp to obey Lang, under any body, but they decamped, and the troops obeyed. I have now therefore joined the army, and at this time command it, Lang being in town.
* * * * I believe that I now stand as high in Lord Macartney's opinion as in Hastings's. When His Lordship arrived, he was hardly civil to me: we disagreed, he was taught by Coote to undervalue me. I have now within these few days heard him say, 'if I had known you as well before you went to Bengal as I do now, it might have prevented much mischief.' This was in a discourse concerning the measures and squabbles with Bengal. I have as far as I could, without disclosing the confidence of either, endeavoured to preserve peace between Hast-

ings and Lord Macartney for the good of the service; being fully convinced that man is not infallible, and that one cannot be all rectitude, the other all baseness, unless absolute depravity is the characteristic of one of the two. Yet I see that peace cannot be preserved, there is somebody who inflames; who it is I know not, nor can I prevent it."

"In regard to the seizure of Stuart, when he wanted to set the King's and Company's troops at variance, Macartney is absolutely right, so I have told Hastings; and so I think he was in dismissing him. If he had not been seized, there would have been a civil war here; if he is supported, there will be one, and the Company will lose the Carnatic."

"What evil spirit could have put it into your heads to agree to supersede all your Officers here so cruelly, by suffering Majors, Lieutenant Colonels, and Colonels to come out in swarms with local brevets? We are men Darrel, as well as they, and we have like feelings; we have capacity, courage, and experience; give them the former, then we are superior to them in the enjoyment of the latter."

"I am, &c.

"Madras, }
26th September, 1783." }

T. D. PEARSE."

To General Pattison.

"MY DEAR FRIEND,

"I wrote you a long letter on the 22nd of March, and sent also a letter to Mrs. Pattison. We were preparing to go and attack Cuddalore: we went, and did not take the place, and we were saved from being cut to pieces

by the news of the peace*. Any body but Stuart would have taken the place, but he was fifty days going one hundred miles."

"The secret history is this, he knew that he was not capable of undertaking the siege, and he threw every possible obstacle in the way. Coote was daily expected; he wanted Coote to come and take the responsibility, whilst he with pretended zeal should be dragged about in his cart,† to make observations, and find out faults. The Government here at last made him put the army in motion, by telling him that they would recall him, make Pearse's a Brigadier, and send the army under his command.—I had really presented a plan for the expedition before this, giving my opinion upon what ought to be done: I gave it afterwards *visû voce* before the Council. Stuart however moved to save his command, and to *mar* it moved as above. At the time we set off the French had hardly any provisions, and they had no works on the outside of the fortifications. When they heard that we were in motion, they collected what they could, and erected redoubts to defend the river. They got supplies before we reached them. Three redoubts were thrown up north of the town; we marched to the south side, where there was not either redoubt or river, but instead of taking possession of the bound hedge on the day on which we arrived, we remained seven days without any signs of life or motion. In the mean time the French threw up redoubts all along

* News of a treaty of peace having been concluded in Europe between the French and English.

† A small garden chair which General Stuart used after the loss of his leg.

the south side, one more would have made *the lines of Philipsburg!* Somebody who had eyes at last persuaded Stuart that another day would put it absolutely out of our power to attack, and oblige us to draw off to prevent our being annoyed by the guns of the enemy's advanced trenches. The attack was then resolved upon: the piquets of the army were strengthened by all the army that was in camp, except the Hanoverians and three companies of sepoy. I was ill in bed, but hearing what was going on, I reported myself well, and mounted my horse. Stuart posted me to the reserve, (as he called the troops last mentioned), *under Lieutenant Colonel Gordon*. This is what Stuart calls attacking with the piquets and grenadiers."

"The attack on the left succeeded without the loss of a man, and the troops got possession of about half a mile of the enemy's works, and of the posts which flanked them. Instead of pushing down *en reverse*, there they stopped by order; then we attacked what part of the enemy's works remained in our front, and we were beaten off with infamous, because unnecessary carnage."

"In my letter of July, I said the sepoy did *all*; now I am to describe it. The grenadiers attacked a post and were beaten off with great carnage; they retreated, rallied, and got ready for another attack. Stuart ordered the reserve, that is the Hanoverians, to attack a post in front, the grenadiers to do so on the left, and the King's 101st and the 25th Bengal regiment to do so on the right of the same post. The grenadiers either mistook the signal, or were delayed, for they did not move; the Hanoverians reached the foot of the works, I was with them, and not thirty yards from the top of the parapet;

the 101st on the right, ran away and left the sepoy who retreated in good order: this created confusion in the Hanoverians; I was wounded at this time, and I did not know that the 101st had disgraced us so much till afterwards. How could they do better? Jails emptied had furnished the men! the half pay list gave a Major from the Cavalry, who had lain by since the last war, and who, when he joined, declared to the Lieutenant Colonel, that he was totally unable to assist him, being entirely ignorant of Infantry discipline: however he is a Major General. The senior Captain was about 20 years old! the second Captain only 18! The Lieutenant Colonel was taken away to command in the line, under his brevet of Colonel in India. The Major, was a Major General as I before said, and *he was left near Madras to command sick quarters!* As soon as the men were embodied they embarked for India, and so made a King's regiment to instruct the Company's Officers in their duty. Six hundred and eighteen Europeans were killed and wounded in this attack;* all did not die, (for I am alive and some others,) but there were more killed than the number who survived their wounds. The French pursued the Hanoverians, and fought in the plains; *they could not overtake the 101st!* The three companies of sepoy under Lieutenant Diss, seeing the redoubt empty, marched round after they rallied, (for they had been defeated), and took possession of it. The French then moved off to try to recover it. The European grenadiers came up also, they had again attacked a post which resisted most furiously, they had to support them, the 13th

* Mr. Mills states the number of Officers killed or mortally wounded on the field in this affair, to be sixty-two, and 920 men, almost all Europeans.

Bengal regiment, and a Carnatic battalion. These sepoys were on the right, and seeing two bodies of Frenchmen coming down, they formed to receive them. The grenadiers, overcome with heat, fatigue, want of water, and the enemy's fire, gave way again, and took shelter behind the sepoys, *who covered them and moved back in perfect order!* The right did not do any thing for want of orders! On the 25th of June the enemy made a sally in three columns; they fell upon the 24th Bengal regiment, the 24th repulsed the French with their bayonets, and took prisoner the Colonel who commanded the attack. The grenadiers were behind the 24th, they made a retrograde motion, *said to be to make room:* it may be so, but it was an odd way to repel an enemy who had come round to the rear of the trenches. Whilst a part attacked in front, a firing ensued from the rear, and the poor sepoys were forced to lie down for a time: however they repelled the French, and preserved possession of the trenches."

"When Suffrein returned from fighting Hughes, he proposed landing all his men, and if he had done so, it would have gone hard with us. News of the peace came just in time to save us."

"Sir John Burgoyne was not at the siege, but he got well enough to join the army the day it reached Torrarum, which is one short march from the Mount. There he took the command, and he made the whole discontented with their fate. After toiling to defeat the enemies of their country, whenever they could find them, they were now doomed to be teased to death with *Coxheathism, to learn how to run through a puddle to attack pig-sties.* Lieutenant Colonel Floyd, a Colonel in India, joined also with the Light Dragoons; I was in

Madras, to get well of my wound, *though certainly it should never have been well enough for me to have gone and joined to attack hogs!* * * * *

General Stuart at last met his deserts. The Government have dismissed him from the Company's service;—grown desperate, he declared that he would continue to command the King's troops, and he attempted to set himself at their head, but the Government seeing that blood must be spilt if he was not stopped in his proceedings, wisely prevented the evil by seizing his person."

"The Company had ordered that an Officer of their own should always command in chief. Lang, (who together with myself have, and others elsewhere had been superseded by illegal local brevets,) was accordingly made a Lieutenant General. The King's Generals declared that they would not obey him—the troops talked of resistance—I flew out to camp to put myself under Lang. Lang ordered the army to march, immediately after an order had appeared from the Government explaining the reasons, and the legality of their act, and requiring all Officers of inferior rank to Lieutenant General Lang to obey him."

"The King's troops withdrew their orderlies from the Adjutant General's Office—the Brigade Major refused to go for orders—the Officers said the troops should not move. Sir John Burgoyne sent a letter to Lang to desire that he would postpone the march *until he had time to consider.* Lang refused to comply, and Sir John Burgoyne and Colonel Floyd left the camp without leave at midnight. Major McKenzie, a local Lieutenant Colonel, went to Lang afterwards and said that he was ready with His Majesty's troops to obey his orders, accordingly the army marched. Thus Sir John Burgoyne, who

never yet saw an enemy, and Colonel Floyd, (who till he got a local brevet was below me,) deserted from camp to avoid serving under a Company's Lieutenant General. Since it is so great a disgrace to them, we, who before had been tolerably passive, cannot after this any longer submit to the indignity of acting under local brevets. I have therefore written a narrative of my services, and sent it to the Board, and I have asked in plain terms for superior rank. And I have written to my Attornies in England to get it, if money can buy interest, or friends will give it without the money. Your interest I have always had gratis, thanks are the least of all possible returns, and yet they are not always paid so punctually as they ought to be. I do not however fear being charged with not having endeavoured to shew my inclination to pay my debt; but paid it never can be whilst I live; therefore like a desperate bankrupt I will run as deeply into debt as I can, and I beg for what interest you may have in our line, to get me superior rank. I want the command in chief in Bengal,—I dare not say more,—but I will take it if I can get it, and I am certain I could not do worse than my predecessors, so probably I might do better."

" I am, my dear Friend,

&c. &c. &c.

(Signed) T. D. PEARSE."

" *Madras,*)
27th September, 1783.")

The following narrative of Colonel Pearse's services is the one adverted to in the above letter.

*To the Hon'ble Warren Hastings, Esq. Governor General,
and Supreme Council.*

"HONORABLE SIR AND SIRS,

"Permit me to lay before you two orders, issued here two days ago; and in consequence of them to crave your attention to a statement of my own case, and your benevolence and aid to relieve me from the burthens I labour under. I had the honour to address you on this subject some time ago, and as I have not had the happiness to receive an answer, I dare to flatter myself that the subject, if not before you, is not finally closed; and even if it then was, I will venture to hope it may be revived, and that the vigorous measures taken by this subordinate Presidency, to extricate itself from the difficulties occasioned by the deluge of Brevets, given by the King, and to relieve their Officers from the consequent disgraceful and humiliating situation, will induce you to think more favorably of my prayer and petition, than any merit in myself might urge me to hope you would do, from that consideration only."

"I marched with my detachment in 1781, and in August joined Sir Eyre Coote. I found Generals Monro and Stuart of the Company's, and Colonels Lord McLeod and Crawford of the King's, with the army; the two Generals commanded the lines, Crawford the European brigade, and I was posted to the third. On the 27th August we fought Hyder at Pollyloor. In the beginning of the action I was detached from the left of the first line with a force, to reinforce a post occupied by Lieutenant Colonel Owen. As we went along General Stuart joined us; we went under his command to the place, and within five minutes after our arrival, he lost

his leg; the command of the left then devolved upon me. Positive orders to support that post at all events, prevented my advancing on Hyder's right, where he commanded in person, as might have been done before one o'clock. The forces I had, independent of those of the post itself, I interposed between Hyder's army and the post; about 5 o'clock Sir Eyre came up, and finding the post less consequential than he had supposed it, he gave permission for us to advance from where I was. We did so, and slept on the very ground that Hyder had occupied. Thus, though in the beginning of that day I had three Officers above me, I had the chief command of half of the army the greatest part of the day, and led the line to victory."

"General Monro quitted the army; General Stuart was wounded; Colonel McLeod was sick, therefore I became the second in command under the Commander in Chief, or the third Officer of the army. Colonel Crawford commanded the first line, and myself the second at Sholingur. I did not get any orders from the Commander in Chief that I could possibly obey; therefore acted, during that whole action, from myself. You have the orders of the Commander in Chief on that subject; this was in the month of September 1781."

"In November we went to Vellore, relieved it, and took out Colonel Lang, by which I lost the command of the second line, and had not any command till we reached cantonments, then I was posted at the Mount, which covered the whole."

"Colonel Crawford quitted the army to go to Europe; and Colonel Lang, in disgust at being superseded by Colonel Horne, in December; by which I became second in command. As such I marched the army from

Madras to Pondamallee on the 2nd January, 1782; then Sir Eyre Coote joined, and we went to Trippasore; on the 5th Sir Eyre was taken with a fit and was supposed dead. News was sent off in secret to Madras, in consequence of which Colonel Lang offered his services, and was suffered to return; even Sir Eyre Coote was not pleased with it, but as he had arrived in camp, and was my senior, he was posted to the first line, myself to the 2nd."

"We proceeded to Vellore, and relieved it. On our way Hyder attacked our rear; the baggage and convoy were cut off from the army by a swamp; fortune had placed me in the rear, when, without orders, I took post with three battalions of sepoy and the rear guard, till all was safe across. It was my felicity to stop Hyder a second time that very day in his attempt to get round through another road, to which Sir Eyre had sent me with a force for that purpose.—You have Sir Eyre Coote's letters on that subject before you, and now the fact also. We had another attack in our way back, and a day of manœuvres in the presence of the enemy. I still commanded the 2nd line, and it was my happiness to direct those manœuvres."

"From what I have related concerning myself you will learn, that under Sir Eyre Coote I never was lower than fourth Officer; and, within a month after my junction, was second. That in two general actions, two attacks, and one day of manœuvres, I commanded a wing of the army, and Sir Eyre Coote has declared, that I did it to his satisfaction. After my return from Bengal, I was second in command, and declared so in orders. An Hanoverian Officer, who had a Brevet of Colonel, was ordered by General Stuart to join us; he commanded

the right wing in the expedition to demolish Wandewash and Carrangolly—was recalled when we returned, and I went under General Stuart to the relief of Vellore. It is well known there was only a little rocketing on either expedition; but it shews that all this time I was second in command, and Lieutenant Colonels Stuart and Gordon of the King's, were serving under me."

"In April we marched for Cuddalore. The day before we marched, the Brevets arrived; and from second in command I became fourth, by being pushed down by two Lieutenant Colonels out of eleven, who had been brevetted over me. Since that, five Colonels, Lieutenant Colonels or Majors, having Major General's rank *in India only*, and a string of Lieutenant Colonels and Majors, having rank as Colonels *in India only*, have come above me."

"I doubt the legality of local Brevets, under the Act which limits our rank to that we hold with King's Officers; but I am convinced of the injury I receive by being commanded by Lieutenant Colonels and Majors, whereas by the Articles of War, I ought not to be commanded by any but Colonels or their superiors."

"The Government here finding the inconvenience of this state of double commissions, have at last been forced to remove General Stuart; and acting under the authority of that order of the Court of Directors which directed that Brevets should be given to keep the command in the hands of their own Officers, they have at once promoted Colonel Lang to be a Lieutenant General."

"Agreeably to a clause in the Act of Parliament, all orders sent to India, are laid before the Secretary of State; therefore, the order alluded to, is an order ap-

proved by His Majesty's Ministers; consequently, the power to give Brevets was known, and thought to be a proper one, by the superiors of those whose rank so grievously oppresses the Company's Officers, and most so myself, who, having served through the whole war with credit to myself and my employers, am pushed down from the object of every soldier's wishes, and so disgraced, instead of meeting the reward which I have laboured to merit. But this is not the full measure of my grievance, I am about to suffer another of a different nature, as I shall now state."

"In 1768 I came out a Major to Bengal—Horne, a Captain of Artillery, to Madras; to which rank he was restored, having gone home in consequence of having been deprived of his commission. I was made a Lieutenant Colonel in 1769—Horne, a Major in 1771. After that, he obtained the Brevet rank of Lieutenant Colonel, and went home again; there he obtained a removal to the Infantry, with orders to rank above Colonel Lang. On his arrival he was appointed accordingly, with rank of Colonel from the 11th October, 1772, but if he had remained in the Artillery, he would only have been a Lieutenant Colonel from 1782; and if a Colonel from his arrival, then he would have ranked from the same year, or if he had come on direct in the fleet that was captured, from some time in 1781, consequently, in either case he must have been below me."

"Orders have since arrived, restoring Lang to his rank above Horne; if that had been expressed by taking away the extra rank, given solely to put him above Lang, I must have been above him: but the order remains in force, and so he ranks as Colonel, from a period before he was even a Lieutenant Colonel, by brevet;

and, when he arrives, will expect to command me, nor can I help myself, or avoid it, unless you take pity on my case."

"From all that I have written, it appears, that though I have served with credit during the war, I have been continually thrust down by brevetted Officers, who have not served at all, or not till near the close of it; and now I am about to be pushed still lower, by an accidental arrangement concerning the ranks of Horne and Lang, which has been overturned by subsequent orders from home, though the order given in consequence of the arrangement remains in force."

"That the falling lower by the promotion of juniors is deemed intolerable in the King's service, may be gathered from the conduct of McLeod and Humberston, on the Malabar Coast, who retired from the army *whilst on service*, because Mathews was promoted to a Brigadier General, which prevented his being superseded by the brevets of those Lieutenant Colonels at that time expected, but which had not been received; and by the conduct of Major General Burgoyne and Lieutenant Colonel Floyd, (*a Colonel by Brevet in India only*) who have now quitted the army in consequence of Colonel Lang's promotion to Lieutenant General."

"Our feelings, as Company's Officers, are precisely the same; I can at least answer for mine, though I submitted for the sake of continuing to do my duty in my station; but now, stung by the examples or precedents just exhibited, I feel more than ever, the indignity of the supersession by local rank."

"I therefore pray you to grant to me superior rank, to support the dignity of the Company's service, and to

relieve me from a burthen which King's Officers deem intolerable."

" I am,

&c. &c. &c.

" Madras, } (Signed) T. D. PEARSE."
17th September, 1783." }

" P. S. Since I sent off the original, I have learnt that the order, giving power to appoint Company's Officers by brevet, above the King's, was assigned as the cause of Lieutenant Colonel Crawford's going home; who, though only a Colonel by local brevet, could not bear to submit to the thoughts of *future supercession*, as he termed it."

It is probable that the termination of hostilities, and the return of the Bengal detachment, were the only reasons for non-compliance with Colonel Pearse's solicitation for superior rank, as his claims upon the Government were of no ordinary nature, and the boon which he so earnestly entreated, it would have been but an act of justice to have bestowed upon him.

The mind of Colonel Pearse was not, however, to be altogether borne down by any supposed or real grievances or disappointments; and the following letter, written about this time, shews that the interests of science were not forgotten.

To the Secretary of the Royal Society.

" SIR,

" The small book that accompanies this letter, written in the Persian language, is a copy of a very large one in the same language, entitled 'The Wonders of the Creation.' It is in fact a kind of general natural his-

tory, extracted by the compiler, from books of science, and from voyages and travels performed by the Arabians; who, it is well known, had not only a great foreign trade, but extensive settlements in the Islands of the East Indies, where their manners and religion do still prevail. I beg of you to present it to the Society in my name."

"The book opens with an account of the wonders of the heavens and the celestial spheres. The system is the Ptolemaic: to each planet, except Mars and Jupiter, figures are annexed, and blank spaces were left in the book, to be used for the figures of those planets. You will see that the sun and moon are drawn as among us—Mercury is represented as in the act of writing with paper and pen in his hand, and the ink-pot before him—Venus is a woman sitting down and playing upon a stringed instrument resembling an Irish harp, but that which occasions this letter, is the figure of Saturn. By inquiry amongst the learned of these parts, Mars ought to be represented as a warrior, and Jupiter as an old man sitting down, with four girls dancing round him. The book says something contrary to this: I never saw the figure, therefore simply relate what was told to me."

"The book was written in the fifth or sixth century of the Hegira, and that which I borrowed, and from which my copy was taken, is in the possession of Mr. Palk, in which the figures are all paintings; but the age of that copy I cannot tell."

"It is now time to tell you why I trouble you with this book: though I must first inform you, that I had it copied solely for the sake of the figure of Saturn, and had begun to translate the part that treated of celestial bodies, to send home with a copy of the original to the illustrious

Society about four years ago, but the difficulty of getting the figures drawn, prevented my carrying my design into execution: however, in the year 1780, having got what I wanted, I sat down to do my part. The war with Hyder Alli, however, carried me from home into the Carnatic, and though I have had the part that was intended for the Society with me all the time, yet I really have not had time to translate it, except the small part that ascertains the age of the book and the account of Saturn, in which however there is not any mention of the satellites or ring; and the account of his periodical time is erroneous, and plainly relates to the seventh planet, *the period of which is about sixty years, and which is very seldom seen, and when seen, deemed ominous to the world in general*: so says the learned Brahmin with whom I conversed. The instant I saw the figure, it struck me as emblematical of Saturn, and as representing him possessed of what, till very lately, we were utterly ignorant of, I mean his satellites and ring. Hitherto only five satellites have been seen by Europeans; he is here represented as having six, and their names, I presume, are expressed by the figures held in the hands; the arms shew that these bodies are moveable, but cannot separate from the planet, and are capable of various motions within certain distances; the seventh holds the crown divided into four parts, and this I suppose to mean the four concentrical parts of the ring; the darkness under the arm which holds the ring denotes that the ring does not every where touch the body, and that there is a passage between it and the body of the planet; the legs folded beneath the body, I imagine to relate to the ring, and to intimate that the ring supports the body of the planet, or, at least, that the body appears to rest up-

on or within it. I conceive that the long beard and emaciated body, denote age, and represent the slowness of his motion."

"If it be urged that this explanation cannot be just, for the ancients had not instruments capable of shewing them, I answer, it is more than we can prove; and if ever a sixth satellite be discovered, it will be a strong argument in favour of the contrary opinion. I am much inclined to believe they had better instruments than we have. I must in this letter aim at brevity, therefore shall only say, that Alhazan wrote on colours and catoptricks, and the problem for finding the figures of objects reflected from a convex specula, is called Alhazan's to this day. I have not seen Alhazan; if I could get it, I could with the assistance this country would afford me, come at the knowledge of its contents, and perhaps might find telescopes; but if not, it does not seem any argument against there having been such instruments: for we know how easily manuscripts are lost, and of such books as those which treat of subjects in which only the learned in particular sciences are concerned, the number of copies will have been few: even now when such numbers of copies of most books are published, do we not find that many are lost, or only to be found in very extensive libraries? much more easily than might the same thing happen before, when only manuscripts were in use, and when we reflect how few men in any country make use of telescopes, quadrants, and such instruments, we may easily conceive that the copies of books treating of such matters would be very few, compared with astronomical tables, which were in greater use on account of their utility in astrology: but these are scarce, and it is difficult for Europeans to get them."

“ I shall now adduce something like a proof of there having been telescopes, though perhaps not like our’s. First, then, I asked a learned Mussulman with whom I had frequent conversations on those subjects, whether they had any mention of such instruments as we now use; he said ‘ he did not recollect that there were any, except Alhazan among the Arabs, who had ever, that he knew, written on such subjects; nor do I know,’ added he, ‘ that he did describe such instruments, but he treats of the principles on which they depend.’”

“ I must here observe, that since Alhazan wrote on colours and reflections, if not on refractions through prisms and lenses;* the not finding of any uses to which the specula were applied, will certainly not prove that there were not telescopes.”

“ Let us suppose a treatise on reflection and refraction, and of the places of figures formed by either to be written purely scientifically, without any mention of telescopes, or any application of the uses of the theorems; that by some accidents, possibly from the revolutions of time, all other books in which telescopes and their uses are described, and all telescopes had perished; if such a treatise were then to be found in any remote period, the finder would not easily discover the use of those theorems, and still less the instruments formed upon the principles therein delivered.”

“ Alhazan delivered principles—artists might possess the application, perhaps not even committed to writing, but learnt as trades are now learnt, by working and practice.”

* Alhazan distinctly describes the power of magnifying glasses in his works. See Art. Alhazan, Rees’s Cyclopaedia.

“ A Brahmin, with whom I discoursed, and asked how they made their tables, said that they were formed a long while ago, by means of great pits dug in the earth, in which the celestial bodies were made visible, but what means they used to see them he did not know; he said he could only use their tables, but could not form them—that the sun had formerly delivered the tables to a learned Brahmin, who had continued above sixty years constantly adoring him, as a reward for his labours. This Brahmin agreed that what he said was allegorical, and simply meant that they were formed by a series of observations diligently made: but so little could I make of them from their discourses, that instead of gaining light, I seemed rather to lose them. And though the Mussulman thought of Alhazan as I do, and moreover told me that the observation of the transit of Venus made by our Horrox,* which I reduced to the Hcgira, was not the first, for that mention is made of one a long period before that in an Arabic book, (he quoted the name of it, which I have forgotten, but I have the name in Bengal amongst my papers,) yet the want of actual knowledge of the use of telescopes, threw all into doubt. However one day as I was reading an English translation of the ‘Arabian Nights,’ I met with mention of these things as common as apples and carpets. Three princes went to seek for curiosities, and the Fairy Purree Bannoo, furnished each under different shapes with what he wanted: to one she gave a small carpet, for an immense price, not from its curious texture, but from its property of transporting him who sat on it to the

* Jeremiah Horrox, born at Toxteth, near Liverpool, 1610. He was the first European, who ever predicted and observed the transit of Venus. Ed.

place to which he wished to go ; to the second an apple that would cure disorders by being laid on the sick person ; and for the same price she sold to the third, a telescope that was endowed with the property of shewing to him that looked through it what he wished to see if he looked through one end, and objects as usual if he looked through the other : and it is described as a small tube of ivory, having a glass at each end. If then that book was written before telescopes were in use in Europe, and that is ascertainable, then telescopes were things in common use before we had any idea of them ; and though they are not described as being such as Dolland has since made, they were telescopes : and amongst those who even now mention telescopes occasionally, how few will describe those exquisite ones applied to astronomical observations ! That useful inventions perish in time, have we not instances enough ? the mummies suffice. Even in our own days have we not seen Dolland perfect telescopes by the addition of three object glasses ? and are we not in danger of losing them again from the want of the materials to make one of the kinds of glass used by him ? Gunpowder is also thought to be, as I may call it, compared with great antiquity, a modern invention ; and yet in ' Gray's Gunnery,' there is a quotation from a Greek author, that gives reason enough to suppose it was applied to guns even in the time of Alexander."

" Much more I could add on the subject, and had written when in Bengal to send to you, but in my present situation I can only add, that the loss of any science is not a proof that it never was known, and all I purpose is to present the figure of Saturn as I found it, and to give you my reasons for explaining the em-

blem as I have done, which yet remains to be made out by some future discovery of the sixth satellite, the existence of which is not thought to be totally chimerical."

"I shall not scruple to inform you of things which may seem wonderful, which come within my own knowledge. I have the prediction of three comets and an earthquake, which I received long before the events: the earthquake did actually happen, and devastated the extensive regions round Lahore—unfortunately that paper is in Bengal—Mr. Hastings has a copy of it, signed by me, with the day marked upon the paper, to shew when I received it, which was in June, and I think the earthquake happened in September, or the latter end of August 1779 or 1780."

"But I send to you the copies of the other two predictions, one of which was fully verified at Bath, though being on my march, I had not time to look out for it, as I certainly should have done had I been settled."

"The Brahmin has promised me a table of 108 comets, and when I return to Bengal, if he is living, I will endeavour to get them; he says they are of different kinds: some have straight tails, some crooked tails, and some fan tails—some are encircled with a burr, and some without any—again, some are retrograde, some direct, and others cross the heavens. I hardly dare tell you that the book was, as he says, written in the jugg preceding this, and that this began with what we call the Creation."

"When we arrive at some knowledge of the Shanscrit, we may make discoveries of some importance, and either verify the assertions or contradict them. I relate what was told to me; I do not pretend to vouch for any thing, but that the man had not any interest in deceiving me. I asked for information after the manner of a disciple,

proposed questions arising from the discourse, and making comparison of what he said with our system for further information. He replied, you and the Mussulmans differ from each other and from us: the Mussulman supposes the sun to go round the earth, daily and annually; but the earth turns round its axis daily, according to your system and our's—the Mussulmans follow Ptolemy, we the ancient books, and you a system of your own, if not derived from our's."

"Here I must put an end to a letter, which I fear, will prove tedious, more especially as it concerns matters which militate with systems that men do not wish to shake, and which I relate merely to shew some part of the belief of some of the men of science of the Hindoo tribe, who are not very communicative."

"I am, &c.

(Signed) T. D. PEARSE."

"*Madras,*
22d September, 1783." }

The following is a translation of part of the Book that accompanied the preceding letter.—

"The Section concerning the properties of the Sun.

"As the Sun is the largest of all the celestial bodies, and is called the great luminary, so the astronomers call it the king of the stars—the Moon, the vizier; Mercury, the secretary; Mars, the commander in chief; Jupiter, the judge; Saturn, the treasurer; Venus, the musician servant—the spheres, they call climates; the zodiacal signs, cities; degrees, towns; minutes, parishes; and seconds, houses: and this comparison is a good one, and through the wonderful goodness of the Almighty, it is placed in the fourth sphere, to the end that the productions of value may be preserved in a moderate tempera-

ture. For, if it had been placed in the sphere of the fixed stars, the elements would have been far removed, and the products would have suffered from the excess of cold; and had it been in the first sphere, they would have been burnt up by the violence of its heat. And it is another mark of his kindness, that the sun was endowed with locomotion: for if it had stood still, the heat would have been intense in one place, and the cold in another, the detriment of which is well known. But it moves over all parts in one day and night, that every part may enjoy a portion of its rays, and in the space of a year, it inclines two ways, once towards the north, and once towards the south, to the end that both extremes may be benefited by it: then praised be the name of God, for He is great!"

"The body of the sun is one hundred and sixty-six times greater than the body of the earth: and the diameter of the body of the sun is forty one thousand nine hundred and ninety-six miles. It remains in each sign thirty days and a part of a day, according to estimation, and daily moves through a degree."

"One of the powers of the sun is, that it makes all the other stars vanish; gives light to the moon; and of the properties of the moon that have been mentioned, all are derived from the influence of the sun."

"Another of its powers is, that when it shines on the seas, and the heat operates on them, vapours arise from them; and these vapours when they reach the air are condensed by the coldness of it and form clouds: the wind transports these clouds to distant places, and produces rain, and so the dead earth becomes animated, and rivers and springs flow to enliven vegetables and animals till the next year, according to the word of God."

“ And it is that God who sends from between the hands of his mercy, the winds to declare glad tidings; that, ‘when the clouds collect the rain, we* will drive them to the dead places, and bring down rain from them, and from that water will be produced all kinds of fruits.’ ”

“ Its power over minerals is, that the juices are collected within the earth, and when the sun acts on the drops of rain and the earthy particles, it produces the bodies of the metals, such as gold, silver, copper, tin, iron—and also rubies, emeralds, and other stones—and quicksilver, sulphur, arsenic, salt, and the like, and the benefit of these mineral bodies, is well known. And another power of the sun over the earth is, that vegetables and corn and trees grow in such places as the light of the sun can reach them. And it is owing to the power of the sun, that the water lilies and mezereon appear above the water: according as the sun rises, their stalks rise, and the leaves keep upright; and when the sun has reached the meridian, then it is, that they also are in most perfection; and as the sun declines from the meridian, these also begin to fade; and when the sun sets, they close till the next day. And the power of the sun over animals is, that when the morning light begins to appear, they also begin to move, to look about, and become lively; and when the sun is highest, they also do these things most perfectly till the decline; and as the sun falls, their strength abates, and they become as it were weak, till the sun sets, when they retire to their places of rest, cease to move, and are as it were, dead till the sun rises again.”

“ And another power of the sun is, that in those places where the sun reaches the zenith, as in the countries of

* The Arabs make God speak in the first person plural always.

the Zungas and Abyssinians, the inhabitants are parched and black, their countenances are ugly, their bodies are dry, and their dispositions are like those of wild beasts; and those people who live where the sun is far from the zenith, such as ———— and ————, have flat faces, are white in colour, and their dispositions are like those of domestic cattle.”

“Barahrat tells us that the vertex of the sun remains three thousand years in every sign, and moves round the sphere of the heavens in thirty-six thousand years, and at this time, which is the eighth and fiftieth and six hundredth of the Hegira, it (the vertex) is in Gemini, and that is towards the north; and when the vertex reaches the sign Sagittarius, which is in the south, the regions of the north will become waste and deserted, and the southern quarter which now is waste, will be inhabited, and the parts that now are seas will become dry land, and the dry land that now is, will become sea, and the north will be the south, and the south the north.”

Here Colonel Pearse remarks as follows,

“In this passage the change of obliquity* is as clearly mentioned as words can express it, and yet this circumstance also was unknown till lately, and even now is doubted by some, who do not diligently explore the depths of astronomy. I shall shortly trouble the Society with a paper on this subject: time will not admit of it now.”

“*Section concerning the Eclipses of the Sun.*”

“The cause of eclipses is, that the body of the moon is interposed between the sun, and our point of view, and the body of the moon hides the sun from us, and the rays of light which proceed from the sun, and extend to the

*The precession of the Equinoxes. Ed.

body viewed, form a cone; the apex of which lies at the point of view, and the base of it at the body viewed."

"If then the moon have not any distance in latitude from the sphere of the ecliptic, the whole body of the moon will fall into the cone, and the whole body of the sun will be taken in. But if the moon have some latitude, then the cone is turned aside from the sun, and according to the degree of latitude some part only falls into it."*

"Division the fifth:—of the Sphere of Mars."

"It has two surfaces, the superior surface is turned towards the sphere of Jupiter, and the inferior one towards the sphere of the sun; and the motion which belongs to it, is from the west to the east, and in one year, two months and twenty-two days it is completed; and the figure of its sphere is like that of the sphere of the moon or Venus, and therefore it is unnecessary to repeat it. The thickness of the sphere of Mars, according to the opinion of Ptolemy, that is to say, the distance between the upper surface and the under one, is twenty thousand and three hundred miles; and the diameter of the body of the sphere is seventy and six thousand and nine hundred and twenty miles."

"Section concerning the properties of Mars."

"Astrologers call Mars the lesser evil, because the malign influence of Mars is less than Saturn. Violence,

* In the margin, taken from another copy, "And when the sun is totally eclipsed, the duration is not long; because when the base of the cone is equal to that of the body of the moon, it is instantly turned aside, and the light appears, but the eclipse varies according to the change of position of the spectator, on account of the change of sight; and in some places there will not be any eclipse at all, and this is the figure of it."

conquest, and rapine are attributed to him. The body of Mars is equal to one half of the earth nearly, and the diameter is nine thousand eight hundred and thirty-five miles. And at the time it is direct, it remains forty days in each sign, and moves through forty minutes nearly in each day."

"Division the sixth:—concerning the Sphere of Jupiter."

"It has also two surfaces, the upper one touches the sphere of Saturn, and the lower one that of Mars; and the motion that belongs to it is from the west to the east, and in eleven years, two months and fifteen days, it is completed. And the thickness of the sphere, that is, the distance between the upper and lower surfaces, is twenty thousand three hundred and thirty-two miles."

"Of the properties of Jupiter."

"The astrologers call him the great good, because he brings good, and they attribute to him great charity and felicity; and his body is equal to eighty-four times and one third and one quarter of the earth."

"Division the seventh:—of the Sphere of Saturn."

"It also has two surfaces, the upper one touches the sphere of the fixed stars, and the lower one that of Jupiter, and the motion that belongs to it, is from the west to the east, and in sixty-nine years and five months and six days it is completed; and Ptolemy says, that the thickness of the sphere is 21,603 miles, and this is the figure."

"The properties of Saturn."

"Astrologers call him the greater evil, because in malignity he is greater than Mars, and they say that from him proceed destruction, and murder, and sorrow, and great grief, and all its accompaniments: God preserve us from him! And the body of Saturn is one and eighty

and one-sixth times greater than the earth; and they say that the beholding of Saturn produces grief, in the same manner as the sight of Venus does joy. God knows best!"

"Prediction of two comets, extracted from a small Almanack, into which I copied them from Mr. Hastings' Almanack before I left Calcutta, which was before January, 1781."

"First—10th January, 1781. One ghurree before day a comet will appear in the form of a flag, i. e. square; it will be seen fifteen days: it is of the kind called dwudge, or flag; its period is eighteen years: this will appear a little to the north of the sun."

"Second—March 1781. On the 5th of this month another comet will appear of the kind called vuckcr, or crooked, from the shape of its tail: it will appear six ghurrees before sun rise near the planet Saturn, and south of it. On the 25th it will appear in the evening; its period is 22 years."

We cannot pass this interesting communication without offering some reflections upon the subjects it embraces.

The circumstance of the four girls dancing round the figure of Jupiter, as they ought to be according to the Brahmin's statement to Colonel Pearse, is a strong argument in favour of the superior knowledge of the heavenly bodies which the ancient Arabians and Hindoos possessed. The four dancing girls evidently represent the four satellites of Jupiter.

These *circunjovial* satellites (as they are styled by modern astronomers from the quickness of their motions in their orbits) were not known in Europe before the year 1609, and the third and fourth only are visible, and

this but rarely and in the clearest atmosphere to the naked eye.

But it is truly interesting and curious that the figure of Saturn should be represented with seven arms. At the time Colonel Pearse wrote his letter to the Royal Society, the sixth satellite of Saturn had not been discovered: it was first discovered by Herschel on the 29th of August 1789; and the seventh satellite, which the seventh arm of the figure, without dispute, must be intended to represent, was not discovered by Herschel until he had completed his grand telescope of 40 feet focal-length, when it was first observed by him on the 17th of September 1789.

All the satellites of Saturn are so small, and the planet is so remote from the earth, that the best telescopes are necessary for observing them. May not the seventh arm *having hold of the ring* denote a circumstance connected with the orbits of these planets, which is, that the planes of their orbits so nearly accord with that of the ring, that the difference is not perceptible? Undoubtedly the ancient astronomers must have possessed the best instruments: probably differing from modern ones, but fully as powerful.

We are not aware that the Royal Society in any of its printed papers have noticed Colonel Pearse's communication, but our imagination warmly interested as it has been in all that relates to the subject of the present memoir, has pictured the probability that Col. Pearse's paper may have met the eye of Herschel, and may have been an additional spur to the indefatigable and wonderful labours of that great man. The thought is too pleasing to us, as connected with Colonel Pearse's posthumous fame, to let it rest uncommunicated to our readers. We will now proceed with the memoir.

The Bengal detachment remained encamped near Madras from the time of their return from Cuddalore until the end of April 1784. During this lapse of time negotiations had been incessantly going on with Tip-poo, and a treaty of peace was at last concluded between this Chieftain and the British Government of India. The army was at this time many months in arrears, and discontents began to prevail in the camp, which at last wore a very serious aspect. In one or two instances the conduct of the troops was highly insubordinate; but the following letter to Major General Stibbert, while it details an unwarrantable proceeding on the part of the troops, still speaks in favour of that character of attachment to their Officers and to the Government, which the Bengal sepoy have ever deserved.

To Major General Giles Stibbert, Commander in Chief.

“SIR,

“I have the honour to send the returns for February, and have struck off those Officers, concerning whom I had received your orders.”

“I imagined my letter concerning the mutiny had reached you; there was a disturbance, and amongst our people only; it was occasioned by a payment made to the Madras troops secretly, when our's were omitted.”

“I had obtained part of a month's pay and sent it out; but they refused to receive the part, though I had declared that the rest would be issued in the course of the week.”

“They surrounded my palkee on the Christmas evening, and as I judged from the numbers and appearance of things, that it was a general mutiny; I jumped out of

it, and seized the sword of the man who had laid hold of my palkee; he struggled with me for it, but as the hilt was in my hand, I became master of it, and then seized him, and declared I would put him to death on the spot, if a single man more approached, and to effect it, I threw off the scabbard."

"Being questioned what was meant, he said, I was going away, and they should be left without protection; that the Madras troops were paid for a month, and that I had offered only part of the same month's pay, though both were eight months in arrears. After this I committed the man to the care of my orderlies, and intended to lodge him in the fort, but the rest rescued him and let me go on."

"The next day Lieutenant Colonel Blanc sent to desire I would return to Trivatore, as the men had declared they would not receive less than four or five months arrears, and some, that they would have the whole. I returned instantly, and was received with shouts of joy. That evening I sent emissaries amongst them to declare my displeasure at behaviour which disgraced both them and me, and was to no purpose, because the money could not be obtained, if it could, they would not have been kept in arrears: and more to the same purport. Captain Williamson paid his battalion that night, though two men of the 13th regiment threatened to fire at them if they did receive it. The next day the whole were paid, except one man, whom I instantly dismissed from the service, and banished from cantonments, and forbad any man of the detachment associating with him; they submitted to it quietly, and then I ordered the man who seized me, and one whom we had found 'bout of the two who threatened to fire at my orderly, to be tried and

punished, which was done, and peace restored, and has continued ever since."

" I have, &c.

" Madras, }
10th March, 1784." }

T. D. PEARSE."

By combining that necessary decision of character, which will ever uphold subordination and discipline, and at the same time command respect, with an amiable and ever zealous interest in the welfare of all ranks under his command, Colonel Pearse had acquired an ascendancy over the minds of his native soldiery, which proved of the utmost value on the present occasion. By a mixture of severity and kindness, of punishment and argument, judiciously applied to the circumstances which called forth the exercise of either, the discontents were allayed, the real hardships were patiently borne, and the conduct of the Bengal detachment, at the period of their final departure from Madras, was such as to call forth the warmest encomiums of Lord Macartney and the Government of the Madras Presidency, for their past services and their conduct both in the field and in cantonments.

After resisting several propositions on the part of the Madras Presidency to send back the sepoy's by sea, which, on account of their prejudices at that time, the native soldiery protested against, the happy day at length arrived, on which this gallant band of veterans were to set out on their return to their own country.

On the 22nd of April, 1784, the Bengal detachment moved from Curringur to the red hills, and the next day to the Cortelar river, which was the first regular stage on the route towards Bengal. On the 24th the detachment was at Spoomrassoodie; on the 30th of

April at Korwari; and on the 4th of May at Nellore. At this last place orders were received by Colonel Pearse, to leave all his Artillery and Ordnance stores behind him, and to send back the European Artillery-men and the Lascars to Madras, in order that they might be sent to Bengal by sea.

On the 10th May, the army left Nellore. The following letter will explain Colonel Pearse's situation at this time, and as it contains a clear description of the country through which the route of the army lay at that time, it is interesting as a record, as many changes in the face of the country may have taken place in thirty-nine years.

*To the Honorable Warren Hastings, Governor General,
and Supreme Council.*

“HONORABLE SIR AND SIRS,

“The orders sent to me by your Secretary, and their explanation by General Stibbert, leave me equally in the dark as to your intentions concerning our future progress.”

“I had the honour to state to you reasons why I deemed Cuttack impassable by the route I had marched, and why I thought Cuttack had another route if the Maharrattas would consent to our exploring it.”

“I therefore beg to trouble you to inform me before we reach Ganjam, what you require me to do, because that I will do, if it be possible.”

“Chilca Lake opens into the sea very wide and rapid in the rains, for it receives a branch of the Mahanuddee at the north end, and all the torrents from the hills which bound it west and south. From thence to Jugger-nauth is a vast plain of sand. At a small distance

from Juggernaut, there is a bridge with many arches, which is a continuation of a causeway, that runs half way to Cuttack; it is in many places above ten feet high, and yet in the rains it is barely above water. After this the country is intersected with a great many rivers, quite to Bhuderuck, at which place the Mahanuddee is above two miles broad, the southern branch being the shallowest, and about half the breadth of the northern, which was barely fordable at the time we passed. In the rains therefore it must be crossed in boats, and so must several others between that and Bhuderuck, most of which have connection with that river, or flow from the hills."

"The rainy season sets in at Calcutta, in full force about the day we should have reached Ganjam, how far south the 21st of June is limited, I cannot say; but it is reasonable to suppose that the rivers are affected before the rains begin to fall in the country. The Coda-very and Kistna rise in the very beginning of June, without any rain in the Circars. If the Mahanuddee takes its rise near the Soane, both will be alike affected, and the Soane is full in June. Whenever the Mahanuddee is full, all the low country is in cultivation, and of course is a quagmire. Such is the country we are to pass. In the dry season it took us thirty days to pass Cuttack—in the rains it would require a longer time to get to Bhuderuck, if I may judge from what I saw in the dry season. But Juggernaut and the Chilca may be left on the east, and the detachment could, if permitted, march through the mountains on the western side. I had hirkarrahs who had travelled that route. The Mah-rattas deny its existence, and yet they passed into the Ganjam district through this route once, with a large

body. When we marched through Cuttack, Chimnaje was there with a large army. He was to the west among the hills, and he had wintered there with all his army; but in the plains through which we marched, he could not have wintered if he had desired it; unless he had turned out the inhabitants from every town and village all along the road to Cuttack. Since then he did winter among the hills, it is demonstrable that in those parts the country is drier, and produces fodder for horses in the rainy season."

"The Polloms near Madras were deemed inaccessible, till we entered them with our whole army. The mountains on the west of the Chilca lake, are of the same appearance as those which run from them, and form part of our country on the south end of the lake; the latter are passable in circuits and winding roads, and so are all the Polloms near Madras."

"The Cuttack hills appear like the Polloms at a distance. We entered them at the Cbomreah river, and there they were precisely the same, so was the cultivation; and since Chimnagee did winter there, and his army did march behind hills parallel to us all the way, with guns &c. I judge that there is a road quite down to the Midnapore provinces, passable in the rains. Such a road is worth knowing; because if the Mahrattas should be our enemies, and allies of a foreign power, they might lead an army to your very gates, at the time you might suppose the country impassable. Therefore if the Mahrattas would let us roam at large to seek a route, it would be advisable to order us to move, wet or dry."

"I must now just inform you that our thermometers are daily at 120°! at 105° by the time we get to our

ground, and not below 96° till after five o'clock. To plunge at once into the rains, and continue through Cuttack, would be little short of certain death.—It has alarmed most people, and been the subject of discourse; therefore I relate the fact, and submit the merits of the case to you, without even presuming to express a wish one way or the other.”

“As an individual I should push on,—as a public Officer I shall regulate my motions by my orders. I should be truly sorry to see these brave troops, whom I have led from Bengal through many difficulties, and who by going have done honour to this service and nation, exposed to destruction from climate.—I fear it would be impossible to get through Cuttack early enough to avoid this evil; and I lament that if we are forced to stop, they and all of us must be kept from that home to which we all look stedfastly with longing eyes.”

The remainder of this letter treats upon the distress which the troops may be exposed to if money is not provided to pay them their arrears on the route, &c.

On the 11th May the detachment was at Mamildoroo. Here an order was received by Colonel Pearse from the Select Committee at Madras, for the Artillery and Ordnance stores which had been left behind at Nellore to rejoin the detachment with all despatch. It appears that a mutinous spirit had broke out amongst the troops in the Carnatic in two or three places, and the Select Committee deemed it advisable that the Bengal detachment should be again in its full state of efficiency for actual service, by resuming its artillery and field equipments. The following letter in some degree explains the circumstances:—

*To the Honorable Warren Hastings, Governor General,
and Supreme Council.*

“HONORABLE SIR AND SIRS,

“About 9 o'clock last night I received the letter of which the inclosed is a copy.”

“I presume that you are duly informed what agitates the councils of this Presidency, but as it is possible that they may not yet have sent any official accounts to you, I shall communicate what has come to my knowledge from the private letters of others.”

“This Presidency having resolved to keep up the Cavalry, who were formerly the Nabob's, and who had served in our pay during the war, the Cavalry claimed nearly two years of arrears due from the Nabob for time antecedent to their being taken into the Company's service. The demand not being complied with, they mutinied, seized their Officers, European and Native, and took possession of Arnee. They fired at General Lang from the walls, and threaten to put their European Officers to death if their demand is not satisfied. So late as the 8th they were (at Madras) reported to hold out, and it was said that a force was sent to reduce them.”

“This is the story as I have it from others; for, though upon hearing it I wrote to Madras, relating what had come to my knowledge, I have not had a word on the subject addressed to myself.”

“Nellore was one of the Nabob's military stations; there were in the fort 3,000 men when I was there, in 1781. They were then in arrears as far as the rest, and mutinous and discontented. Having occasion to employ part of them, three days elapsed before their demands could be satisfied; at last the Fouzdar paid them a sum

for their immediate use, and into my hands a further sum, which they were to receive when they joined the grand army. It was paid to their Sirdar, though very few of the original claimants remained at the time. After this it was found necessary to blow the Sirdar from a gun for mutiny, and latterly the whole were disbanded. The greater part of them live in or near Nellore; some have gone to Kurpah, and engaged with the enemy; but so many remained, that the President found it necessary to write to the Officer in Nellore to be upon his guard."

"This will, I presume, sufficiently explain the cause of the order 'not to leave the guns at Nellore.' But I had already left them, and therefore to prevent any bad consequences, I have halted, and have sent a sufficient force to bring them to me."

"Between Kurpah and Vencatagherry there lies a country subject at this time to the Rajah of the latter place; but it is claimed by the Nabob of Kurpah. As it was an appendage of Vencatagherry before the war, and of course came under it by the peace, hostilities ought to have ceased; but the Kurpah Nabob still carries on the war, and is in this country, and has, I hear, taken the principal fort. I learnt that on our moving northward, he had retired, but on hearing that we had passed on, he returned into it. This Nabob is the son of Mheer Sahib, who was killed at the battle of Cuddalore in 1781, and the contest about this very country introduced the late war, as I am told. All this is hearsay, and not on public authority, but I believe it is fact."

"Such a situation of affairs would account for the desire expressed by the Select Committee, that I should halt near Ongole."

“In Masulipatam, one Rajah has retired to his fastnesses; and I understand that the Government intend to disband their local troops, and to replace them by troops of the establishment generally. These may be the reasons for my directions to wait for further orders at Masulipatam.”

“I thought it my duty to convey to you, all that has come to my knowledge; for though I presume the Government have more clearly, and from actual knowledge of their own views, informed you what directions they have sent to me; yet as there is a possibility that they may have waited for the issue, I thought it necessary to lay before you the probable causes, when I reported what I had done.”

“I have written to the Committee, telling them that I have sent for the guns, that I shall not cross the Kistna till the 2d of June, nor then if they direct the contrary, but that I shall not stay later without an express order; because the river fills about that time, and cannot be passed afterward; without great difficulty and danger. I have also said that afterwards I shall wait their orders in the Masulipatam district, and I have apprized them that they ought to determine ultimately concerning us, because if we get to the north of the Kistna, I cannot even flatter them with hopes of being able to get the troops back to the southern side, should they be wanted.”

“Thus far I have, Gentlemen, as far as in me lay, obeyed every order that has reached me, and I hope it will not be deemed presumption in me to request you will be pleased to let our guns be once more an object of your consideration. When I asked for them from Lord Macartney, it was on a maxim, which, if erroneous,

is nevertheless fully established in my mind from the history of this country, our own, and every other that I have read. That the English in India are always to be considered in a state of warfare, and ought not to quit their arms in times of the most profound peace; because peace in India is only apparent, and cannot from the nature of man be solid, and because the instant they suppose it real and act accordingly, they will feel a blow which most likely they will not be able to recover.

Let me apply what has happened, as above related, to this:—After a war of long continuance, on the conclusion of a peace, it was supposed that the Bengal detachment would not want guns to march through the dominions of the Company to Beugal. His Lordship (Lord Macartney) held my maxim to be too general, not well founded, and almost ridiculous: and yet Gentlemen, within a fortnight it was found necessary to direct this detachment to retain possession of the guns, and not to leave them behind, although secured in one of the principal fortresses of this part of the Company's territory, from fear of intestine foes. And though a peace had lately been signed, there was just cause to apprehend that the ratification of it must be completed by arms."

"Were I to relate what more has come to my knowledge of the commotions amongst the Rajahs and Sirdars dependant upon the Company, I might possibly expose myself to ridicule for my credulity; and yet I fear ultimately they will afford good arguments in favour of my maxim, and perhaps before we reach Ganjam, it may be found necessary to send more after us by sea."

"Cuttack, Gentlemen, is in the hands of our allies, and yet these may be foes before we reach their country—I own this is not likely, but it is possible—and supposing

that we were to attempt to pass Cuttack, and that they should change in the interim, we should find it next to impossible to get through or back again without guns; but if the change were premeditated, and we had our guns with us, we could not be stopped in our progress, and therefore should in all likelihood avoid the insult of the attempt."

"In regard to the expense, it really is no more than the hire and feed of the bullocks and drivers, and some small stores for repairs. The heat of the weather makes it impossible to travel faster without guns than with them; and the same would be the case in wet weather: for the baggage cannot travel faster than the ordnance, and where the baggage carriages can go, there can the guns travel also."

"It was your pleasure that the guns should be left behind in the first instance; I now wait for them by your orders. They shall be obeyed again in the next district; but foreseeing as I do, that it may be found advisable to have guns with the troops, I have presumed to give my reasons why I think so, and to support these reasons by recent facts, that you may have before you the new matter that has risen, and which I hope may induce you to think the subject worthy of further consideration."

"Permit me to add, that it cannot be any personal object to me to ask for the guns, further than it is my duty to consider all that may contribute to the honour and dignity of the Company, and to the actual safety of the troops committed to my charge; and since it does appear to me that keeping the guns with me will best answer those ends, I hope you will pardon my having ventured to send this representation, in support of an opinion contrary to that which you held, when you thought proper to give your orders for leaving them."

“From the interruptions we have met with and shall meet, I think it will appear, that it will be impossible we can get to Cuttack before the rainy season is too far advanced to make the attempt advisable, without permission, to seek a road through the mountains.”

“ I am,
with the greatest respect,
&c. &c.

“ *Momulidaroo,* }
12th May, 1784.” }

T. D. PEARSE.”

A few days after this, orders came from Lord Macartney and the Secret Committee, ordering the guns to be left behind, when the detachment reached Masulipatam.

On the 22nd of May, the detachment was at Ongole, and on the 24th at Kutepollam. The troops at this time were ten months in arrears! On the 26th, the detachment was at Chundole, and on the 27th at Siccacollum.

Here Colonel Pearse mentions a melancholy accident which happened with the army, as follows:

“Yesterday Lieutenant Dowe was killed by his horse falling back upon him: he expired in a few minutes after the accident. He was a young man much esteemed in his corps.”

Exposed to these dreadful heats and occasional chills from rain, it might be anticipated that the army would not be free from sickness. Colonel Pearse in a letter from the north bank of the Kistna, to Mr. Hastings says,

“The rains have caught us already, and the consequence is great sickness.—We had 131 sepoy who required to be carried when we set off, and we have now 150, besides Europeans and Lascars.”

The detachment was at Moodinoore on the 29th of May, and at Ellore on the 1st of June. Repeated

applications for money to pay the troops had been made both to Bengal and to Madras; but the distresses of the treasuries at each Presidency were such, that immediate relief could not be afforded. At Ellore, the detachment fell in with a body of troops who were paid up to the day; the comparison excited some discontent and clamour. Colonel Pearse writes from this spot to Lord Macartney as follows:

*To the Right Honorable Lord G. Macartney, K. B.
Governor of Madras.*

“ MY LORD,

“ I have plunged into distress where I had least expected it, and consequently was but ill prepared to meet it. We have fallen in with troops paid up to the day, and it has created dissatisfaction in minds, which before this, were contented and happy.—I have heard the sepoy say, ‘Sir, we are ten months in arrears—we came from Bengal to the Carnatic—were there in dangers and fatigues daily—far from our homes, and our families are starving. These troops have been at ease in these cantonments or garrisons, during the whole war, yet they are paid up to the day!—Is this justice? or, what justice is this!’—Fortunately a lac of Rupees was procured at this station, and the troops were paid one month’s pay.”

“ In a long letter to R. Johnson, Esq. written on the 2nd of June, Colonel Pearse writes: “ On the 26th of last month, we were within two marches of the Kistna, at a place called Chimdole, where the French destroyed a magnificent Hindoo temple, the ruins of which are not yet carried away. They exhibit a fine sight to an anti-

quarian. Amongst other curious circumstances, there is a zodiac sculptured upon a pillar, with the signs the same as our's, except Sagittarius, which is expressed by a bow only, and something defaced about the size of a hand at a distance from it, and except Capricornus, which is expressed by the head of the Aligator of the Ganges, (the Gurrial): there are many other curious figures which I cannot now describe."

"Colonel Pearse mentions in several letters the anxiety of mind which he felt, in consequence of the distresses which the troops of his detachment were subjected to, not only from want of pay, but from the dreadful heats of the season. By promises and arguments, Colonel Pearse had allayed the prevailing discontents as much as was in his power, and earnestly implored from the Madras Government and from Bengal, that supplies of money might be collected to meet them on the route. It appears that Mr. Daniel, chief of the Factory at Masulipatam, who had behaved so well in his situation on the march of the Bengal detachment to the Carnatic, was one of those who was earnestly solicited on the subject of furnishing money for the payment of the troops, and to him Colonel Pearse had not only detailed the actual state of things in the detachment, but had openly made him acquainted with his own feelings and anxieties on the subject."

The following letter to Mr. Daniel on this subject must not be passed over:—

To James Daniel, Esq. Chief of Masulipatam.

"SIR,

"Having been informed that the Kistna was rising, I have, by a forced march of at least 23 miles, got across,

and we shall all be over by dark; here we shall stay to-morrow, perhaps the next day, as I must allow time to rest after so great an exertion."

"Our sepoys have learnt that your's are paid up to the day—we are ten months in arrears; they draw comparisons and say, that those who have enjoyed the comforts of peace all the war, and have not been exposed either to fatigue or danger, are paid up to the day—we, who were daily exposed to danger or excessive fatigue, are ten months in arrears: what justice is this! with much more to the same effect."

"These discontents have arisen since we passed Ongole, and came to my knowledge only a day or two ago, when I wrote to the Board at Masulipatam, stating this fact, and desiring to have another lac of Rupees, which, with the one we got by draft, will equal the remittance which I hear was made for us from Bengal."

"I shall liquidate three months by the rice and balance; still seven will remain. If I can promise a speedy payment, as for instance, one on our arrival at Vizac, and another at Ganjam, I shall be able to keep peace; but I fear it will be impossible unless I am assisted. I therefore beg your aid on this occasion, and I hope you will see the necessity of exertion. I cannot answer for consequences if I do not get it, and I think I certainly can if I do. Whether I get the money or not, I shall use my utmost endeavours to suppress the ferment, but if I cannot succeed, the blame will be off my shoulders, and I shall have taken every step possible in my present situation."

"The circumstance of your being paid to the day, was unknown to me till the time I mention; if I had even suspected it could be so, I should have stated it

fully to Lord Macartney before I set out. The ferment that happened at Trivatore, which was next to a mutiny, was occasioned by a payment of only one month made to the Carnatic troops in a secret manner; how then can I answer for consequences, when there are ten months difference in the present case, and must be seven after all my exertions, unless further aided?"

"I have sent an escort for the lac due for the bill, and hope for a favourable answer from the Board here. So much depends on it that I shall have very little ease till I hear; and if then it proves not to be such an answer as I wish, I shall hope that this further application may be productive of what I so earnestly solicit."

"I am, Sir, &c.

T. D. PEARSE."

"From my Palankeen, }
Sicca, 27th of May, 1784." }

The answer from Mr. Daniel to this letter, called forth the following spirited reply:—

To James Daniel, Esq. Chief of Masulipatam.

"SIR,

"This day between 3 and 4 o'clock, at table, I received the honour of your letter of the 1st instant."

"The high respect I have for your station and person, makes it extremely painful to me to be under the necessity of giving the letter just received a particular answer; but as it bears very hard on the troops I command, and even on myself, I find it incumbent on me to reply to the several parts of your letter, in vindication of both."

"You are pleased to say that 'you are sorry to hear that the troops under my command, after the indulgence

of a lac of rupees at Ellore, and every necessary provided for them on their march to their native country, should breathe a spirit of discontent, after so much has been done for them.' ”

“ I too am sorry that they expressed symptoms of discontent ; but they did so, and it was my duty to prevent the realizing of it. I am still more sorry that they have but too much cause to be displeas'd at the difference of their situation, compar'd with the troops of the Circars, and of the King's and Carnatic troops serving in the Circars ; for you, and all the world will allow that there is a wide difference, because our's are now nine months in arrears, and the others are all paid for April.”

“ When the King's troops left me at Trivatore, they were in arrears ; their Commanding Officer told me they are now two months in advance : and when the Carnatic troops left the army, they were several months in arrears, and they are now paid up.”

“ The King's and Carnatic troops were paid up by this subordinary, it is therefore reasonable to suppose, that you and the Council did it to destroy distinctions, and because it was a hardship for troops serving together, not to be on an equality.”

“ Hence, then, it is by your own act acknowledged, that you deem'd it a hardship that there should be any difference. It is at least as great a hardship for a greater difference to exist amongst troops of the same service, though of another establishment ; and it is not to be considered as wonderful, that our's, who labour under these disadvantages, express their displeasure by murmurs ; nor that I, hearing those murmurs, endeavour to discharge my duty to the service by seeking the ways

and means to prevent public discontents and their consequences."

"When we set out, we received one month's pay, and were then nearly nine months in arrears, as we had been for many months before; having been above a month on our march, (in consequence of orders from the Select Committee, which stopped our progress), the debt due to the troops when they arrived at Ellore was ten months. At this time we received the lac of rupees to pay one month; that lac was all expended in the payment, and yet some Officers are not paid: and I myself have not had a rupee, though I am in very great need of cash, even for my table."

"It is not any indulgence to pay troops regularly, but is by all Governments deemed meritorious, when they will suffer their pay to be withheld, and arrears to accumulate, in cases of necessity; and consequently it is not any indulgence to pay the Bengal detachment a month's pay, at the end of six weeks, in which they have been exposed to such heats and consequent fatigues, as are very trying to the human constitution. If then any indulgence has been shewn to them, it is only in getting wood and straw, for they have paid for the rice as they took it."

"It is the custom of every service in Europe to furnish the troops with provisions, fuel, and fodder; and it is an indulgence in countries in which armies subsist, to do it: for, if it were not done, the troops must for their own preservation, take from the country articles, without which they must perish; but by their being supplied with them, the country is left unhurt."

"It does not appear then that our troops have had more indulgence than all other troops enjoy; yet they

are nine months in arrears, and all the other troops we meet, are paid up."

"The part that bears hard upon me, is the last of your letter, in which you say, that 'if any money had been sent from Bengal for the use of my detachment, it would certainly have been received for us.'—I do not doubt but it would, but if you will please to turn to my letter you will find that I only said, I understood it to be so."

"Three lacs were sent to Madras expressly for us: Lord Macartney told me so, and offered the bills to me. The same letter announced two lacs sent to Masulipatam, and that letter said the remittance was for us. Mr. Tyler saw the letter, and he understood from Lord Macartney, that when we arrived here, we should find another lac ready. This shews why I understood the money you have lately received, viz. two lacs of rupees, was all for our troops, and consequently clears me of the imputation of inventing it."

"I am very sorry you find it *not convenient* to supply our wants—that is an all-powerful reason, and of itself was sufficient, without any reflections on us for pleading the notorious and great difference between ourselves and the troops we meet, to endeavour to get more money."

"I wrote to Lord Macartney from Ellore, in consequence of the answer from Masulipatam, laying before him the true statement of the murmurs, as the reasons for my application; for, be assured Sir, if I had not heard the very words recited, or others to that effect, you would not have had the trouble of answering my letter, nor I the necessity of vindicating the troops I command, against the imputation of being discontented without a cause."

“ I again assure you, I shall do my utmost to keep the troops at ease in their minds; but I cannot say, it will be so. One lac and the rice accounts, would pay off three months, and liquidate a very long and intricate account; therefore, so small a sum would enable me to say, that I shall not have any further occasion to give trouble or to bear it.”

“ Before I close, I must just add, that in consequence of the letter I have received from the Board of Masulipatam, I had so far depended on an actual supply, that I had given hopes of the adjustment I mention, though not an actual promise of it.”

“ I found it necessary to set the minds of the troops at ease, if I could by words effect it; the letter was sufficient warrant for trying words, which answered my expectations; and the troops, relying upon receiving the balance after they cross the Codavery, are now in the most perfect state of tranquillity. But when they find that I fail, I cannot say they will remain so; and every word I shall say afterwards will have less weight than my assurances were wont to have. However I shall strive to the last; if bad consequences ensue, I have done my duty to the service, and I can only lament that I failed, when I thought I was sure of success.”

“ I am, Sir, &c. &c.

“ *Gestnagoodam,* } (Signed) T. D. PEARSE.”
5th of June, 1784. }

On the 6th of June the Bengal detachment reached the banks of the Codavery, and Colonel Pearse with a part of his staff got across, but the rise of the river at this time, and the want of proper boats to cross the detachment delayed them until the 13th instant, on which day, the whole of the troops having crossed the river, the

detachment proceeded to Rajahnaghur. On the 14th of June the detachment was at Peddaporc, from whence the following letter was written,

To Claude Russel, Esq.

“DEAR SIR,

“You will very much oblige me by sending the two letters to Vizeram Rauze and Siteram Rauze; they are merely complimentary; but the attentions they paid the detachment when it went through the district, really merits every attention on our part, and of course on mine through whom that was shewn to us.”

“Siteram was then the principal, now I find the other is; I write to both. I should be hurt much were I to slight either intentionally; most so, if I passed over him who is fallen. It is a misfortune to fall—but it is a wound to be slighted; on that account, and after his studied politeness to me, I should be criminal to do so.”

“Thus, my dear Sir, I fairly state my reasons for being so very antediluvian, as to write to him who is in disgrace. I am only a traveller, and therefore not competent to enter into the why’s and the wherefore’s, and consequently have not any business to know of internal changes which may be produced by crimes or by party; be very justly deserved, or not at all. We see it is so in life, and enough of it in lat. 52° north, and therefore as I do not know your sentiments, I hope my taking the liberty to trouble you with my request, will not be an offence.”

“I halt to-morrow to pay Mr. Daniel the compliment of showing our line to him, if he pleases to see it; and when we come within reach of you, I hope to display it to you also. We have not any guns with us, but we are what we are, and I hope worth looking at.”

At this place a further supply of cash was received from Mr. Daniel, and the troops were paid for August, September, and October, 1783.

On the 25th of June Colonel Pearce received instructions from the Supreme Government to canton for the rainy season at Chicacole. The following letter explains the orders.

To C. Russel, Esq. Chief, and Council of Vizagapatam.

“GENTLEMEN,

“Yesterday I received a letter from the Supreme Council, by the 2nd paragraph of which I am directed to canton at Chicacole, during the rains, which have cut off our communication with Bengal: the words are as beneath.”

‘The arrival of the last makes a particular reply from us to any of the former unnecessary. It will therefore be sufficient for us to acquaint you with our directions that you canton your detachment at Chicacole until further orders, or until the season will admit of your marching onwards, without risk to the men under your command; for we are entirely of opinion with you, that the health of the troops who have served the Company with such distinguished bravery and honour, is an essential primary consideration, to which every other but necessity should give way.’

“I take the earliest opportunity of communicating to you the orders which I have received, and request that you will be pleased to grant to me your permission to canton the troops under my command, in Chicacole, and to give such orders as may enable me to do so.”

“I am, &c. &c.

“*Sabaram,* }
26th June, 1784.” }

T. D. PEARSE.”

On the 29th of June the detachment was at Vizagapatam, where it remained in camp until the cantonments near Bimlipatam were ready for the troops, which was in the middle of the month of July. The detachment remained in cantonments until the 31st of October, when, the rainy season having terminated, the march towards Bengal was resumed.

The detachment was at Vizanagram on the 1st of November, at Ganjam on the 22nd of November, Cuttack Island on the 10th of December, on the 25th at Soobaureeka, and on the 31st reached the ground at Midnapore, where the troops were assembled to proceed on service, which circumstance Colonel Pearse reports in the following letter to General Stibbert.

To Major General Stibbert, Commander in Chief.

“ SIR,

“ I have the extreme pleasure to inform you that the detachment under my command is just arrived at the ground near Midnapore, where it first assembled to proceed upon service.”

“ We shall resume our march on Wednesday morning next, and proceed, agreeably to your orders, *viâ Burdwan to Ghyrettee*. My halt till that time will, I hope, be approved of, as the troops were all at different times long at this station, and have many connections round about, whom they wish to visit after so long an absence.”

“ I am, &c.

T. D. PEARSE.”

“ *Midnapore,*
31st December, 1784.” }
}

In the middle of the month of January¹, 1785, we find Colonel Pearse arrived at Ghyrettee, and encamped with

the veteran remains of his gallant detachment; and Mr. Hastings honoured the camp with his presence on the 24th of the month. The following General Orders and Minute of Council, are the proudest testimonials of the estimation in which the services of Colonel Pearse and the Bengal detachment were held by the Supreme Government.

“General Orders by the Government of Bengal, dated Fort William, the 22nd of January, 1785.”

“The Governor General and Council direct, that their thanks be expressed in General Orders to Colonel Pearse and the European Officers, and the Native Officers and Privates composing the detachment lately returned from the Carnatic, for their gallant behaviour and useful services in the defence of the Company’s territories in the Carnatic, during the course of a long and unequal war; and as a lasting mark of their approbation, they bestow upon each of the Sepoy regiments a pair of honorary standards; on each of the Subadars a gold medal, and on each of the Jemadars a silver one, with such a device, motto and inscription as shall be judged applicable to the occasion; and medals of the same sort to the Officers of the Golundauze company; also similar badges of inferior value, to such of the men, warrant officers and privates as have served with the detachment from the commencement of the expedition until its return into the provinces.”

“The Governor General and Council further direct, that in acknowledgement of the services of the two great detachments which have served in the Carnatic and the west of India, an additional pay of two rupees per month be granted to each non-commissioned officer

and private of the European corps; and one rupee per month to each non-warrant officer and sepoy of the Native corps composing those detachments, who were originally attached to the same on the march to their respective destinations, and returned with them."

"This additional pay to commence from the first of the present year."

"General Order, by Warren Hastings, Governor General, Camp at Cihyrettee, January 25, 1785."

"The Governor General, having already testified his sense in the General Orders issued by the Governor General and Council, of the meritorious conduct of the troops lately returned from the Carnatic, can add nothing to the credit of their services by any acknowledgment which he, as an individual, can make them; yet they will not be displeased to receive from him the separate tribute of his particular and personal thanks, for his share of the reputation which their actions have reflected on the Government of Bengal, in its original appointment of the detachment to the relief of the Carnatic. Great as the exertions have been, which were made by the gallant troops employed on that service, it will in no degree derogate from them to affirm, that to this aid the Company's possessions and interests under the Presidency of Fort St. George owe their present existence; and that with every report made to this Government of the successes of the war, the most honourable mention was uniformly made of the Bengal detachment, as primarily distinguished by its patience of hardship, its generous submission to the pressure of those wants which affected every corps of the service, but which were to them, acting at such a distance from their na-

tive homes, the cause of aggravated distress; and by its steady discipline, activity, and effective valour."

"The Governor General has deemed it incumbent upon him to visit the detachment in person, to offer his thanks to them before their separation; and desires that the Commanding Officer, whom he is proud to call his friend, will make them known in public orders to the Officers, his countrymen, and to the Native officers and private sepoy's of the detachment."

"The term of his public existence is now within a few days of its close. But it is a consolation to him thus to mix with his regrets, for the loss of a service endeared to him by many years of care, attachment and vicissitudes, a declaration of justice and gratitude marking its last period."

"(Signed) WARREN HASTINGS."

"Minute of Council, 26th January, 1785."

"The following Minute by the Governor General, being so consonant to the ideas of the other Members, and creditable to himself, they requested and obtained his permission for the publication of it at length, in General Orders."

"Minute of the Governor General."

"The detachment sent from this Presidency to the relief of the Carnatic consisted, in its original formation, of above 5,000 men; and is now reduced by the service it has seen, to less than 2,000. These small remains being returned to Ghyrettee, the Governor General yesterday visited their encampment; and he hopes that the Board will allow that indulgence to his feelings, excited by the mixed sentiments of gratitude and regret, which were impressed by the occasion, as to accept with can-

dour the following recommendation, which it has induced him to make in their behalf."

"The Board have liberally rewarded the services of the Native Officers and privates of the detachment, and afforded such testimonies of those which have been rendered by the European Officers, as will be felt by men professing the spirit of honour which they have so signally displayed, with sentiments superior to such as are excited by the pledges of substantial bounty---neither is it easy to devise others. Such additional honours as may be bestowed, the Governor General now begs leave to recommend, and these are as follow :

"1st.—That a sword be given to Colonel Pearse, the Commanding Officer of the corps, and one to each of the Lieutenant Colonels, his second and third in command, Lieutenant Colonel Edinonstone and Lieutenant Colonel Blane, both as a testimony of their faithful and meritorious services, and for the incitement of example to others, their juniors."

"2ndly.—That the Officers who are now attached to the corps, in whatever degree of command, may be confirmed in their stations and commands, notwithstanding the general rules of appointment. Such an indulgence will be equally grateful to the Officers themselves, and to the men who have served with them, as the removal of the former for the sake of a literal adherence to general rule, would appear like the privation of the right, which the chance of hard and severe service has given to the surviving Officers of the detachment, in favour of others who have enjoyed a long season of repose; and would be a cruel separation of the sepoy's from the Officers, to whom they are endeared by their common sufferings, and operate as a more cruel hardship, by placing

them under strangers, to whom their merits will be unknown or unfelt."

"3rdly.—That the names of the Officers be entered on record, for such future marks of the favour of Government as the rules of the service may admit; and to this list may be joined, on the same principle, that of the Officers who have lately served with the other great detachment returned from the other side of India."

"This is the last appeal which I shall make to my present colleagues in the administration, and I venture to declare, without consulting them, that the sentiments of one are similar to my own, from the same impulse, excited by the personal meeting with men so deserving, and among them some veterans who were once his associates in the same career of military enterprize; and that those of my successor will not be less favourable, when to the spirit of liberal discernment, he shall have joined the same personal motives as those which I have ascribed to myself and Mr. Stables."

"(Signed) WARREN HASTINGS."

Such public records as these above quoted, are the most gratifying and heart-consoling rewards to the breast of a soldier. And no doubt Colonel Pearse and the gallant veterans who are alluded to, received these public expressions of Mr. Hastings's feelings towards them with the most heartfelt joy.

Independent of other circumstances, our readers have only to reflect upon the dreadful exposure to an Indian climate in the seasons in which they were on their march, to be convinced that these men, both European and Native, were deserving of their reward. Colonel Pearse's health was now beginning to decline, and when he arrived at Ghyrettee, he was too unwell to pay the accus-

tomary round of visits to his friends, and the settlement of the accounts of his detachment became now a painful and wearisome toil to him. Every expenditure necessarily incurred on the march, which was not literally allowed in writing, became now a subject of litigation; and Colonel Pearse's own personal allowances were made a subject of dispute, while he was called upon to answer in person for innumerable items of necessary expenditure. Colonel Pearse however took the earliest opportunity of accounting for all expenditures, and earnestly soliciting an early settlement of all accounts, as the bad state of his health rendered this act of justice absolutely necessary.

Amongst other sums the payment of which was disputed, was the allowance to Lieutenant Colebrooke,* as a Surveyor; and it appears that Colonel Pearse first brought forward this young man in the line of his profession, in which he subsequently became so distinguished and eminent.

In a letter addressed to the Honourable Warren Hastings, Governor General, and the Supreme Council on the subject of accounts, Colonel Pearse writes,

“ On the 15th of November, 1783, I appointed Lieutenant Colebrooke, to be Surveyor of the detachment, then about to march as it was supposed into Kurpah. On the 18th of that month I notified it by letter to the Honourable Board, but was not honoured with an answer; therefore I concluded the appointment was approved of by them. In April, having occasion to write to the Honourable Board again on some further appointments necessary for us on our march, I mentioned that I ordered our Surveyor to officiate as second Aid-de-camp on his

* Afterwards Colonel and Surveyor General of India.

Surveyor's allowances: that is, without any increase of expense. The Honourable Board approved of the new appointments, and did not object to the Surveyor, or intimate that his post was not allowed; this confirmed me in the opinion I had formed, that it was approved on the former letter."

"At Ganjam I first learnt that the Commissary General had refused to pass his bills, alledging that the appointment had not been notified to him by the Board, and that it therefore did not exist."

"The survey was made as far as that place, and is since finished with astronomical observations, which prove its value to be far superior to any thing of the kind I have heard of. If Mr. Smith's, made on the same foundation is superior, it is the only one."

"I request the Board will be pleased to order the bills to be passed."

"By order of the Governor General I add for the information of the Board, that when Lieutenant Colebrooke entered upon his office, he was not acquainted with the astronomical part; he however very rapidly acquired it, by means of the instructions I gave him, and has without any further aid from me, carried the survey on from the cantonments to this place."

"The plan is finished as far as Ganjam, and I could have had the honour of laying it before the Board with these papers; but I thought it would be better to keep it back, until the Surveyor has completed it, and this shall be done in a few days."

On the 26th of January, a Major Moore of the Bengal detachment destroyed himself by discharging the contents of a fowling piece into his mouth. This melancholy circumstance was reported to Colonel Pearse,

(who appears to have been absent from Ghyrettee) by Captain Williamson, and we find the signatures of the undermentioned Officers to the opinion, that "a violent depression of spirits, almost bordering on insanity," caused the fatal act.

" D. OCHTERLONY, Lieut.*

" T. EALES, Lieut.

" G. A. SWINEY, Lieut.

" EDWIN LLOYD, Lieut.

" A. HENNESSY, Adjutant."

On the 27th of January Colonel Pearse forwarded the survey of Lieutenant Colebrooke to the Council.

" HONORABLE SIR AND SIRS,

" I have the honour to lay before you the plan of the route from Madras to this place, together with an abstract of the observations, and a comparison of the survey with them."

" I avow having had a share in the labour, and what I did I have noted; and I held it to be as much a part of my duty to conduct a regular plan of my route, as I have knowledge of the modes, as to make a true return of the number of men."

" I hope the accuracy of the survey will entitle it to your approbation."

" I am,

With the greatest respect,

&c. &c. &c.

T. D. PEARSE."

" *Calcutta,*)
27th January, 1785." }

* The present Major General D. Ochterlony, Bart. G. C. B. who was present during the whole service of this detachment, and was wounded in the gallant repulse of the French troops, by the 24th regiment at Cuddalore.

A comparison of the Survey, with the observations of emersions of Jupiter's first Satellite.

	By observation.		By survey.		Difference.	
Madras,	2 — 80°	07' 03.5"				
Camp, near Nellore, 1st Immersion,	79°	55' 45"				
Deduct to reduce it to an Emission,		10' 55"				
	79°	44' 40"	79°	30'	18.5"	0° 5' 21.5"
Peddapore,	1st Immersion, 82°	16' 26.25"				
Deduct as before,		10' 55"				
Vizagapatam,	2 — 82°	05' 31.25"	82°	01'	57.5"	0° 3' 33.75"
Bennulwilsa,	4 — 83°	15' 24"	83°	15'	26.5"	0° 0' 02.5"
Kalingapatam,	1 — 84°	10' 37.5"	83°	21'	07.5"	0° 2' 23.25"
Ganjam,	1 — 85°	12' 45"	84°	10'	13.5"	0° 0' 24.0"
Jehanpore,	1* — 86°	24' 15"	85°	09'	09.5"	0° 0' 24.5"
Godavereeka,	1 — 87°	0' 42.7"	86°	19'	49.5"	0° 4' 25.5"
Calcutta,	6 — 88°	18' 45"	87°	05'	53.5"	0° 5' 12.8"
			85°	18'	47.5"	0° 0' 02.5"
Khapore,	1 — 84°	60' 54"	84°	47'	05.5"	0° 2' 48.5"

By an Eclipse of the Moon.

“The latitudes were daily observed, and the result is entered on the tables. From the difference of latitude of the places where the satellites were observed, and the easting and westing of that place with respect to Madras, taken from the tables, I calculated the angular difference of longitude, which, added to the longitude of Madras, gives the longitude of the place by survey.”

“The differences are such as must happen, because the satellites, observed with every degree of attention, will give different longitudes for the same place; and these differences will sometimes amount to 10 or 12 minutes of a degree, but the differences on this survey are all less.”

“From what I have thus shewn, I will venture to say, that this survey excels all I ever heard of in accuracy, if not in extent.”

“Should the Board be pleased to order it to be published by their printer, it might serve to shew to others how surveys ought to be made, and how they actually can be made with little trouble, by the surveyor of any detachment that may march into remote parts. And I should very willingly see that it was prepared in a scientific manner, and put into a form fit to be laid before the public. The Surveyor’s journal is large, and that would shew any future detachment every difficulty it could have to encounter, in a march of above 1,124 miles: I might have saved much time and fatigue, if I had had such information when I went towards Madras; what I did get was really very deficient.”

“I am, &c.

(Signed) T. D. PEARSE.”

On the 8th day of February 1783, Mr. Hastings resigned his office of Governor General, and embarked for England. Mr. Macpherson as senior member of Council, succeeded to the office.

On the 21st of March Colonel Pearse addressed a short letter to Mr. Macpherson, requesting that the accounts of his detachment might be brought to a close, as his state of health made it necessary to contemplate a voyage to sea. This however did not appear to be of much avail, for on the 6th of April a long letter was forwarded, of which the following is the first part.

To the Honourable John Macpherson, Esq. Governor General, and Supreme Council.

“HONOURABLE SIR AND SIRS,

“I have now tried every mode possible to bring my accounts before you, but having been unsuccessful, and unable to bring forward those I sent on the march towards Madras; I take the liberty of laying before you a copy of the whole of the accounts, and of the letters or paragraphs that relate to them, giving information concerning the several articles of expense at the time they were found necessary, together with the causes of the necessity for them.”

“The uneasiness these accounts occasioned at the time, is most fully expressed in the several applications I made, stating the necessity of having them passed while the facts to which they relate are recent; but unfortunately for me and others, those applications were not successful, nor do I wonder at it now, that I have been so long in the settlement, and have been unable to find out where the accounts are, or what prevents a settlement of them.”

“My original instructions, paragraph 5th, most fully warranted any contingent expenses I might incur; and expresses the Board's reliance on my official exactness: but still the expense was defrayed by me, and I stood

liable to be called on for the several sums I received from time to time, and the amount is very considerable. In fact the whole of the cash of the detachment passed through my hands, as it was ordered that I should give receipts, and draw on the Board for cash to supply our wants; and such was the practice until I joined Sir Fyre Coote, when he chose to take that trouble on himself."

"For the further information of the Board I have added an explanation of every item, according to the mode I observed, with respect to the expenses during our march back; and I flatter myself the Board will be kind enough to call on me for any further explanation, if any part of the expenses should be found liable to objections: though, as I made it my study to avoid every possible increase of expenditure of cash, I trust there cannot be any of material consequence."

The result of this application was probably favourable to Colonel Pearse's wishes. Amongst the MSS. which have come into our possession, we find no letters which bear date between the 6th of April, 1785, and the 18th of September, 1786—so that a lapse in correspondence occurs of 17 months, or during the whole time of the administration of Mr. Macpherson. In the month of September 1786, Lord Cornwallis arrived and assumed the high and important situation of Governor General. We may conclude that Colonel Pearse's situation during the interval of Mr. Macpherson's government, was not a very comfortable one to himself, from the following extract of a letter to Mr. Darrel, dated the 18th of September, 1786.

"I commanded the troops to receive Lord Cornwallis; the notice he took of me made me very happy, many very jealous; but the troops were pleased at it I believe,

and the Officers in general, for even the interested parties allow that I have been scandalously treated."

"I have not spoken a word to him, (Lord Cornwallis,) on any subject but compliment yet; so I cannot say any thing, but that he seems to be as noble in disposition as he is in birth,—he has proved it by coming alone—all wonder, all admire."

On the 8th November 1786, Colonel Pearse addresses General Pattison as follows :

"MY DEAR FRIEND,

"From what I am able to judge already, I think the spirit of prophecy is not necessary to enable me to fore-tell happiness to the settlement, and honour to the nation from the government of Lord Cornwallis."

"Some of the many *dirty jobs* of the preceding *pair* are done away, and more will follow. The change is to me most pleasing; I may say most beneficial: for it saves me from the ruin which the others had planned for me, and very nearly executed."

"As yet, I have not gained any thing more than I had before the new regulations: but all I have I may be said to have gained, because Macpherson and Sloper had reduced me to the necessity of asking for them, by bidding the Commissary General refuse to pass my bills for the allowances which I have received ever since 1773; and I know they would have referred me for an answer to the Court of Directors. Upon the whole, my present prospects are pleasing, and I do really believe if a change for the worse happens under his Lordship, it must be my fault, and therefore I will take the more pains to prevent it. I remember that when his Lordship was first talked of, that my friend Hastings wrote me the report

that Lord Cornwallis was to be his successor; and that if he was to quit, that he was glad his Lordship was to be the man; because he knew from his general character, that he was a man of honour, who would make us happy, and the English name respectable."

"Yesterday I had the honour of His Lordship's company at my country house, this made me very happy. Colonel Ross was here also, and he seems to me to be just the man fit to second the views of his principal. We shall be much better acquainted when he has more leisure, but they have had enough to do, though from their mode of doing business their future labours will be considerably less, the plan being to do all current business as it comes. The Secretary of the secret department told me the other day, that business was done to the day."

"Mr. Macpherson lately made a most scandalous convention with the French; one part of it really enabled the French to trade in Calcutta above four per cent cheaper than the English. The merchants complained, it was laid aside, and his Lordship has given relief to them. This is an act of public notoriety, and therefore may serve as a contrast of the two governments. I do not mean to exaggerate when I say, that Mr. Macpherson's convention made us contemptible in Bengal, and laid the foundation of a power which would shortly have crushed us, and exalted our rivals in our stead. Possibly it has been discussed at home, where, unless the spirit of the nation is quite dead, it must be reprobated; and ought to entail punishment upon the heads of those concerned in the transaction."

"We are made very happy by hearing that the judicature bill is to be amended. I hope it was done before

the petitions arrived, because I do think the petitions would not give reason to do it. You know that the clause that obliged us all to swear to our effects, was all I objected to in it; though that clause must have banished me for ever: for if I had sworn to what I am worth, I should have been deemed perjured, and have exposed my real poverty. However I hope times will mend, so as to remove poverty, that when age comes on, I may be enabled to get a small retreat to shelter me."

"May you enjoy every good the world can afford, and my good friend Mrs. Pattison also; and may I soon be blessed with the sight of you both in health and happiness."

"I am,

My dear General,

Your faithful friend,

T. D. PEARSE."

Fort William, }
8th of November, 1786. }

On the 10th of November Colonel Peurse dates the following letter

To Mr. Hastings.

"MY DEAR FRIEND,

"Your friends here, and none more than myself, received infinite pleasure from the letter you sent to Larkins to be shewn to us, and the short one which you wrote to Shore just before he sailed. But we long to hear the sequel; we hope that the very first packet will tell us that it is all ended, and to your satisfaction. We did hear by the foreign papers of the 29th of May, that you had again been before the house, but we want to see that noble defence which we have heard so much extolled.

I have read Burke as far as he went, and have wondered how a man could seriously exhibit such a mass of nonsense as an accusation against any one! He might as well have charged you with the destruction of the human species in the famine of 1770! But I see from all this that the spirit of party will produce the same effect in an individual, that fanaticism produces in the multitude. Therefore from the effects of this may the Power Divine defend you, which hath so wonderfully enabled you to stand up against the many violent storms which I have seen beating against you! And thanks be to that Power for sending Cornwallis, as the time of your return was not arrived. He now, as you did before, dignifies the chair, and fills each heart with gladness. He has raised us again out of the mire of meanness and baseness into which M***** and S***** had plunged the English name; and he will preserve Hindoostan to the English, though *sold* by them to the French. This I write as an Englishman, and as an individual I have every reason to rejoice; for, besides the honour his Lordship did me the very day he arrived, he has since redressed the injuries which the others did me, and one of them in particular, before I knew that I had suffered it."

"The grand matter about the command of the provinces I have not mentioned; his Lordship has had enough to do to wade through this mass of corruption in every department of the State, and has left military business to the last, as being something that wants a radical reform, and leisure to effect it. Macpherson and Stewart stopped me when I wanted to proceed to the field; but I rejoice at it now. Had I been at a distance, his Lordship might have been persuaded that I was what I am not. • By their malevolence it happens that I am on the

spot to shew his Lordship the worst of myself, and I trust he will find out what I am fit for, if any thing, and then I am sure he will employ me, and put me in the way to earn as much honour by his thanks, as I received dignity from your's."

"Still, however, I fear the orders from home. I know if ever the Board of Controul allow the Directors to appoint a provincial Commander in Chief, that there will be a swarm to rise up to seek for it; reduced gamesters, worn-out skulkers, and the whole list of avaricious, will say, We were above this man—we have been in the service 50 years—and this man must be a dunce because he is in the artillery. Champion once had the impudence to give an opinion that an Artillery Officer ought not to rise, but that he ought to have the bullock contract as a recompense. Can any recompense repair a wound in a man's honour? or riches supply the loss of honour? Be riches with honour, or honour without riches mine! The latter is mine, for you put me in the road that led to honour; directed by you, I sought and found it: the half is your's, and the other half is mine. 'Tis true you did not need a share of it, so great was your own treasure, but by condescending to take a share, you have eminently enhanced the value of mine."

"Besides the favours I have mentioned to have received from Lord Cornwallis, all which I attribute to you, I am thankful to him for giving me employment, though it is attended with some trouble; I mean the Ordnance branch of the command of Fort William, which I will have in nice order soon; so that if it be my fate to receive you in it, on some future day, you may enter without fear of defilement."

“ I saw Beneram Pundit yesterday, and he was talking of you to me, in that language which shews he remembers you with reverence and real esteem. As we conversed his Lordship came up and joined us, and desired me to tell Beneram, that he was sorry he could not join in the conversation. He has *not much* reverence for Macpherson and Sloper; and he asked me with a sneer of contempt, what the French would do, now that they had lost their friend Macpherson. This is sufficient to shew what the natives think of the convention. Beneram and Tufazzul Alli Khawn have been much slighted by Macpherson, they were too much attached to you to thrive in his reign.”

“ Do me the favour to present my best respects to Mrs. Hastings, and do favour me with a line when you get clear of Foxes and Pitts, standing firm on the rock of your own integrity, smiling contempt upon those who would have robbed you if they could, mixed with pity for their depravity. May every good be your's!”

“ I am,

Dear Sir,

Your faithful friend,

T. D. PEARSE.”

“ *Fort William,*)
10th of November, 1786.” }

On the 22nd of November Colonel Pearse had the satisfaction of laying before Lord Cornwallis the plan of Tentage for the Bengal Army, which he had long matured, and had earnestly called the attention of the Commanders in Chief and Government to decide upon the measure. Lord Cornwallis, it appears, had solicited a public statement of Colonel Pearse's plan, as appears by the following letter:

“MY LORD,

“In obedience to your commands I have the honour to lay before you a plan of tentage for the Sepoy corps of the Bengal establishment, together with the calculation, and a statement of the principles upon which they are founded, and the rules necessary to be observed to carry the plan into execution with effect.”

“I have also almost finished the plan for the general tentage, of which this is a detached part, and I hope to have the sequel complete by next Tuesday.”

“I am very thankful for the honour your Lordship did me by your order to prepare the papers; and shall be extremely happy if any part of them shall be thought worthy of your Lordship’s approbation.”

“I am,

My Lord,

Your most obedient and humble servant,

T. D. PEARSE.”

“*Fort William,* }
22nd of November, 1786.” }

We pass by, probably only for the present, the long statement which accompanies this letter, as we have much interesting matter before us, connected with the present memoir.

On the 8th of January 1787, we find Mr. Hastings was addressed by Colonel Pearse as follows:—

“MY DEAR FRIEND,

“The fate you have met with, the persecution you have undergone for saving India, are the rewards which I expected you would meet, when I learnt that Macpherson was made a Baronet; and I might have expected it earlier than I did, if I had considered that the same dignity was conferred on Rumbold, though I con-

fess I did not imagine matters were so bad as I find they are. I thought he had secured his own safety by his money, and as the set who saved him were out, those who were in might pursue different principles. I now perceive that my eyes were darkened by superstition, which taught me to believe that there was some degree of integrity in the Island which gave me birth.—It is not so, and I was a fool for my belief.—And yet when I reflect upon what has happened here, I must begin to believe again, and so here is my creed: That Cornwallis is sent to be *Hastingsed*—half perjury is embarked—the other half embarks soon. I saw old S——r return to the water which cast him up before, on Thursday sennight; and Mac goes off shortly, they say to the Cape only. If only, may the ship founder, and every trace of her be buried in the deep! for if he returns, ‘India shall pass from the hands of England:’ so says the Prophet, though he has not said to whom. With respect to my creed, I have foundation for it, which is more than many creeds can boast. Cornwallis has made us all happy; as he becomes more known, he rises in the respect of the natives. They see the revival of Hastings in him, and they expect a good, a firm, and an upright government, resolved upon doing what is right; not diligent to investigate the billionth part of a grain of lead, nor extravagant to waste the treasures of the State upon minions, and its own creatures.”

“In the *things* that are removed the natives saw rapacity, timidity, injustice, tyranny, weakness, ignorance, fickleness: millions squandered on minions—annas extorted from their opponents, and sent to the public treasury in procession to pay off the public debt—the public robbed to gratify private secretaries, and the complainants

threatened with destruction if they did not withdraw their complaints—despondency in the countenances of the injured, and insolence and malignity in those of their oppressors. India and I saw John Macpherson made a Baronet, and Hastings cast into a den of lions or more savage beasts, an hungry and disappointed faction; and hence we conclude that the rules by which England is to fall, will not be departed from.”

“ May your own noble spirit support you through the fiery trial. I wish with all my heart that you had not been exposed to it: alas! that you would not believe me.”

“ Under Lord Cornwallis I begin to breathe again; I had been nearly suffocated; but when I write concerning him, rely upon my veracity, if I assure you I write the words of the whole. Cornwallis has made Bengal happy, and has given a new face to things in India, and every day produces something to make all more happy, and the face of the country more beautiful.”

“ Saudutt Alli and the Nawab Morbauruck Uldowlah have been down here; I visited both, and I had the honour to entertain the Nawab in the fort by a cannonade from the ramparts, and a breakfast in the *Great House* where I reside. Hyder Beg Khawn is on his way, him I presume I shall see at Dum Dum, where the corps is, and where we have already twice been honoured with his Lordship’s presence and approbation, though only at drill. Upon the whole, I am as happy as I can be whilst you are absent. I wish you also could enjoy, or were allowed to enjoy happiness. May it soon be your’s, and continue to the end.”

“ I am,

Your faithful friend,

“ *Fort William,*
8th of *January, 1787.*” }
}

T. D. PEARSE.”

“As you suffered the trays of mangoes to be received, because those who sent them claimed a right to send, extend the rule to the pipe of Madeira that is on board the ‘Ganges.’”

To Lionel Darrel, Esq.

“MY DEAR FRIEND,

“Sloper gone, and Macpherson going, is pretty nearly what a man in the situation I was, under them could have prayed for: perhaps I did so! whether I did or not I will rejoice at it and so shall India.”

“’Twas a mercy that there did not fall a red ribbon for Sloper, and that a blue one did become vacant for Cornwallis. I wish it was arrived. The ‘Intelligence’ will inform us of many things that we are now ignorant of, and remove our vain doubts on others that we have heard partially.”

“With respect to myself, every thing remains just as it was. I have not asked; consequently have not been refused. I have been trusted, and I believe have given satisfaction.”

“I must continue to wait until the ‘Intelligence’ arrives: what news she may bring I cannot guess, but when I reflect upon the events at home, I rather fear than hope.”

“The persecution carried on against Hastings, makes me even hate England. I almost repent that I have sent my son to the place, lest his education should give him principles which would make me detest him.”

“Your son is well, and well beloved, and deserves to be so. Some ten years hence may you be able to write me the same of mine: then when the curtain lowers

down I will exclaim, God and my friends be praised!
Adieu."

"Fort William,)
8th of January, 1787.")

T. D. P.

"On the 'Ganges' there is a pipe of Madeira at your service."

To General Pattison.

"MY DEAR FRIEND,

"When Hastings left us, my letters shewed that I considered his departure as a public calamity. It is with joy I write it, the arrival of Lord Cornwallis has saved India. Sloper is gone—Macpherson carries away the rest of the pest in a few days. But what a prostitution of rewards! Sloper has obtained one hundred pounds a year for every month in which he filled the place of a Company's servant!—Macpherson is made a Baronet! and Hastings is delivered over to his sworn enemies, an hungry disappointed faction, to be torn to pieces for having made a feudatory pay his quota for war: or, to speak properly, for having punished a collector of a province who had presumed to raise a rebellion, who had emissaries in every durbar in India, trying to excite all to join against the English, and who took the opportunity, when we were engaged with all the globe, to try to extirpate the English. Amongst us it is a thing well known that every zemindar was ready, and waited for the signal at Benares, and if a fortnight had run in favour of Cheyte Sing, the English in India would have all been massacred."

"For saving India, Hastings is to be tormented to death!—For attempting to sell India to the French; for

having signed the compact, and only waiting for the opportunity, Macpherson is made a Baronet!—For disgusting the army; for robbing them of their rights to enrich himself and Secretary; for forming a fictitious contract by which to rob that army, under the pretence of saving, which was a false pretence, Sloper is to receive 1,500£ a year in England! Cornwallis has already done so much good, that I presume the axes are put in readiness. Rodney I suppose is executed by this time, and though the papers do not mention it, I dare add old Elliot likewise; were I their judge, they should not live an instant, for they are all guilty against the new statute, which *makes it felony to deserve the admiration of mankind and the thanks of one's country*. Seldom has it been the case, but I can now say, that my situation is happy. Under Lord Cornwallis I feel a comfort which I have long been a stranger to. If the absence of pain gives pleasure, of course the removal of torture gives delight. I cannot express all I feel, wanting words to do so. His Lordship raises the structure of his own happiness, by uniting the bliss of others. Honour, integrity, and justice are his supporters, and the rays of gladness are reflected around him. May every bliss be your's."

• "I am,

Dear General,

&c. &c. &c.

T. D. PEARSE."

"Fort William,
8th of January, 1787." }

"Let me beg you to receive a pipe of Madeira, which is on the 'Ganges,' as an offering of thanksgiving from me."

To Warren Hastings, Esq. &c. &c.

“MY DEAR FRIEND,

“You are too kind to think of me—I blush when I consider that I have given you trouble when I would have laid down my life to have eased you of it. Yet, by your kind letter received by the ‘Intelligence,’ I find it has been so.”

“The letters which you were troubled with from me, were written when we had not any reason to suppose you were to be delivered over to persecution as a reward for saving India. We have heard of the Rodney and Hood, and we did in idea behold Hastings seated by their side in the upper house. We knew where we ought to look for Hastings—we looked, and our sight was confounded by the sight of patents for Macpherson and Rumbold, and by a vote to whitewash the man who introduced Hyder into the Carnatic to hide his own villainies.”

“It is true that I wrote other letters about my concerns after I had heard what was agitated at home, and I sent home duplicates of others. This I did, because as I had inadvertently plunged into the misfortune of giving trouble to you; I thought I could not add to that trouble by letting you know the sequel of my business.”

“I feel the vast obligation I am under to you for the generous assurance with which you have honoured me, as you would wish me to do it.”

“I pass my time in comfort with Lord Cornwallis, respected by him, and of course by others; and I smile with pity at those who withheld their respect, because they thought to court favour by doing so.” ●

“Macpherson went away in the ‘Barrington;’ he *stole away*, and thus preserved his real character to the last. From the ship he sent up a sealed paper, to be lodged with the Secretary, which is to be opened when he is dead, or sends further instructions about it. Some say it is a prophecy, to be opened if it comes to pass, or to be suppressed if it does not; and add, that this is the best mode of prophesying. He set off to go to Madras for his health, now he is going to the Cape for the same purpose, where, I suppose, with the rest of the people, he will find a French frigate to carry him to the south of France for his health or safety. What a misery it must be to be conscious of deserving contempt!”

“To-morrow morning Cornwallis reviews us, so lest I should not be able to resume the pen in time for the packet, may every human good attend you.”

I am, &c. &c.

T. D. PEARSE.”

“*Fort William,*
18th of February, 1787.” }
}

On the 28th of December, 1786, we find Colonel Pearse’s opinion upon the use of 3-pounders recorded in a letter to Lord Cornwallis, being an answer to a communication from Government, proposing that a portion of Bengal 6-pounders should be sent to Madras, and some 3-pounders received in exchange.

“With respect to the 3-pounders which the Presidency of Fort St. George offer to this, I beg leave to offer my opinion, that they are not worth accepting, unless for the purpose of the metal to be cast into 6-pounders; and this, if they arrive here at all, I beg leave to recommend, having by very long experience, found that a

less calibre than a 6-pounder is not capable of producing any good effects, and consequently 3-pounders are very little better than incumbrances. We have eighteen here already."

"In the late war in the Carnatic it was found that 6-pounders with horses, could follow the Cavalry wherever they moved; so that if we needed guns for the Cavalry, it would not be necessary to have 3-pounders, even for this purpose."

On the 28th of February, we find a letter written to Lieutenant Colonel Call, on some projected improvements in Fort William. The concluding passage is, "I send you the names of the Bastions, &c. of the Fort, as I should name them. I take the names from those in actual use:—

*New Names for Gates, Bastions, Ravelins, &c. &c.
of Fort William.*

- A. South Bastion, Duccan Burge,
- B. Chowringhee Bastion, .. Chowringhee Burge.
- C. Tank Bastion, Thalaub Burge.
- D. Calcutta Bastion, Calcutta Burge.
- E. Bazar demi Bastion, Bazar Burge.
- F. Arsenal demi Bastion, .. Silla Conna Burge.
- G. Chowringhee Gate, .. Chowringhee Durwazza.
- H. Tank Gate, Thalaub Durwazza.
- I. Red Gate, * Loll Durwazza.
- K. Kidderpore Gate, Kidderpore Durwazza.
- L. Calcutta Gate, Calcutta Durwazza.
- M. River Gate, Deriah Durwazza.
- N. Chowringhee Ravelin, Chowringhee durwazza burge
- O. Tank Ravelin, Thalaub Durwazza Burge.
- P. Red Gate, Loll Durwazza Burge.

- Q. Kidderpore Ravelin, .. Kidderpore durwazza burge.
 R. Calcutta Ravelin, Calcutta Durwazza Burge.
 S. Bazar Counter-guard, .. Bazar Bahir Burge.
 T. Arsenal Counter-guard, Silla Conna Bahir Burge.
 U. Barrack Redoubt, Barrack Bahir Burge.
 V. Ghaut Redoubt, Ghaut Burge.”

On the 10th of March the Bengal Artillery was reviewed by Lord Cornwallis at Dum Dum, and His Lordship expressed himself much pleased with all he saw, and a general order was issued so flattering to Colonel Pearse, as to call forth a letter to Lord Cornwallis expressing his most lively gratitude.

In consequence of a great number of desertions having taken place from the European troops in garrison, Colonel Pearse on the 22nd of March, presented a paper to Lord Cornwallis on the subject. The three concluding paragraphs of this paper relate to a subject which is well worthy of consideration, viz. the establishment of regular punch-houses, where there are European troops.

“If this be done, a well regulated punch-house in the Fort will contribute to sobriety amongst the men, and prevent many from going to town, where they are seduced by the low Europeans, and secreted until berths are provided for them on ship board.”

“I do not propose a punch-house for the emolument of the Commandant, as I have never yet benefited by the destruction of my men.—I renounce such gain, were it admissible;—but I verily believe that a punch-house is an actual necessary in Fort William, and I therefore recommend it.”

“It is necessary to prevent excesses and other vices, and I do think recreation, well regulated, may do much

more than the most exemplary punishment. The troops ought to be paid by the week, they are now paid monthly. But as the pay serjeants were lately struck off, they ought to be restored; the striking them off did not save 500 rupees per month, and it was a very ill-judged saving."

On the 18th of July Colonel Pearse addressed a letter to Lord Cornwallis, proposing improvements in Fort William, which we believe were all attended to, and executed according to Colonel Pearse's suggestions. The principal of these were:

1st. Lining the ramparts of the Fort with bricks throughout, which is only partially the case now.

2nd. Altering all the drains in Fort William, so as to make them shallow and broad, instead of being deep and narrow, to the great nuisance of the garrison.

3rd. New sluices to be made, to keep the ditch of the Fort clean, so as to enable the water to be carried completely round the Fort: entering at one end of the ditch, and running completely round the Fort with a gradual fall to carry off the water.

4th. Small arcades to be built in the ravelins for the sepoy's of the garrison to cook their victuals in, for which purpose no place has been to this time provided.

5th. That necessaries should be made over the Cunette for the use of the sepoy's and servants, which have not to this time been provided.

Lord Cornwallis proceeded on a tour of inspection to the upper provinces in the month of July, 1787, leaving Colonel Pearse in command of Fort William, with power to assemble Native General Courts Martial when necessary.

On the 13th of February, 1788, we find a letter addressed to Sir Joseph Banks as follows:

“SIR,

“A small box will be delivered to you by Captain Cooper, of the ‘Atlas,’ East Indiaman, who has been kind enough to take that charge and trouble for me. It contains a meteorological journal of the weather here from the 23rd of November, 1773, to the end of June, 1787. Also a brass model of a Machine to turn a mill by the steam engine. A model in ivory of a vertical axis, supported by three friction wheels. A model in wood of the same, with four friction wheels, when the weight is great; and a model of a Marine Barometer tube. I beg the honour of their being accepted by the Society.”

“In the packet there is a letter containing further accounts of these things, addressed to you. I beg you will excuse the liberty I have taken, for though I claim a right to be a fellow-labourer in the field of science, I have not the honour of knowing you personally.”

“Certain astronomical observations that I sent home to Mr. Maskelyne, and which he did not lay before the Society, with others, made as the detachment which I commanded in the late war in the Carnatic, marched back to Bengal; by which a survey of 1,200 miles was accurately made, have been printed for the first volume of the Transactions of the Asiatic Society of which I have the pleasure to be a member. I shall have the honour to send a copy to the Royal Society, unless our learned President should think proper to do it. I will send home by the next ship, the continuation of the meteorological journal, and henceforward a copy of the journal of the year annually; unless our Society should desire to print it, in which case as I have not yet the

honour to be a member of the Royal Society, I must admit the prior right to the produce of my labours, such as they are, to be with the Asiatic."

I have the honour to be,

Sir,

&c. &c. &c.

T. D. PEARSE."

"Fort William,
13th of February, 1788." }

The following description of the models sent to Sir Joseph Banks, appears in a letter to him as President of the Royal Society. As it also contains an excellent description of the mode of filling Barometer tubes with mercury, we transcribe it as an interesting and valuable memorandum to the Indian Philosophical reader.

"The model made of brass,* shews the method of working two pistons by the motion of a winch, or the reverse of that, the method of turning a wheel by the motion of the lever (beam) of a steam engine. This was sent home by me some years ago to Sir Robert Barker, and was invented by me in India in the year 1779. Sir Robert did not present it to the Society as I requested, because Mr. Smeaton, one of the members of your Society, said it was not my invention. I presume Mr. Smeaton could only mean that I was not the *first inventor*, and whether I am so or not, I cannot take upon me to say positively, though I still believe I am, and I shall trouble you with my reasons for that belief."

"In the Philosophical Transactions there is a paper of Mr. Fitzgerald's, and a drawing of his contrivance to turn a wheel by the lever of the steam engine, which

* This is the same contrivance, of which a plate and description is given in vol. I. page 172. .

method is totally different from mine, and very complex."

"The late Mr. Stewart, who published an account of Bootan in the Philosophical Transactions, and who was formerly Secretary of the Supreme Council in Bengal, a gentleman of my intimate acquaintance, who I believe was a Member of the Royal Society, and Society of Manufactures and Commerce, shewed me a very little while before he quitted India, a model of a contrivance of his for doing the same thing. His method was totally different from mine, and effected what was intended to be done, by means of a chain, the links of which worked in the teeth of an arch described by the beam of the steam engine. This method was borrowed from the rope makers in India, who twist their strands by a rope that passes over a pulley above the twisting spindle."

"By discoursing with him, I learned that a method of turning a wheel by means of a steam engine, was a thing much sought after at home; for that Fitzgerald's, the only mode he then knew of, was too complicated. In 1780 the Board of Ordnance of Bengal, having desired me to give directions for the construction of some engines to extinguish fire, it became a subject for my consideration what mode would be the easiest to work the pistons, and this led me to the invention. The late Lieutenant Colonel Watson, who was then but just returned from England, told me that he had seen all the newest improvements in steam engines, and that my mode of turning a wheel by means of them, was different from, and more simple than any he had seen. I have lately obtained the publications of the Society of Arts and Manufactures of England and of France, and I do not find in them any thing like what I have now the honour to send to you. From what I have said, I

think that I have shewn clearly that I am the first inventor of this mode; and I can positively assert that I did invent it, that is to say, that I did not receive any hint about it either from books, writings, or discourse, and this is all the merit I presume to claim. The model in ivory shews the method of supporting a vertical axis on friction wheels, which I perfected about two months ago. In this model, the friction wheels are frustums of cones, the radii and axes of which are equal; and the screw at the outer end of the axis of one of these friction wheels, adjusts and applies that friction wheel to the cone that supports the vertical axis, and at the same time keeps the base of the friction wheel from touching the support of its axis, thereby preventing in a great measure the resistance which the friction wheel might receive from friction. I hardly need say that such a screw is necessary to each friction wheel."

"When the weight to be supported is very considerably greater than the effort to displace the axis laterally, the number of friction wheels can be increased to four, and the slant side may be less inclined to its axis; in which case, the slant side of the cone of the vertical axis must be more inclined, so that the angle which it forms with its base, may be equal to the complement of the angle which the slant side of the friction wheel makes with its base."

"The model in glass shews how to convert a land barometer into a marine barometer. The piece of ivory which contains the small tube, must not be fixed to the large tube by cement, or made air tight; because in fixing it on, some air would be confined, and thereby introduce itself into the tube when the barometer should be put up for use. It must however be fixed firmly, and

but just loose enough to give the air passage through its junction with the glass. The small tube is fixed into the ivory on the same principle, and air can escape beneath it."

"After this apparatus is applied to the tube in which the mercury has been boiled, and that tube is fixed into the box of the barometer in such a manner that the mouth of the tube itself, exclusive of the ivory apparatus, be always half an inch immersed in the mercury; if the box be filled, and the part of the tube below the box be heated, the mercury within the tube, by its expansion, will drive out the air lodged in the vacuities between the glass tube and the ivory apparatus, and therefore complete the continuity of the mercury within the tube, with the mercury in the box. As the mercury cools, the mercury in the box will supply the place of the air, and for ever exclude it from the tube. Experience has taught me that the small tube must be fixed horizontally at the side of the ivory; as it is in the model, and not vertically through the bottom of it. As I do not find that this apparatus does in any degree prevent the mercury from rising to the same height that it would do in an open tube, I am of opinion that it would be an improvement on barometers in general, to make them so; as it would in a great degree prevent the possibility of any air getting into the tube on sudden jolts, or jerks in carriage. Barometers in which the mercury has not been boiled through the whole extent of the tube, are of so little worth, that the makers of them may perhaps be glad to know how they can perform the operation without much expense, or danger of breaking the tube. This may be done in the following manner:—

“ Let an iron sling be prepared to support the tube in a vertical position. This sling should consist of two circular plates of iron, each twice the diameter of the tube intended to be heated. Let these be perforated with three holes across a diameter of each; the two outermost are to be of the size of a wire strong enough to support the tube and the mercury. In the lower plate, the middle hole is to be of a conical shape, (counter sunk,) to receive the end of the tube which is to be supported.”

“ In the upper plate the middle hole is to be wider than the largest tube used; these two plates are to be joined together by two bars of iron rivetted into holes at the edges, and are to be distant from each other about 30 inches.”

“ In the upper plate two additional holes are to be bored near the edges, at right angles to the former, into which are to be introduced the ends of the loop of iron which is to support the whole apparatus. This loop or handle, is to be wide enough to allow the introduction of a small iron funnel, to be fixed upon the upper end of the tube.”

“ Let a small funnel of hammered iron be prepared, the cup of which is to be about $1\frac{1}{2}$ -inch in diameter, and as much in depth; in shape like a small tea cup; the hole at the bottom of the cone of the funnel is to be less than the bore of the glass tube, but the neck of the funnel is to be wider than the external diameter of the largest tube, to which it is to be applied. Let the whole be made as light as possible, but all of one piece, without seams or solder.”

“ Let a furnace, in shape like a large bowl, be prepared, about 15 inches in diameter, and 4 or 5 inches deep; and

let the bottom be perforated with a hole a little wider than the plates of the iron sling. Let this furnace stand upon the top of a tube of wood or metal, about $3\frac{1}{2}$ feet high, and be placed exactly beneath a pulley fixed to the ceiling or any other convenient place, and distant from the top of the fire about five or six feet. Fill the tube in the usual way with mercury, and then put on the iron funnel, filling up the vacuity between the glass tubè and the neck of the funnel with thin pieces of cork, to prevent the escape of the mercury, then cut off the superfluous part of the cork, even with the lowest part of the neck of the funnel, and pour mercury into the funnel, until a little rises into the cup."

"Let the tube thus prepared be put into the iron sling, and the handle of the sling be tied to a cord that passes over the pulley before mentioned. Let a fire be made in the furnace by putting large pieces of charcoal round the edge of the hole in the bottom of the furnace, until the bowl is full; then let the operator take the cord in his own hand, and lower the iron sling gradually into the cylindrical cavity of the furnace; then watch the mercury until it boils at the closed end of the tube, at that place the boiling ought to be continued for nearly a minute. The operator must then let the tube down about an inch, and wait until the mercury of the tube of the part in the furnace boils. This must be continued inch by inch, and in this manner the process may be safely conducted. The fire must be kept up by means of broad fans, any blast from a bellows, or the smallest moisture within or without the tube, will infallibly cause a fracture. When the operation is ended, the iron sling is to be removed from the furnace, to a place where it may gradually cool, and the funnel and mercury is not to be

taken off till the tube is wanted for use. It will also be necessary so to regulate the fire, that the mercury may not boil furiously; but a degree of heat less than boiling will not drive out the air, it must actually be made to boil.*

The description of the alteration in a Barometer, as invented by Colonel Pearse, is also sent in a letter to the inventor of Marine Barometers.

In Fig. 1. Plate xiv, *aa bm ln*, represents a section of a piece of ivory—*d*, a small piece of a thermometer tube—the neck of the ivory, of which *aa* are opposite points of the edge, is turned small enough to enter the Barometer tube, without any force being required to push it in. On the horizontal part of the shoulder of the ivory *b, b*, small grooves are to be made, so as to give passage to the air. The same is also to be observed in regard to the tube *dd*. This small apparatus is to be bound on with silk, after the tube is fixed into the box, and the box is filled with mercury. Heating the tube will make the mercury expand, and drive out the wind. If it were air tight, the wind would be confined, and spoil the Barometer, as experience has taught me. When the mercury cools, the union between the mercury in the tube and that in the box being complete, it will be impossible for any air to get in, so long as the box is kept full of mercury; but unless the mercury in the tube of a Barometer is boiled inch by inch, it is of little worth. As we have no glass houses in India to supply our wants, those

*The operation of hermetically sealing spirit tubes, or boiling the mercury in barometer tubes, is best performed in the dry months of the year, in India; as during the rainy months, the superabundant moisture of the atmosphere condenses on the surface of the glass when heated, and is very liable to cause its fracture. Ed.

who use mathematical instruments here, must often mend, and sometimes make, and at other times must contrive how to turn one instrument into another.

In March Colonel Pearse addresses a letter to J. Scot, Esq. in which he states that he has been long labouring under severe illness, and the letter concludes as follows :

“The pangs I feel for Hastings are severe indeed! When I read the debates upon the subject, my soul is all on fire! I see with horror that faction murders truth, and drives out every endeavour to defend her! Acting supplies the place of argument, and mutilated fragments of mutilated letters are brought as proofs, which the mob hear without understanding, and believe because incomprehensible; although delivered in flowing periods, and enforced by the wonderful exertions of the actor.”

In November we find the following interesting letter,

To Mr. Hastings:

“MY DEAR FRIEND,

“I can truly say that this year has not passed without affording something to gratify me, for in it I have had the happiness to receive five kind letters from you, for which I give my sincere thanks. Your first of the 8th of February mentions the pleasure you received from hearing both from me and others, that Lord Cornwallis has thought me worthy of his notice, and has on all occasions treated me with a most friendly attention, (which rather increases than the contrary) and I will study to deserve it. Hussey delivered me a letter of the same date, and your intimation that he shewed attention to you, shall entitle him to every attention on my part. Hitherto I have been able to shew little or none to any

body; for indeed, my dear sir, when your letters arrived, I did not imagine that I should live to answer them. Lieutenant Cooper delivered your's of the 25th March, he shall meet every assistance I may be able to give. I trust he will not suppose that I have neglected him, though from the severe illness which I have laboured under, I have not been able to see much of him. I have not the means of serving him for ever, which he sees plainly: Lord Cornwallis has not, and yet he would do it if he could, because he is recommended to his Lordship by General Conway, who, whilst he was Commander in Chief, paid much attention to His Lordship."

"Nicholls and myself were school-fellows and bed-fellows at Mitcham in Surrey, where he staid to finish his education; but the ruin of my father turned me adrift at fourteen and a half years old, with an education not half finished. Thank God! however, I had been pushed on far enough to give me a relish for study, to which, added to a constitution ever unsuited to riot, I owe that course of life which has blessed me with the honour of being admitted to your friendship. It is a great pleasure to hear that Nicholls has displayed the principles which worthy old Evanson deeply planted in our hearts; and I trust that either of us would rather die than renounce those principles. *By these he has dared to refuse to act contrary to truth."

"Your kind letter of the 27th of March would have made me submit with patience to the pitiful arrangement about rank. Musgrave is a brave soldier, and bled for his country in America; some of us are not less so, and have bled for our country in India. Musgrave deserved rewards from the king; but he had not any right to my slice of it; for a right I had, because though under the

Company's name, still England was the cause for which we fought. Here we did conquer, but there all was lost that was fought for. It is true Hastings forbade us to let the English colours fade in India, and his orders filled every soul with enthusiasm; so the English standard brightened in the East, and now we are ready to support them again under the same impulse. But the new arrangement of rank tends actually to debasing the whole of the Company's service, with the specious appearance of granting nearly all we asked; for it will be said, though the cessation of arms at Cuddalore is fixed for the period of the commencement of this arrangement, and about a third of the Company's Officers do not instantly get what they asked, yet as the promotion goes on in both services according to the casualties of either, in a few years all who seem at present excluded, will enjoy equality of rank in their next commissions—this is specious—but false, as it applies to all, for the Colonels are excepted, and therefore equality of rank is refused in the superior ranks."

"The Directors sent orders in 1786, that there should not be any Officer in their service promoted to a rank above a Colonel; and it is enforced with the utmost strictness and even severity. For Horne and Nelson, who are Brigadier Generals, are, on the 29th of September next, to become Colonels of 1783. McLeod, Elphinstone, and two or three more Lieutenant Colonels and Majors of the King's, with the rank of *full Colonels in India*, are at the same time to yield up their local brevets: all this seems fair,—but it is not so. The order to stop our promotion puts us beneath them. In September next they will become Lieutenant Colonels and Majors, and our two Brigadier Generals will become Colonels.

By September next they will become Colonels on some general promotion in the king's service, and perhaps are so at this moment; then they rank with the Company's Colonels according to the dates of commissions for a little time, until by another general promotion they become Major Generals, and then at once step over the Company's Colonels, who, by the orders of the Directors, sent by ministerial mandate, cannot be made Major Generals. Ultimately then we must all be superseded by Officers, not more deserving, not more skilful, not more brave, more loyal, or more zealous than we are as servants of the Company. It may be said that the rise in the Company's army being by seniority only, many rise up not fit for superior commands,—grant it—then let them look at home: I dare say they can find a fool to match our fool—and match for match as long as we can stake. One kind of wisdom even our fools possess, which their wise men cannot acquire at once, they know how to manage the natives and the climate; and their wise men despised both at first. Lord Cornwallis saw many monsters when he arrived, which he views now, not as monsters, but as things right in themselves, adapted to the country and the climate, and not alterable for the better. But every Governor who shall come will not be a Cornwallis, and the more stupid they are, the more obstinate they will be, and the more they will set their faces against any thing that deviates from the rules in St. James's Park."

"To write to you upon such subjects as these, would even to myself have seemed ill-timed; but that your letters have shewn you to be so much above the persecution which you are undergoing, that I hardly dare to write upon it. Yet I will venture to say that our feel-

ings boil with indignation at it; and whilst you are calm, we are overpowered with grief on your account. That you should find time to think of what we may suffer, and what in particular I may suffer from the consideration of speculative points, is too much, indeed it is! the very name of England is grown odious in my ears, and though invited to it by yourself, I will never set foot in it again, unless transported by open force; and if that should happen, only close confinement should make me stay in it for an hour."

"Your son-in-law is here, he lives with Thompson. Touchet never brought him to me, and it was some time before I knew that he was in India; but when Thompson goes I have laid claim to him, and have a room ready, not merely in my house, but in my heart; for he is your's, and therefore shall be mine, whenever he pleases to be so; and, I think I may say, as long as he pleases, for I can safely assure you, that I am in health again, though lean enough. Perhaps I must again have recourse to mercury, to which I certainly owe my life,—and as to my disease, the doctors may discuss what it is when it is gone from me. If I have any of it left, it is so little that I hardly know it, and though last year the cold almost destroyed me, this year I feel it comfortable and delightful. May the House of Lords deliver you from the hands of your persecutors! may their rancour prey upon their own minds! may your triumph be great, and long your life! Amen.

Your's faithfully,

T. D. PEARSE."

"Fort William,
9th of November, 1788." }

The following letter, containing instructions for the Trustees of Colonel Pearse's son, who was in England for education, we find in the Letter-book of this period.

To the Trustees of Thomas Deane Mahummud Pearse.

“GENTLEMEN,

“I dare not absolutely prescribe a profession for my son, yet I sincerely wish that he may be educated for public life, and the bar seems to be the only line in which a man can force his way, and rise by his own abilities to dignity and importance. The qualifications for the bar will also, with the same abilities, enable a man to become conspicuous in parliament, therefore I request that he be educated for the bar. I have accordingly set apart five hundred pounds a year for his education, and he has already been put to school at Harrow with a private tutor, to push and assist him in his learning, and I mean this assistance to be continued. When he shall be qualified for the university, I request that he may be sent to Cambridge. His grandfather was a fellow-commoner at Jesus College; but the choice of the College must be left to you, for I understand that there is a great difference amongst them, and that much depends on the choice. In choosing Cambridge, perhaps I err; Oxford may be fitter for the object I have in view; and as the time of sending him to either is distant, it may be the subject of future letters, and I shall hope to be advised by you.”

“Having mentioned parliament, it is necessary that I should advise you, that at this instant I have not the means of pushing him in that way. At present what I give in trust to you, is all that I see any prospect of being able to appropriate to him during my life time. I therefore earnestly hope that he may take a liking to the

bar, and practise the profession; the rest must depend upon his own abilities, eloquence, and learning, and on his own desire to rise and be conspicuous. I know, my friends, that I myself, ought to be the person to direct upon the spot, but as I have met the most grievous disappointments, I must not presume to entertain the thoughts of revisiting the country I was born in; nor of enjoying the delights of watching over the progress of my son in the different stages of his education."

"It is, I fear, become a part of education, to make boys stage-players. It may be said that it teaches them the art of speaking correctly in public, and so it is a necessary part of that education which I have pointed out for my son. But I confess it does not seem to me at all requisite. I do not find that ever Cicero, or Demosthenes, were stage-players; and though Sheridan acts plays and writes them, though he fabricates speeches of six hours length, and rehearses them with all the action of the stage, I am fully convinced that Cicero would have done more than Sheridan, without that kind of acting which converted the House of Commons into a play-house, and made a player lament that Mrs. Siddons could not be present to represent the Bhoo Beegum.* If therefore it be possible in these times to teach my son to speak like an orator, I intreat you to guard him against the dangers of stage-playing. Music and painting are deemed fine arts, and kings play solos, and some paint pictures; but I know that to do either well must require much time for practice, if a man means to excel, and the necessity of associating with those who excel in these arts, too often corrupts the morals, and certainly wastes time that cannot be spared from studies of ano-

* Alluding to the speeches in Mr. Hastings's trial. Ed.

ther kind, by the barrister who aspires to the dignity of Chancellor. Instead therefore of becoming a performer, let him if possible be taught to be content with being one of the audience or spectators."

"Riding and swimming are necessary to every man; perfection in these arts may save a man's life; and the first is almost indispensibly necessary for every gentleman, who means to use exercise."

"Fencing and dancing are absolutely requisite, because they give that grace and ease which qualify a gentleman for public company."

"Mathematics teach the art of reasoning strongly, truly, and conclusively, better even than logic alone; but both combined lay the foundation of manly eloquence. Therefore I hope he will learn all these arts, and pursue these studies so far as may be necessary for the orator; but as I know the danger of intense application to mathematics, I pray you to guard him from it."

"Preserve him from gaming; and I pray you to enjoin him to defend his own dignity by his own strength and courage, and yet not be quarrelsome. If I seem too minute, excuse it. I have but this one child, I want to have him high in the estimation of mankind: manly, graceful, learned, not pedantic, eloquent and bold, able to defend himself, yet inoffensive to others, and above all determined to form his own fortune by his own abilities, firmly resolving to rise to the highest dignity, and daring to clear away impediments. And because, my good friends, I cannot be his teacher as I ought to be, I hope you will not think that I have been too particular. For a moment change places with me; but may you never have the pain of being forced to trouble others to perform for you what you long to perform for yourself,

nor meet with misfortunes to compel you to submit to it."

"T. D. PEARSE."

The following letter to a Mr. Watts, who had made some application for the patronage of Colonel Pearse is strongly characteristic, and as such we give it a place.

To Mr. Watts.

"SIR,

"It would afford me much real pleasure to be able to assist any gentleman of my acquaintance, who should, unfortunately for him, have occasion to wish for my aid. But I fear that your case is of that nature, that I have not the means of being of the smallest service. The post which you have mentioned is not of a military nature, nor is it in any shape whatever connected with the army. It has been the invariable rule of my conduct to confine myself strictly within the line of my profession. Though Lord Cornwallis has condescended to think me worthy of his notice, and the honour which that notice does me is the source of much happiness, yet I cannot venture to presume on it by introducing subjects to his Lordship, which in the time of my closest intimacy with my much to be honoured friend, Mr. Hastings, I would not have spoken to him about; lest by doing so, I should have renounced my own principles, and broken down the bounds which I had prescribed for myself. These reasons will, I hope, suffice to shew that in your case I can only lament that your labours have not been rewarded with success; and yet as Mr. Shore has taken up your cause, I think I may venture to say, that I perceive fair prospects opening to your view, and feel much satisfaction on that account."

Colonel Pearce having received orders from Lord Cornwallis to examine some papers containing a proposition to construct some new Powder-Mills by a Mr. Farquhar, the following was his report upon the same. The account of the strata of the soil at Garden Reach is curious.

“In obedience to the orders of the Right Honourable the Governor General in Council, I have perused the papers concerning the Powder-Mills, and I have examined the ground on the spot, and the plan of the Nullah taken by desire of the Committee, by Lieutenant Wilton, of the Engineers.”

“I am of opinion that the Nullah is capable in its present state, of supplying water for more than the number of mills proposed; for by calculation I find it holds, exclusive of the branches, a difference between high and low water of cubic feet 9,410,444 up to Kysapore or letter F only, and a sluice there erected, would at a small expense widen it to hold double that quantity.”

“The necessity of having good powder need not be argued by my office; I am qualified to say that though the powder made since Mr. Stewart’s time, is upon the whole stronger than the Government powder in England when I left it, yet it is not so good in point of *equality of force*, as that was.*”

* We believe this to have been the case generally with Indian made gunpowder. It is a point of serious consequence to the Artillerist, for it is impossible to make accurate practice without powder of equal strength. Doctor Hutton in his *Mathematical Tracts*, describes his *Eprouvette* as a means of ascertaining the strength and quality of gunpowder in a more exact and easy manner than with any other known mode, and with this opinion we fully coincide. But Dr. Hutton asserts that “the accuracy and uniformity are such, that in a number of successive trials” (the recoils) “do not commonly differ by more than a small fraction of a degree out of an extent of 40° or 50°

“ I lay before the Right Honourable the Governor General a medium of a certain number of rounds of powder fired from each mortar, in the years 1787 and 1788 at Dum Dum, and the last experiments were made with mortars standing upon wooden platforms, which at the end of the season were very little affected, and had only suffered by the starting of a few nails. These will shew the variations of the strength of powder of the same weight, and used in all respects under similar circumstances. The experiments of last year are the most to be relied on, because the two large mortars were new. The shells in these experiments were always of the same weight, and the whole of the powder intended for the experiment was started into an heap, mixed together, sifted, dried, repacked in barrels, and afterwards turned every day in the magazine till opened for use.”

“ The place chosen is in my own opinion better than that where the mills now are, the water is fresh, and fitter of course for refining saltpetre without expensive repetitions. Below the fort they were liable to be destroyed at any time, for an armed boat might have passed up the river, and have done the business before intimation of the design could be had. The only objection to the new place, is the vicinity of the foreign settle-

on the instrument.” See vol. III. page 153. This circumstance shew an equality in the strength of the gunpowder which the Doctor used, which we fear has not yet been obtained in the Indian Manufactories, though we have heard the Madras powder very highly spoken of in this respect. We consider a little superiority in the strength of powder when fresh, as unimportant when put into competition with the circumstance of *equality of strength* in the composition. The care and exactness which the Artillery Officer may bestow in cutting the fuzes of spherical case shot to the exact lengths for different distances, is thrown away if the charges of powder are not of equal strength. **ED.**

ments, and the possibility of the destruction of the mills in case of war, by some sudden effort of the nation about to commence hostilities with us, should they have the means of conveying intelligence to their settlements earlier than we can get it. Why this should ever happen, I do not now know, and if Suez be again opened to the English, I think it cannot happen at any time. The mills intended to be erected, will, I am clearly of opinion, make powder more equable in force than the present rolling mills. I do not say any rolling mills, because I think these are capable of being improved, till they acquire superiority over pestles or pillons."

"That the present powder works are all in ruins is well known; therefore I think it will be better to erect new mills in a fit place, than to repair ruined mills in an objectionable one. Upon the whole I do not see any thing that ought to impede the experiment proposed."

"The Nullah is the drain of a very extensive jeel, and itself will afford some water during the whole year. It is said that in the rainy season the jeel communicates with the Sunderbunds; in some future day it may be an object to open it by a canal. Mr. Farquhar proposes a cut to carry off this water, but it will operate against his plan; and if the same sum were expended to make his floodgate a lock, it would secure an inland navigation."

"Having had occasion to examine the strata of the soil to a considerable depth, I presume to subjoin the observations, as they will serve to shew whether piling is, or is not necessary. They furnish me with reasons to think, that if the river end of each mill-course or sluice be placed at 100 yards from the natural bank of the river, piling will not be necessary, and were I to build at my own risk, I would not incur the expense of piles."

“ Account of the different strata of soils found in digging a pond and wells at Colonel Pearse’s garden, 3½ miles below the Fort.”*

	<i>feet.</i>	<i>inches.</i>	
Vegetable soil and sand,	7	10.5	
Brown clay which crumbles on exposure to the air,	0	10	
Soil, clay, mould, various strata,	5	0	
Marle and turf,	1	10	} springs.
Whitish blue clay,	1	10	
Marle, turf, and roots of large trees, ..	1	10	
Stiff whitish blue clay,	17	6	
Clay and sand, with a little water,	3	0	
Blue clay,	5	0	
Black tenacious clay with lumps of brown calcareous stony matter in considerable quantities,	2	0	
Lighter bluish clay, with white calca- reous stone in lumps which efferves- ces furiously with acids,	8	0	
<hr/>			
Total depth, 54		8.5	

“ Below this depth there was found yellow clay and micacious sand, about 3 feet in depth, and beneath the yellow stratum very fine water, which held in solution a small quantity of mineral alkali, and was saturated with fixed air. The water was slightly acidulous, the spring rose 35 feet in four hours, and the springs have kept the pond flowing ever since at the height of 46 feet.”

* “The measures were taken from a fixed pin.”

	<i>feet.</i>	<i>inches.</i>
The well commenced from above low water of spring tides,	22	0
And the bottom is below the level of _____		
low water,	32	8.5

“From the upper strata that are visible at Nawab Gunge, and from the boring began at low water mark, I conceive that the strata are the same, and if so, Mr. Farquhar will have the stiff whitish blue clay of 17.5 feet thick to support the foundation of his works.”

In a letter to Lord Cornwallis we find some remarks upon the subject of perambulators, which ought not to be overlooked. Colonel Pearse says,

“In the march to the Carnatic it was found that the perambulator was rendered useless before the detachment had performed a fourth of the march, the Surveyor was actually obliged to buy a new one at Masulipatam, and that also became useless before we reached Madras. The perambulators with small wheels and clock-work, are therefore by experiment proved to be unfit for service of any duration.”

“In the Madras army Captain Pringle measured with a wheel of 7 feet diameter; and I caused a wheel to be made of the same dimensions, and adapted to it brass counting machinery,* very different from what he had used, and I think better. One of these was used in my

* What the construction of the counting part of these perambulators was, we are at a loss to ascertain. Edgeworth's Perambulator, in which an index moves along a fine screw within a tube, is as simple and correct as any instrument of the sort: but it is probable that Colonel Pearse may have adopted the endless screw, cut upon the axis of the wheel, which works in two toothed wheels suspended from that axis, a construction which has lately been revived in Bengal. Es.

journey (with the cash) from Ganjam to Madras, and afterwards in all our subsequent marches quite down to Cuddalore, and from thence to Calcutta. Before we set out upon our return, two more of the same kind were constructed, and connected together by an iron axletree; and with these three, the distances were measured for that fine survey which was made by Lieutenant Colebrooke, in which the difference of longitude between Madras and Fort William, derived from the reduced measure by the wheel, and that calculated by observations of Jupiter's satellites, differed, as I think I found it, not quite five geographical minutes. I therefore recommend the single wheels of this construction for all future surveys, and will lend mine to the arsenal as a pattern for more to be made by. As perambulators are included in the proportions of stores, I beg leave to recommend sending them to the different stations, and also one to the office of the Chief Engineer, and another to that of the Surveyor General."

In January 1789 we find the following interesting letter to General Pattison, of the Royal Artillery.

"MY DEAR FRIEND,

"This season I was made happy by the receipt of your two kind letters, for which accept my warmest thanks; but still more for the generous part which you take in my concerns."

"The arrangement of rank is so strange, so incomprehensible, that I will plainly acknowledge, that it does not please me, and that it ruins my prospects for ever. What passes on my mind on this occasion, it is not necessary for me to load your's with: you already pity me, your letter was to teach me to bear my fate. I trust that

I shall not shew myself quite unworthy of your friendly admonition, and if by expatiating on the subject I could through your support obtain redress, of what since it is undeserved, I really deem a grievance, I could draw such a picture of my own feelings as would be highly improper now, because it would only make you uneasy. God forbid! that any thing which I may write should ever produce such an effect, and so I will turn away from this painful subject, and only add that we have received the *things called brevets*, for which we paid half price fees: it runs thus—“but as this commission is granted to you in virtue of the rank which you bear in the service of the Honourable East India Company, it is to have force and effect no longer than you shall remain in the said Company’s service; unless you shall be transferred, with similar rank, into the immediate service of His Majesty.”

“From the latter part I consider it as the *lease*, and presume the *transfer release* is not far off.”

“The ‘Swallow’ arrived on the 22nd instant, it brought me many letters, but there was one I wanted and did not find. I hope my disappointment arose only from your being engaged in contemplating the beauties of nature, and the sweet prospect of rich abundance in the harvest that was about to reward the husbandman for his toils soon after she sailed. We have been afflicted with famine here, but the last crop set all right in this quarter; though I lament to say that famine has only shifted place: though we have plenty here now, our supplies will hardly serve the wants of other parts of India.”

“You will have heard how Burke’s humane, gentle, mild, beneficent Rohillah* has plucked out the eyes of the aged, weak, infirm, oppressed Shah Allum, his law-

* Gholaum Khadir.

ful sovereign; how he was scourged with stripes, how the zenana was plundered, and the wives and mothers of the heirs of Hindoostan were stripped and dishonoured: how he took out another line, and placed him on the throne; then scourged him; how he lastly deserted Delhi, and carried away the sons of Shah Allum, but left the old king to perish in the fort, helpless, distressed, deprived of his eye-balls, tortured with the pains of his body, and racked in his mind for the fate of his unhappy children, whom the tender Rohillah had taken under his own care. The children he flogged, to make them feel that they were men; he disgraced them further by making them dance before him, to teach them how to move their limbs; he made them bow before him, to teach them humility. All this was done merely from cruelty, from a desire to monopolize the power of tormenting, and doing things monstrous to be told of."

"To the men in England, the few who merit the name I mean, it will prove that Burke and his followers can assert what is false, but dare not utter truth. To the *company* of the Chapel, it will afford a new charge against Hastings, and to Sheridan, a speech of a month long."

"Pray is it true, that the nobles have consented to let scenes he put up behind the throne, and a band behind the actors; and that Mrs. Siddons and Countess of P— and Duchess of F— and others of the weeping band, are engaged to act in the last scene of the trial, after Hastings shall have done, when the *gang* shall speak their last, (oh may it be their last dying speech!) and the curtain drop, till raised for the epilogue or judgment? Things as ridiculous as these are we hear; we certainly hear that the House of Lords was clapped by the

ladies in the galleries when Sheridan declared that his tale was at an end! From this little sally, which pray excuse me for, you will see that I am not quite overcome, nor in a dying way. All last year however I was in so precarious a state, that I did not believe that I should live it out, but time has shewn that my constitution was stronger than my faith. And now my dear friend, let me add a few lines that I know will give you pleasure, as the writing of them does to me."

"It is my happiness to be able to assure you, that I still retain that place in the good opinion of our noble Earl, which, from the time that I first obtained the honour of admittance to it to this moment, has been my comfort, my support, the gem which by its lustre shews where Pearse still exists, and still desires to be."

"This year (on the 17th instant) we were reviewed again by His Lordship. In my account of the former review, I described how we pass a ditch:—this year it was performed by the whole line of guns: first by the flank divisions covered by the centre, then by the centre covered by the flanks, both in advancing and retreating; and I believe that I fully convinced the spectators, that what we did would be practicable in the face of an enemy. The line of twenty guns was over in five minutes, and all were in line and firing with the water behind them, and in the next five minutes the water was between the enemy and the guns, and the firing never ceased. His Lordship alighted and came to the spot, into the midst of the busy scene, which was altogether as like a real action as it could be, nor did we think it any loss to be deprived of the sounds of the enemy's shot. His Lordship expressed himself highly pleased, and his thanks though only through me, were real. He does

not issue thanks by camel loads, as they do not at Madras."

"*Fort William,*
27th January, 1789." }
}

T. D. PEARSE."

To Mr. Petrie Colonel Pearse writes :

"You did us too much honour in supposing us worthy of the support you gave to our pretensions to full rank. If his Majesty had ordered that every Company's Officer should be commanded by his Serjeant Majors, we should have taken the parchment as we have done. There was a spirit amongst us formerly. They were served out at half prices, and recite that they cease to be of force, if we cease to serve the Company, unless we shall be hereafter transferred with similar rank to the king's. Some have got the lease, and the release will follow. My spirit boils within me. I said, I will not stay an hour, but I looked into my purse and found it empty, so I must stay to fill it if possible, and in the mean while I keep my brow as smooth as I can, and the wrinkles on the heart are hidden.*"

In the following letter there seems strong grounds for asserting that Colonel Pearse was most unjustly denied the rank which might have fallen to his lot, and soothed the last days of a laborious and zealous service of the Honourable East India Company.

* These ebullitions of dissatisfaction which we have recited in many letters, must have preyed much upon the spirits of Colonel Pearse and his brethren in arms at this period: they beheld themselves excluded from a just and equal participation in rank and honours with His Majesty's Officers, and subject to be superseded by them.

Every cause of dissatisfaction is however now most happily removed, and we may safely pronounce the Military service of the Honourable East India Company to be equal, if not superior in its advantages to any in the world.

To Charles Purvis, Esq.

“MY DEAR CHARLES,

“I resume the pen in consequence of a letter by the ‘Swallow,’ which came to hand only yesterday, as I have been sent cruizing for a week: it contains these words: ‘Mr. Darrel and myself (Mr. Mitchie, deputy chairman, *no objection*, the Secretary at War ready to carry up any recommendation for your promotion,) have done every thing in our power, but Mr. Smith, the Chairman, has carried the majority against its being recommended from the India House for your having that rank, which they say themselves you so justly deserve; and it cannot be done without this. It may be done when some other person is Chairman, for Smith has a relation who is inferior to you in rank; but he says he has been longer in the Company’s service, so they want such as are above him to come home, and then to send him out with his rank.’ Thus far the letter.”

“Nearly as much as this you told me, and this relation is Tottingham. Charles! it is not true that Tottingham has served longer, though he did come out to India before me. Tottingham arrived the 27th of July, 1764, and resigned the 20th of March, 1782, therefore he served 17 years and 8 months. Pearse arrived the 24th of August, 1768, is still here, and has not once been away or absent from his duty for 10 days, except on sickness; he has therefore served 20 years and a half, therefore to this day has served 1 year and 10 months longer than Tottingham, and when the Chairman urged the argument, had served at least a year longer than his relation. Were I a man of fortune I would wait for the rank, for it will come in course now. By the transfer I shall in 1791 become a Colonel in India from 1783, and fu-

ture promotions, which invariably follow, will give the title. The not giving the rank to me therefore will keep me here, whether I am rich or poor."

"My health, Charles, reminds me that I ought to visit England, and so I would, but besides the name of General, I want the means. If you ask why I do so, here is my answer. In 1781 I went to the Carnatic, and my allowances were settled as below, to which Morgan's and Goddard's are opposed.

	Goddard.	Morgan.	Pearse.
Pay for a month of 30 days,	300	300	300
Allowance for table,	5000	5000	4000
Batta for 30 days,	1500	1500	1500
Contingencies,	5000	5000	1500
Offreckonings,	0	150	150
Horses,	250	0	0
	12,050	11,950	7,450
Secret services and contingencies,	variable	7000	variable
And the sum total was only		18,900	17,500

"In 1785 I asked Mr. Macpherson for the difference; see his answer in orders, (vide Minutes of Council, 10th of February 1785). The answer establishes the justice of the claim, and the passing these allowances to Morgan in full, does it still more completely.—Then it is unjust to withhold the difference from me, merely because of imaginary distresses."

"Again, every senior Colonel, whether dubbed Commander in Chief under the Presidency or not, had 5½ shares of revenue; other Colonels had only 2½. The senior Officer had also very great allowances besides.

Lord Cornwallis gave the 5½ shares to the senior Colonel after Stibbert, and so to me, but kept the three shares in deposit. The Directors refused to grant the shares, they too urged the same imaginary distresses. What is withheld from me by these pleas of distress, would enable me to visit you—get me my dues and you shall see my person—yet, I would not make it a bargain so to do; my health would demand it and enforce it, if I could exist in England. Oh Charles! I have not the means. Deduct the 150.£ a year, or its principal, (for though not given, I will never resume it from my sister if I can avoid it)—deduct this, have I a thousand pounds left? After making my settlements here, if I live till May, I shall have 5,000.£ more, so six in all; and if I had the shares, I should have about a lac of rupees: if the Carnatic part I should be independent, and repair to the House of Commons; for, to obtain a seat there I came here, and until I can obtain it I will never quit. Somewhere I must die, then here as well as there; to me, here is better, because here I can live and save, amongst you I must beg, and who knows but I might beg in vain.”

“Mr. Smith then by opposing me has injured the prospects of his relation, and by opposing will still further injure him; for poverty compels me to stay, and the want of the rank would have warranted it. Both these the Chairman could have removed, by giving only what is my due; that is, by merely doing me justice. I write this, to be used if you please, and think it can be of any benefit, but I again say I will not bargain—I am free, —and I will be a free agent.”

• “Adieu,

Dear Charles,

• “30th January, 1789.”

• T. D. PEARSE.”

To Mr. Hastings.

“MY DEAR FRIEND,

“Your most kind letter of the 14th of April reached me two days ago, (on the 22nd January) by the ‘Swallow.’ Thompson had left us about a fortnight ago, and so I instantly sent to Turner, and yesterday he brought me that letter, concerning which you honour me with your commands. To-day it set off for Lucknow, committed to the care of that trusty Hircarrah who conducted my detachment from Masulipatam to Cuddalore, and from thence to Bengal, attended by two others for fear of accidents. I inclosed it in a letter to the Nawab, in which I requested that he would do me the honour to acknowledge the receipt of the letter by the dawk, to enable me to communicate the receipt of it to you by the latest ships.”

“Turner favoured me with a sight of your letter to him, and it determined me to send home a pair of Nepal pheasants, of exquisite beauty, which I have had ever since March last in a coop on purpose to prepare them for a voyage to you. If they live Blundel shall deliver them to you, together with a stuffed musk deer, in high perfection. Blundel is an officer of high merit, and a man of sound honest principles. I am promised more, and shall send all to you, that your villa may first be adorned with the plumage of Nepal, and England be indebted to you for another addition to its good things.”

“We hear that Dundas, having drank too much wine, acknowledged that the ministers suffered Hastings to be impeached for the purpose of quashing the power which Hastings and the Indians had. What a set of miscreants! They owe their existence as Ministers to the man they now suffer to be tormented more cruelly

than by the pains excited by racks and wheels; for what is bodily pain compared with that of the mind—and I can feel all that you must have felt, when the scurrility of one of your persecutors (into whose hands you have been delivered as a punishment for going home), extorted from you the exclamation—"it is false!"—an action which is bad in itself, cannot be made worse by the abuse of him who committed it; nor can abuse of a man under trial prove that he is guilty. Therefore a prosecutor who knows that his cause is good, and that his accusation can be supported by proofs, will cautiously avoid harsh expressions; while the prosecutor who feels that he undertakes to dress up fiction in the garb of truth, must rely upon abuse, and will try to harden the hearts of the judges by filling them with ideas of supposed criminality, all which must be conveyed and forced by eloquence and acting, and by the use of those very terms which men convinced of that criminality, would be apt to use in speaking of it. I rejoice that your vile persecutors have been reduced to the necessity of using such modes of proof as hitherto they have exhibited; for though it is odious to hear, and painful to bear in the first instance, yet the certainty of your internal rectitude, and the glorious triumph that will arise from exposing these falsities, will console you when it shall be your turn to speak; and the hearts of the judges will be filled with indignation against those who have laboured to pervert their judgment. This triumph, I trust, you will be receiving about the time that this letter reaches you; and God grant that it may be complete!—Oh may I live to hear of this! and to behold my Hastings emerged from the mist of delusion, which faction has raised to hide him from his country, and rewarded for his suf-

ferings by a glorious clearance from the mass of calumny, and for his services, by a seat amongst those men, before whom by barbarous forms he is obliged to kneel!"

"Concerning myself I have little to say, but that I was till December last in a very declining state of health, and at times through the last year dangerously ill. The cold season has in a degree set me to rights again, but the seeds of my disorder are not rooted out, and every cloud that passes makes me fear that they will shoot again. However I was able to exhibit such a corps, and such performances before his Lordship, as made him express his delight and astonishment, and I still preserve his esteem undiminished."

"We have received the half price commissions, not worth a rupee—dishonourable to hold, and meanly degrading to me and three more, and only to us four, for all the rest are rising to the rank of Colonel, and will acquire equality of rank. But I am poor, and so I will bear it for the little while I may live. Once I was high-minded and wanted a ribbon—now I shall endeavour to steer clear of a halter, since Mr. M * * * is made a Baronet, and S * * * has got what I strove to earn. I have missed my aim; it was not my fault, but it is my pain. Adieu! adieu! adieu!"

"Your's faithfully,

T. D. PEARSE."

The following letter is addressed to a Mr. Tyson, the private tutor of Colonel Pearse's son, when at Harrow School.

"MY DEAR SIR,

"My letter by the 'William Pitt,' and the duplicate by the Triton, will inform you of the pleasure your ac-

counts of my son up to April gave me, and you may naturally conclude that I was still more pleased to find by your's of August, that you consider his abilities of the first rate. God grant that they may turn out so through life. That he has made so much progress, that he has in so short a time got into the upper school, I attribute to the friendly aid which he has received from you. Left to himself he could not have accomplished it, and therefore I will take merit for putting him under your care, and render thanks for the pains which you have bestowed upon him."

"You already know some of my opinions on the modes of teaching; I own I am really a foe to those in use, and I confess I cannot see the smallest use in making Latin verses. I am certain this habit will corrupt the prosaic style, for often an elegant word must be put out to make room for one that is synonymous, in which the syllables suit the verse, and the words must inevitably be displaced to suit the metre in every line. This will introduce a habit of writing bad prose, and of choosing bad words,—and pray what good end can it answer? Men never talk in verse, unless they strut upon the stage and utter plays. You will say it will teach true pronunciation,—the length of the syllables I agree; but not pronunciation. I dare say my son is taught as I was—*lego, legis, lejit*, for *lego, lexis, lexit*—to call Julius who invaded England *Sezar* instead of *Kæsar*, and when he meets with the name *Καῖσαρος* will be forced to translate it *Sezar*. In Greek, in Persian, and in Arabic, it is *Keisar*, consequently the C in Latin was K, and not S, as we utter it before e and i; and the S never became Z. I dare say too that if the famous orator (whom I hope your pupil will through your care surpass,) was near by, that he

would not turn his head if one should call out O Sisero! which is the way I was taught to utter Cicero, and I remember getting a box on the ear for reading ecce, ekke, and not exe. Who would be able to guess that Diocess,^s Diaccious,st Cephalic,^s Cephalalgy,^{ri} Hydrocele,^s were all Greek, pure Greek, διοικήσεις, διοικος, κεφαλαλγια, υδροκηλη. I know my opinion will not be of any weight, because I do not pretend to be a man of learning. I was turned into life to seek for bread at 14½, just as I was beginning to understand what I had been drudging at, and consequently have no pretensions to deep criticisms in the dead languages. But remember, I only now write about the error of English pronunciation, and then arguing that making latin verse will not teach the true pronunciation, and consequently is utterly useless. As I intend my son for a Lawyer, Latin and Greek he must understand; Hebrew I am sure he need not learn; Arabic or Anglo Saxon I desire to substitute. The latter must be the foundation of all the northern languages, and I believe too of most of the oriental. I heartily wish that I could speak it, or that I could get books in it, and its Lexicon particularly: I would at least compare. Excuse me if I have attempted to muddle waters, which are deemed pure by more competent judges. Only make my son speak as well as Sheridan, without uttering untruths in every sentence; let his language be as correct, but his tongue be incapable of falsehood, and his heart honest. Let him dare to tell the truth, though the Commons should expel him as a monster for doing so."

"I am, &c. &c.

T. D. PEARSE."

A very alarming fire took place in Fort William in the month of March, in the dead of the night, in some workshops belonging to the Commissary, which were entirely consumed "with all they contained," (says Colonel Pearse in a letter to Lord Cornwallis) "except a number of carriages of different kinds, which by the unparalleled efforts of the Officers and soldiers were preserved from the flames." A complete set of arms for His Majesty's regiments, and all the Camp Equipage in store, "old and new" were destroyed.

In consequence of this accident Colonel Pearse addressed the following letter to Lord Cornwallis, which accounts for the present disposition of the Barracks, &c. in Fort William.

*To the Right Honourable Charles, Earl Cornwallis, K. G.
 &c. &c. &c.*

"MY LORD,

"The accident which happened this morning in the Fort I have already reported in a letter on that disagreeable subject; this, which I now presume to address to your Lordship, concerns the arrangements which that accident seems to point out as indispensibly necessary."

"The building which is consumed was a store-house and workshop united, and last year it took fire, but was preserved without much damage. The fire then was occasioned by a forge, which from the ground floor communicated fire to a beam of the upper terrace. The accident of this day is not to be traced, it is supposed to have broken out amongst the painters' tools, but then the coopers work there also, and they use fire; otherwise it might be laid to the charge of the workmen and their hookahs, and in spite of every degree of vigilance,

accidents from this cause may be said to be unavoidable. It of course follows that store-houses ought to be totally distinct from workshops, and that a union of them is incompatible. That fires are not frequent in dwelling houses in India, is not any reason why such accidents cannot happen; it is possible, and therefore store rooms ought not to be connected with dwelling-houses."

"At present, My Lord, the arsenal is a dwelling-house, and therefore it cannot be said to be one moment in safety. The south-east face is called the arsenal barrack, and is inhabited by the Captains and one Field Officer of the Artillery; the south-west angle by the Commissary of Stores, and the north-west by his deputy; so that two faces of it are dwelling-houses, and the whole of the spare arms of the establishment are inclosed between, and joined to two buildings that are liable to accidents from fire. From these premises I take the liberty to recommend the removal of every person who resides under that roof, and in consequence,

"1st. To allot other quarters to the Commissary and his deputy for the present, and to put on house rent as many Officers as must be deprived of quarters, until Barracks can be provided."

"2ndly. To convert the Royal barracks into Officers' barracks, by running a wall through the middle of it, and one over the inner wall of each verandah, by valving the upper windows, which is about to be done, and raising the barracks so as to admit of two stories, and by increasing the offices where the soldiers' kitchens now stand, and where they may be increased without any danger to the magazine, or by erecting the requisite number in the area behind the south barracks. This will provide quarters for 68 subaltern officers, and will

not cost much more than is about to be paid for it; because all the lower apartments will not need valves, and only cutcha partition walls to separate the offices."

"3rdly. To convert the destroyed buildings into barracks for the soldiers, by taking down the upper part of the south-west face, and adding a wall to the north-west face, to make it of equal breadth with the other two faces; and by breaking a passage through the north-east face, where the divisions will make the barracks equal; and lastly, by building up the retaining wall of the half of the Calcutta gate curtain, immediately behind this building, and under it erecting the kitchens, &c. for the barracks. This will make it like the triangle, but sufficient to hold two battalions of infantry on the present establishment. The whole be valved above and below, as that is, and the floor of the lower apartments be laid upon flues, open to admit the air. It will be requisite to move the kitchens of the north barracks, and to erect them in the area near the water gate, along with the offices for the gateway quarters, to afford room for the corps to parade."

"4thly. To alter the workshop sheds of the foundry, and so to enlarge them that all the forges and shops requiring the use of fire may be contained therein."

"5thly. To add to the water gate quarter, the room requisite to make it like the rest, and to appropriate it to the arsenal for the Commissary."

"Lastly. To give up to the Commissary of Stores, and to alter according to the several uses requisite for the arsenal, the two faces now used as dwelling-houses, by which arrangement the whole of the stores can be lodged in perfect safety, and separated from the workmen of all denominations. There is however one thing

more, which I think it necessary to mention.—We neither have, nor can have water in the garrison to answer an emergency in case of fire, unless deep wells, at least ten feet wide, be sunk to the depth of sixty feet. The water will then be brackish, but it will serve to wash the drains, and be sufficient to extinguish fires; and if at one of these wells a steam engine was erected, with iron pipes to run round under the ramparts, and a leader up the main road, water could be so diffused that there could not be danger from fire, nor complaints of bad smells, as every drain could be washed daily.”

“The destruction of the building will unavoidably occasion an expense, and a small addition will secure the stores of the establishment, and increase the quarters of the garrison, by a number, which will, I think, be equal to the house rent list. I therefore hope your Lordship will excuse the liberty I take in thus submitting my ideas on what it may be necessary to do, to your Lordship's consideration.”

“I am, &c. &c.

T. D. PEARSE.”

“*Fort William,* }
9th of March, 1789.” }

An idea may be formed of the value of the property which this fire destroyèd, when, exclusive of the buildings, a great number of gun carriages, camp equipage, and several thousand stands of arms were consumed.—By the great exertions of the men, stimulated to the utmost exertion as they were by the presence of Colonel Pearse, it is recorded that 135 garrison carriages, 22 field carriages with limbers, 7 ditto without limbers, 20 tumbrils, 8 transport carriages, and 1 ammunition waggon, total 193, were saved from the flames, besides 22

new carriages, which were to have been surveyed that very morning.

This is the last public act we find recorded amongst the papers which have been put into our hands, of this distinguished and lamented officer. We now lay before our readers the *last letter* which appears to have been written to Mr. Hastings.

•
“MY DEAR FRIEND,

“I have postponed writing to the last minute, in hopes of being able to send word of the arrival of Hyder Beg Khawn’s answer; but it is not yet come to hand, so I shall do it by the August Ship.”

“Latterly I have been a good deal out of order, but by the application of mercury I hope to be freed from all complaints, as I find real benefit from it, and mend even in appearance.”

“On Monday we had a fire in the Fort, in that building which Colonel Watson erected for the destruction of the stores to be lodged in it. It answered his views exactly. The wooden floors spread the flames widely, and except what the soldiers dragged out, and their exertions were wonderful, all was consumed. Lord Cornwallis generously acknowledged that I had early predicted this misfortune, and I believe wished that he had attended to what I had said, more than he did at the time. It is supposed to have been occasioned by the fire of the coopers, who, as well as painters, carpenters, turners, and smiths, all worked under these wooden floors; so that as a forge did set fire to a beam, since His Lordship came here, it did not require the spirit of prophecy to predict what might be expected. I was attending all the time, but all that could be done was to save a few moveable

things,—one solitary engine could not oppose flames, spreading along dry teak floors, and dry stores of all kinds. Upon the whole it is a lesson well bought, and cheaply too. I am not the worse or the better for my exertions. May health attend you, and a speedy deliverance from the hands of your enemies make glad our hearts, and confer happiness and honour upon yourself!"

"I am,

Your's faithfully,

T. D. PEARSE."

"Fort William,
11th of March, 1789." }

We find on the same day a letter to Sir Joseph Banks :

"SIR,

"I have commissioned my son to be the bearer of this letter, and of the first volume of the Transactions of the Asiatic Society, and to request that you will do me the honour to accept it."

"I hope my son will execute his commission properly, but more that you will suffer his youth to plead for him, if he should appear to be a little deficient or abashed."

"A gentleman who traded to Bencoolen, brought me a plant of indigo of that island. I call it indigo because it yields a blue dye, but by the help of the microscope I have examined it, and it proves to be an apocyuum—I have called it apocynum territorium, and I think it will be valuable. I have also met with another of that genus, which produces greenish and yellow flowers in bunches, and has a most fragrant perfume, like mignonette. This I have called apocynum amœnum. It is here known by the name of the 'Pegue flower,' and at

Madras by the name of the 'West Coast Creeper.' I will trouble you hereafter, with seeds, drawings, and descriptions."

"I am, &c.

"11th March."

T. D. PEARSE."

Colonel Pearse mentions in a letter to Charles Purvis, Esq. that on the fatal night of the fire, (9th March), he was under the influence of mercury; exposure to the night air may have assisted the progress of disease, in terminating his valuable life. No letter of a later date than the 11th of March appears, and it is probable that all correspondence was interrupted by sickness. Colonel Pearse lived to the month of June, and died on the 15th of the month.

The following epitaph is to be found upon Colonel Pearse's tomb in the great Burial ground of Calcutta :

Sacred to the Memory of
 THOMAS DEANE PEARSE, Esq.
 Late Colonel in the service of
 the Honourable East India Company.

He was an Officer of the Royal Artillery in 1757, was present at the sieges of Guadaloupe, the Havannah, and Bellisle. In 1768 he came to India with the rank of Major of Artillery, and in 1769 he succeeded to the command of the corps, which he retained till his death. He marched a detachment to join the army under Sir Eyre Coote, in the Carnatic, and served there during the war, and returned to Bengal in 1785: and for the last three years of his life he was Senior Officer of the Bengal Army. In his public capacity he distinguished himself by his abilities and unwearied attention to the duties of his station, and to the general interests

of those he commanded. As an individual he was respected for the benevolence of his disposition, and for the warmth of his friendship.

He died on the 15th June,
1789,
Aged 47 years.

Upon the death of Colonel Pearse the Officers of the Artillery regiment, erected a handsome column of the Corinthian order, at the Station of Dum Dum.

The following inscription is cut upon a tablet which is let into the dye, upon which the column stands.

To the
Memory
of
THOMAS DEANE PEARSE,
Colonel Commandant of
Artillery.
This Column is
erected by
the Officers of
the Brigade
in testimony of their
respect.
MDCCXC.

On concluding the Memoir of Colonel Pearse, we feel it necessary to call the attention of our Subscribers to the circumstance of our having considerably increased the number of our pages, beyond the limits which we proposed in the Prospectus, which was originally circu-

lated. This we have been enabled to do, from the kind encouragement the undertaking has met with from each Presidency. The future Nos. of the British Indian Military Repository will treat upon subjects which may be considered perhaps more generally interesting to the Armies of the three Presidencies, but we have been assured by many of our readers, that they have been much gratified by the parts of this memoir already given, and we feel the hope that we shall meet with pardon from those who may consider us as having been unnecessarily or injudiciously diffuse in placing before them so extensive a collection of original correspondence, to illustrate the life and character of an individual. Having done this, we shall not presume now to draw up a summary of the virtues and excellencies of Colonel Pearse's character. Our readers have the best evidence before them, that his life was devoted to his profession;—that he was ever zealous to promote the service he belonged to, and to raise and maintain the character of the Honourable Company's army, particularly of the important arm to which he was attached.

ARTICLE II.

On the Carriage of Musquet Ammunition.

It appears extraordinary that there should be two different modes employed for the conveyance of Musquetry and Ordnance Ammunition. Either carriages, or carriage cattle, are best; but we believe that we can support the assertion that the first mode, (viz. carrying the ammunition in carriages,) has a decided superiority.

Lieutenant General Cuppage, inspector of the royal carriage department at Woolwich, has been kind and condescending enough to favour us with one or two letters upon professional subjects since our return to India. The following is an extract from one of these letters, dated 18th January 1721, Royal carriage office.

“ We have lately made a great change in our mode of conveying musket ball ammunition, on the suggestion of His Grace the Duke of Wellington, who objected to barrels, and who approved of square boxes holding similar proportions to the barrels formerly used. His Grace observed, ‘that when the army halts in India, the ammunition is unloaded and piled,’ this is subject to constant accidents. I think therefore the new mode would be equally useful to you. We carry 20,000 rounds upon a carriage similar to the limber and body of an ammunition waggon—the limber carries 8,000, and the body 12,000 rounds.”

As early as the year 1778, Colonel Pearce, when he gave in a list of ‘Proportions of Stores’ for the magazines, &c. strongly recommended the mode of carrying all ammunition in carts or waggons. His arguments

were not however of sufficient weight to overcome the opposition of Colonel Watson, commanding the Engineers, and Colonel Dow, Commissary General, both members of the new formed Military Board, or Board of Ordnance, as it was then named. During the march of the Bengal detachment to the Carnatic, experience induced Colonel Pearse to express his opinion in a letter to Mr. Smith, President of the Select Committee at Madras, in favour of carriages, (see page 36, vol. ii. Br. Ind. Mil. Repository.) And on his return to Bengal, we find the subject was again revived at the Military Board, again met with opposition, and we are not aware that to this day the practice of carrying musquet ammunition on carriages, has been practised on the Bengal establishment.* The change from barrels to boxes for the carriage of the ammunition was an important one, but beasts of burthen are still employed.

Colonel Pearse's minute in reply to the objections made against his proposal by the Members of the Military Board, was as follows:

"Minute, 7th December, 1785. If I had known of any objection to the use of carriages, I should have stated it. Whether carts or carriages with four wheels, are best, is another question. Service is the best school for settling opinions. Until I arrived in India I never heard of ammunition being laden on beasts of burthen. My own minute states the dangerous accidents which may happen from the use of bullocks. Experience taught the grand army the necessity of a change in the Carnatic, and they had introduced the change before we arrived, so that it was not done at my instigation."

* We shall be happy to receive communications on the subject of this paper from the other Presidencies.

“ My former ‘Proportions of Stores’ had waggons for this purpose—the *great benefit the army did receive from carts in the late war*, shews that they are infinitely preferable to bullocks. The difference of expense between carts and waggons, surpasses the advantages that the latter have over the former. This fixed the preference for carts in my mind. One advantage in point of expense is obvious, the carts require only one bullock to two barrels even in long continued marches: to the Carnatic for instance, or across India. But with bullocks, one and one-sixth are required to carry the weight of two barrels, so that the load of them must be reduced, and then of course the number of bullocks increased; or the Company must pay for all accidents by death, if the bullocks carry beyond the contract load. A line does not stop for one carriage, unless the road is only passable for one at a time, and the broken carriage cannot be thrown aside. There are spare ones in proportion, to supply accidents. In the Carnatic, the carts never did lengthen the line, except in defiles; they passed on the flanks in common, and may do so on all dry grounds, with the assistance of bildars to cut down rice field dams. The carts must pass on the road on deep grounds, so must the bullocks; for, if they attempt a morass, half the ammunition will be destroyed. In war, the ammunition is a principal consideration, if that is destroyed, the army may be so too. The preservation of so essential an article forbids all consideration of expense, for the saving of a small sum, cannot be put into competition with the loss of an army, or with the danger of even a check. But unless the prime cost be an object, carts produce a real saving.”

We know not of any argument which can be produced in favour of the carriage of ammunition by beasts of burthen, except it may be the one alluded to in the last sentence of Colonel Pearse's minute, and if we inquire into the history of our first establishment in India, it is not improbable that this was in the first instance, the cause of the practice being adopted. Confined at first, principally to act on the defensive, and extremely limited in the extent of our possessions, which even as they extended, were adjacent to the banks of a navigable river, a provision for the land carriage of ammunition, was probably never thought of in anticipation of the hour when it became necessary to transport it; and even then, the constant practice of the natives of lading their burthens upon beasts for inland journeys, readily presented itself. But it so happened, that in Bengal we extended ourselves principally along the banks of a navigable river, and the practice of carrying the supplies of ammunition for the army in boats prevailed here. We are borne out in this assertion by a letter of Colonel Pearse's to the Board of Ordnance, from which we extract the following sentences:—

“ The ammunition, as at present carried, is exposed to the greatest danger from all kinds of accidents. With the army in the field every thing is left to chance, not a fourth part of the proportion is in the field, the rest is left in boats on the river. Let us suppose our army quit their boats (they did so lately) with 30 rounds of ammunition in their pouches. In this case all that is left in the boats is at the mercy of the enemy, as there is not in all our possessions (Chunarghur excepted) a single place of defence to protect the boats. Suppose a body of troops left sufficient for this purpose, it is

evident the army is proportionably weakened; but this is not the only mischief; the attention is divided, the enemy may take advantage of it, they may draw us from the boats, then suddenly return and destroy our ammunition. If this is found to be the enemy's intention, then either the Army must follow them to secure the boats, and the object for which they quitted them must be neglected, or the boats and stores must be given up to pursue that object. Let me now suppose that a long engagement takes place, the boats are destroyed, we necessarily expend the greatest part of our ammunition in the engagement; suppose our Army merely to be successful on that day, and the enemy have the means of renewing the fight, what then must be done when the Army is without the means, having expended their cartridges in the first engagement? I most readily grant that hitherto these things have not happened; with very small armies we have beat multitudes; but it is not from thence to be inferred that the contrary may not happen at some future period; and the time in which the natives may meet us on more equal terms, may not be so distant as is thought. The bravery some of them have shewn upon the Coast, plainly tells us that they only want leaders in whom they can confide."

"It is with a view to prevent as far a possible the mischiefs which I have pointed out, that makes me so earnestly recommend carriages for ammunition; that so the army may have within its power, the means of performing the duties for which it may be sent."

"Fort William, }
5th November, 1778." }

There are so many disadvantages attending the use of carriage cattle for the purpose of carrying musquet am-

munition, that it is extraordinary the change to carriages has not taken place on this establishment. Waggon for this purpose may be used, exactly similar to those which are now about to be introduced into this service for the Artillery, which will differ very slightly from the excellent pattern of the Royal Artillery ammunition waggon. The rear part or body of the waggon being composed of four small portable boxes, instead of two large ones, as in the Royal pattern, or they may be of a construction which we consider still better adapted to this country for all ammunition waggons, viz. of two gun limbers, having two boxes on each axle, the rear limber having a small beam with a limbering eye at the end of it, which is to be fastened into the centre socket intended for the pole or shaft, and it will be thus limbered upon the front limber. Thus each waggon, whether for infantry or artillery ammunition, will be exactly alike in all its parts; and the partitions in the boxes being moveable, can be adjusted so as to suit the nature of the ammunition to be carried. Each gun would then be accompanied on service with three limbers—if the limber of the gun is destroyed, half the waggon will supply its place—if either half of the waggon is destroyed, the other half forms a cart of two wheels instantly. The advantage of the infantry and artillery waggons exactly resembling each other, would be found to be of great importance, as the want of either can then be mutually supplied, on whichever side there may chance to be a deficiency.

By General Orders of the Commander in Chief, 23rd of July, 1806; we find that, “For musquet ammunition with ~~corps~~ to be carried by bullocks, the following proportion is allowed for a Battalion of Native Infantry,

which is calculated for a supply of 100 rounds and 10 flints per man, (40 in pouch—60 on cattle.)”

Bullocks, carriage, for ammunition for 60 rounds	
per man,	32
Ditto, ditto, spare, including carriage for flints,	6
	—
	Total 38
	—

Of Ammunition a Camel is to carry:

Musquet—Balled cartridge rounds,	4,000
Flints,	11,400
Carbine— Balled cartridge rounds,	5,000
Flints,	18,800
Pistol— Balled cartridge rounds,	6,000
Flints,	26,500

By a resolution of the Military Board, 27th of February, 1807, “ Ordered, that all new camel ammunition boxes, to be hereafter made for the public service, be constructed on the improved principle as follows:—

“ Dimensions of a camel ammunition box for 2,000 musquet balled cartridges, with a binn for the proportion of flints for the same. Length inside, 2 feet 6 inches; width 1 foot; depth 10½ inches: width of binn, 2 inches; depth, the whole of the box or 10½ inches; thickness of the planks of the box, eight-tenths of an inch; thickness of the binn partition, four-tenths of an inch; weight of the box made of deal plank, without the covering of gunny, &c. 31 lbs.; length of the canvas bag to hold the flints in, 1 foot 3 inches.”

Camels alone are used for carrying the ammunition in the upper provinces in Bengal, but it is well known, that on bad ground, and especially on clayey soils after

rain, camels are extremely liable to fall and injure themselves mortally. A camel cannot advance over any precipitous ground, and the delay and danger in loading and unloading the boxes, is very great; besides, when unloaded on a halt, they must stand upon the ground, for a time at least, whether it is wet or dry.

Supposing the battalion 1,000 strong, and each man carries 40 rounds in his pouch, the 32 bullocks will only carry 60,000 rounds. Three waggons, drawn by 6 bullocks each, will carry the same quantity with ease. So that 18 bullocks will only be required with the waggons, instead of 32. We take no notice of the spare bullocks, because the same number as allowed with the bullock system, viz. 6, will give a spare yoke of cattle for each waggon, which would be a full allowance.

To carry the 60,000 rounds required for a battalion of 1,000 strong, at 4,000 rounds each camel, 15 camels will be required. The comparison therefore, in an economical point of view, as to the number of cattle required, is greatly in favour of the waggons, and the prime cost of these, with all wear and tear, if put into competition with the expense of keeping camels, and with the many serious accidents to which they are liable, will be still more in favour of carriages, especially in long continued marches. Besides the safety, security, and economy with which ammunition may be carried in waggons, they afford conveyance, with each battalion of infantry, for sick and wounded men, for which purpose the Artillery tumbrils were often employed, during Lord Lake's campaigns.

The ammunition boxes of these wagons may be so made, that on any occasion of a small detachment of troops proceeding through a country impassable for

carriages, they may be available for man-carriage, or cattle, as deemed most advisable. Half the wagon, with two or four bullocks might always accompany a Treasure party, and it would then prove a useful and secure mode of conveyance for the Treasure. ED.

ARTICLE III.

*Traverse Table for the Perambulator by Captain
Garrard, Madras Engineers.*

To the Editor of the British Indian Military Repository.

SIR,

Wishing to contribute my mite of information to your interesting collection, I beg leave to furnish you with a Traverse Table, adapted to the Perambulator, and having for its object greater accuracy and expedition in laying down Military Surveys than the usual mode with the Protractor.

This table I submitted to the Madras Government through the Surveyor General of India some years ago. It was highly approved of, and 100 copies were printed by order of that authority for the use of the Survey department. I have since had various applications for copies; and as I conceive that the best mode of diffusing them is through the British Indian Military Repository, I offer the table to you for insertion, if you deem it worthy thereof.

I am,

Sir,

Your very obedient servant,

W. GARRARD, *Captain,*

Madras Engineers.

Cannanore,
15th January, 1823. }

Traverse Table for

1°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.0
—	—	2	—	—	2.0	—	—	0.0
—	—	3	—	—	3.0	—	—	0.1
—	—	4	—	—	4.0	—	—	0.1
—	—	5	—	—	5.0	—	—	0.1
—	—	6	—	—	6.0	—	—	0.1
—	—	7	—	—	7.0	—	—	0.1
—	—	8	—	—	8.0	—	—	0.1
—	—	9	—	—	9.0	—	—	0.2
—	—	10	—	—	10.0	—	—	0.2
—	—	20	—	—	20.0	—	—	0.3
—	—	30	—	—	30.0	—	—	0.5
—	—	40	—	—	40.0	—	—	0.7
—	—	50	—	—	50.0	—	—	0.9
—	—	60	—	—	60.0	—	—	1.0
—	—	70	—	—	70.0	—	—	1.2
—	—	80	—	—	80.0	—	—	1.4
—	—	90	—	—	90.0	—	—	1.6
—	—	100	—	—	100.0	—	—	1.7
—	—	200	—	—	200.0	—	—	3.5
—	—	210	—	—	210.0	—	—	3.7
—	1	—	—	1	—	—	—	3.8
—	2	—	—	1	219.9	—	—	7.7
—	3	—	—	2	219.9	—	—	11.5
—	4	—	—	3	219.9	—	—	15.4
—	5	—	—	4	219.8	—	—	19.2
—	6	—	—	5	219.8	—	—	23.1
—	7	—	—	6	219.8	—	—	26.9
1	—	—	—	7	219.8	—	—	30.80
2	—	—	1	7	219.5	—	—	61.60
3	—	—	2	7	219.3	—	—	92.4
4	—	—	3	7	219.0	—	—	123.20
5	—	—	4	7	218.8	—	—	154.00
6	—	—	5	7	218.6	—	—	184.80
7	—	—	6	7	218.3	—	—	215.60
8	—	—	7	7	218.1	—	1	26.40
• <i>Distance.</i>				<i>Departure.</i>				<i>Latitude.</i>

2°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	1.00	—	—	0.03
—	—	2	—	—	2.00	—	—	0.07
—	—	3	—	—	3.00	—	—	0.10
—	—	4	—	—	4.00	—	—	0.14
—	—	5	—	—	5.00	—	—	0.17
—	—	6	—	—	6.00	—	—	0.21
—	—	7	—	—	7.00	—	—	0.21
—	—	8	—	—	8.00	—	—	0.28
—	—	9	—	—	8.99	—	—	0.31
—	—	10	—	—	9.99	—	—	0.35
—	—	20	—	—	19.99	—	—	0.70
—	—	30	—	—	29.98	—	—	1.05
—	—	40	—	—	39.98	—	—	1.40
—	—	50	—	—	49.97	—	—	1.74
—	—	60	—	—	59.96	—	—	2.09
—	—	70	—	—	69.96	—	—	2.44
—	—	80	—	—	79.95	—	—	2.79
—	—	90	—	—	89.95	—	—	3.14
—	—	100	—	—	99.94	—	—	3.49
—	—	200	—	—	199.88	—	—	6.98
—	—	210	—	—	209.87	—	—	7.33
—	1	—	—	—	219.87	—	—	7.68
—	2	—	—	1	219.74	—	—	15.36
—	3	—	—	2	219.61	—	—	23.04
—	4	—	—	3	219.48	—	—	30.72
—	5	—	—	4	219.35	—	—	38.40
—	6	—	—	5	219.22	—	—	46.08
—	7	—	—	6	219.09	—	—	53.76
1	—	—	—	7	218.96	—	—	61.44
2	—	—	1	7	217.92	—	—	122.88
3	—	—	2	7	216.88	—	—	184.32
4	—	—	3	7	215.84	—	1	25.76
5	—	—	4	7	214.80	—	1	87.20
6	—	—	5	7	213.76	—	1	148.64
7	—	—	6	7	212.72	—	1	210.08
8	—	—	7	7	211.68	—	2	51.52
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

Traverse Table for

3°

Distance.			Latitude.			Departure.		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	1.00	—	—	0.05
—	—	2	—	—	2.00	—	—	0.10
—	—	3	—	—	3.00	—	—	0.16
—	—	4	—	—	3.99	—	—	0.21
—	—	5	—	—	4.99	—	—	0.26
—	—	6	—	—	5.99	—	—	0.31
—	—	7	—	—	6.99	—	—	0.37
—	—	8	—	—	7.99	—	—	0.42
—	—	9	—	—	8.99	—	—	0.47
—	—	10	—	—	9.99	—	—	0.52
—	—	20	—	—	19.97	—	—	1.05
—	—	30	—	—	29.96	—	—	1.57
—	—	40	—	—	39.95	—	—	2.09
—	—	50	—	—	49.93	—	—	2.62
—	—	60	—	—	59.92	—	—	3.14
—	—	70	—	—	69.90	—	—	3.66
—	—	80	—	—	79.89	—	—	4.19
—	—	90	—	—	89.88	—	—	4.71
—	—	100	—	—	99.86	—	—	5.23
—	—	200	—	—	199.73	—	—	10.47
—	—	210	—	—	209.71	—	—	10.99
—	1	—	—	—	219.70	—	—	11.51
—	2	—	—	1	219.40	—	—	23.02
—	3	—	—	2	219.10	—	—	34.53
—	5	—	—	3	218.80	—	—	46.04
—	5	—	—	4	218.50	—	—	57.55
—	6	—	—	5	218.20	—	—	69.06
—	7	—	—	6	217.90	—	—	80.57
1	—	—	—	7	217.60	—	—	92.08
2	—	—	1	7	215.20	—	—	181.16
3	—	—	2	7	212.80	—	1	56.24
4	—	—	3	7	210.40	—	1	148.32
5	—	—	4	7	208.00	—	2	20.40
6	—	—	5	7	205.60	—	2	112.48
7	—	—	6	7	203.20	—	2	204.56
8	—	—	7	7	200.80	—	3	76.61
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

4°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.1
—	—	2	—	—	2.0	—	—	0.1
—	—	3	—	—	3.0	—	—	0.2
—	—	4	—	—	4.0	—	—	0.3
—	—	5	—	—	5.0	—	—	0.3
—	—	6	—	—	6.0	—	—	0.4
—	—	7	—	—	7.0	—	—	0.5
—	—	8	—	—	8.0	—	—	0.6
—	—	9	—	—	9.0	—	—	0.6
—	—	10	—	—	10.0	—	—	0.7
—	—	20	—	—	20.0	—	—	1.1
—	—	30	—	—	29.9	—	—	2.1
—	—	40	—	—	39.9	—	—	2.8
—	—	50	—	—	49.9	—	—	3.5
—	—	60	—	—	59.9	—	—	4.2
—	—	70	—	—	69.8	—	—	4.9
—	—	80	—	—	79.8	—	—	5.6
—	—	90	—	—	89.8	—	—	6.3
—	—	100	—	—	99.8	—	—	7.0
—	—	200	—	—	199.5	—	—	13.9
—	—	210	—	—	209.5	—	—	14.6
—	1	—	—	—	219.5	—	—	15.3
—	2	—	—	1	218.9	—	—	30.7
—	3	—	—	2	218.1	—	—	46.0
—	4	—	—	3	217.9	—	—	61.4
—	5	—	—	4	217.4	—	—	76.7
—	6	—	—	5	216.8	—	—	92.0
—	7	—	—	6	216.3	—	—	107.4
1	—	—	—	7	215.7	—	—	122.8
2	—	—	1	7	211.4	—	1	25.6
3	—	—	2	7	207.1	—	1	148.4
4	—	—	3	7	202.8	—	2	51.2
5	—	—	4	7	198.5	—	2	174.0
6	—	—	5	7	194.2	—	3	76.8
7	—	—	6	7	189.9	—	3	199.6
8	—	—	7	7	185.6	—	4	102.4
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

5°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.1
—	—	2	—	—	2.0	—	—	0.2
—	—	3	—	—	3.0	—	—	0.3
—	—	4	—	—	4.0	—	—	0.3
—	—	5	—	—	5.0	—	—	0.4
—	—	6	—	—	6.0	—	—	0.5
—	—	7	—	—	7.0	—	—	0.6
—	—	8	—	—	8.0	—	—	0.7
—	—	9	—	—	9.0	—	—	0.8
—	—	10	—	—	10.0	—	—	0.9
—	—	20	—	—	19.9	—	—	1.7
—	—	30	—	—	29.9	—	—	2.6
—	—	40	—	—	39.8	—	—	3.5
—	—	50	—	—	49.8	—	—	4.4
—	—	60	—	—	59.8	—	—	5.2
—	—	70	—	—	59.7	—	—	6.1
—	—	80	—	—	79.7	—	—	7.0
—	—	90	—	—	89.7	—	—	7.8
—	—	100	—	—	99.6	—	—	8.7
—	—	200	—	—	199.2	—	—	17.4
—	—	210	—	—	209.2	—	—	18.3
—	1	—	—	—	219.2	—	—	19.2
—	2	—	—	1	218.3	—	—	38.2
—	3	—	—	2	217.5	—	—	57.4
—	4	—	—	3	216.6	—	—	76.5
—	5	—	—	4	215.8	—	—	95.7
—	6	—	—	5	215.0	—	—	114.9
—	7	—	—	6	214.1	—	—	134.0
1	—	—	—	7	213.3	—	—	153.2
2	—	—	1	7	206.6	—	1	86.4
3	—	—	2	7	199.9	—	2	19.6
4	—	—	3	7	193.2	—	2	172.8
5	—	—	4	7	186.5	—	3	106.0
6	—	—	5	7	179.8	—	4	39.2
7	—	—	6	7	173.1	—	4	192.4
8	—	—	7	7	166.6	—	5	125.6
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

6°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	1.0	—	—	0.1
—	—	2	—	—	2.0	—	—	0.2
—	—	3	—	—	3.0	—	—	0.3
—	—	4	—	—	4.0	—	—	0.4
—	—	5	—	—	5.0	—	—	0.5
—	—	6	—	—	6.0	—	—	0.6
—	—	7	—	—	7.0	—	—	0.7
—	—	8	—	—	8.0	—	—	0.8
—	—	9	—	—	9.0	—	—	0.9
—	—	10	—	—	9.9	—	—	1.0
—	—	20	—	—	19.9	—	—	2.1
—	—	30	—	—	29.8	—	—	3.1
—	—	40	—	—	39.8	—	—	4.2
—	—	50	—	—	49.7	—	—	5.2
—	—	60	—	—	59.7	—	—	6.3
—	—	70	—	—	69.6	—	—	7.3
—	—	80	—	—	79.6	—	—	8.4
—	—	90	—	—	89.5	—	—	9.4
—	—	100	—	—	99.5	—	—	10.5
—	—	200	—	—	198.9	—	—	20.9
—	—	210	—	—	208.8	—	—	21.9
—	1	—	—	—	218.8	—	—	23.0
—	2	—	—	1	217.6	—	—	46.0
—	3	—	—	2	216.4	—	—	69.0
—	4	—	—	3	215.2	—	—	92.0
—	5	—	—	4	214.0	—	—	115.0
—	6	—	—	5	212.8	—	—	138.0
—	7	—	—	6	211.6	—	—	161.0
1	—	—	—	7	210.4	—	—	184.0
2	—	—	1	7	200.7	—	1	47.9
3	—	—	2	7	291.1	—	2	111.9
4	—	—	3	7	181.4	—	3	75.9
5	—	—	4	7	171.8	—	4	39.9
6	—	—	5	7	162.1	—	5	3.8
7	—	—	6	7	152.5	—	5	187.8
8	—	—	7	7	142.8	—	6	151.8
<i>Distance</i>			<i>Departure.</i>			<i>Latitude.</i>		

84°

L

7°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	V.	M.	F.	V.	M.	F.	V.
—	—	1	—	—	1.0	—	—	0.1
—	—	2	—	—	2.0	—	—	0.2
—	—	3	—	—	3.0	—	—	0.4
—	—	4	—	—	4.0	—	—	0.5
—	—	5	—	—	5.0	—	—	0.6
—	—	6	—	—	6.0	—	—	0.7
—	—	7	—	—	6.9	—	—	0.9
—	—	8	—	—	7.9	—	—	1.0
—	—	9	—	—	8.9	—	—	1.1
—	—	10	—	—	9.9	—	—	1.2
—	—	20	—	—	19.9	—	—	2.4
—	—	30	—	—	29.8	—	—	3.7
—	—	40	—	—	39.7	—	—	4.9
—	—	50	—	—	49.6	—	—	6.1
—	—	60	—	—	59.6	—	—	7.3
—	—	70	—	—	69.5	—	—	8.5
—	—	80	—	—	79.4	—	—	9.7
—	—	90	—	—	89.3	—	—	11.0
—	—	100	—	—	99.3	—	—	12.2
—	—	200	—	—	198.5	—	—	24.4
—	—	210	—	—	208.1	—	—	25.6
—	1	—	—	—	218.4	—	—	26.8
—	2	—	—	1	216.7	—	—	53.6
—	3	—	—	2	215.1	—	—	80.4
—	4	—	—	3	213.1	—	—	107.2
—	5	—	—	4	211.8	—	—	134.1
—	6	—	—	5	210.2	—	—	160.9
—	7	—	—	6	208.5	—	—	187.7
1	—	—	—	7	206.9	—	—	214.5
2	—	—	1	7	193.8	—	1	209.0
3	—	—	2	7	180.7	—	2	203.5
4	—	—	3	7	167.6	—	3	197.9
5	—	—	4	7	154.1	—	4	192.4
6	—	—	5	7	141.3	—	5	186.9
7	—	—	6	7	128.2	—	6	181.4
8	—	—	7	7	115.1	—	7	175.9
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

8'

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.1
—	—	2	—	—	2.0	—	—	0.3
—	—	3	—	—	3.0	—	—	0.4
—	—	4	—	—	4.0	—	—	0.6
—	—	5	—	—	5.0	—	—	0.7
—	—	6	—	—	5.9	—	—	0.8
—	—	7	—	—	6.9	—	—	1.0
—	—	8	—	—	7.9	—	—	1.1
—	—	9	—	—	8.9	—	—	1.3
—	—	10	—	—	9.9	—	—	1.4
—	—	20	—	—	19.8	—	—	2.8
—	—	30	—	—	29.7	—	—	4.2
—	—	40	—	—	39.6	—	—	5.6
—	—	50	—	—	49.5	—	—	7.0
—	—	60	—	—	59.4	—	—	8.4
—	—	70	—	—	69.3	—	—	9.7
—	—	80	—	—	79.2	—	—	11.1
—	—	90	—	—	89.1	—	—	12.5
—	—	100	—	—	99.0	—	—	13.9
—	—	200	—	—	198.1	—	—	27.8
—	—	210	—	—	208.0	—	—	29.2
—	1	—	—	—	217.9	—	—	30.6
—	2	—	—	1	215.7	—	—	61.2
—	3	—	—	2	213.6	—	—	91.9
—	4	—	—	3	211.4	—	—	122.5
—	5	—	—	4	209.3	—	—	153.1
—	6	—	—	5	207.2	—	—	183.7
—	7	—	—	6	205.0	—	—	214.3
1	—	—	—	7	202.9	—	1	21.9
2	—	—	1	7	185.8	—	2	49.9
3	—	—	2	7	168.6	—	3	74.8
4	—	—	3	7	151.5	—	4	99.8
5	—	—	4	7	134.4	—	5	124.7
6	—	—	5	7	117.3	—	6	149.6
7	—	—	6	7	100.1	—	7	174.6
8	—	—	7	7	82.0	1	—	199.5
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

Traverse Table for

9°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.2
—	—	2	—	—	2.0	—	—	0.3
—	—	3	—	—	3.0	—	—	0.5
—	—	4	—	—	4.0	—	—	0.6
—	—	5	—	—	4.9	—	—	0.8
—	—	6	—	—	5.9	—	—	0.9
—	—	7	—	—	6.9	—	—	1.1
—	—	8	—	—	7.9	—	—	1.3
—	—	9	—	—	8.9	—	—	1.4
—	—	10	—	—	9.9	—	—	1.6
—	—	20	—	—	19.8	—	—	3.1
—	—	30	—	—	29.6	—	—	4.7
—	—	40	—	—	39.5	—	—	6.3
—	—	50	—	—	49.4	—	—	7.8
—	—	60	—	—	59.3	—	—	9.4
—	—	70	—	—	69.1	—	—	11.0
—	—	80	—	—	79.0	—	—	12.5
—	—	90	—	—	88.9	—	—	14.1
—	—	100	—	—	98.8	—	—	15.6
—	—	200	—	—	197.5	—	—	31.3
—	—	210	—	—	207.4	—	—	32.9
—	1	—	—	—	217.3	—	—	34.4
—	2	—	—	1	214.6	—	—	68.8
—	3	—	—	2	211.9	—	—	103.2
—	4	—	—	3	209.2	—	—	137.7
—	5	—	—	4	206.5	—	—	172.1
—	6	—	—	5	203.8	—	—	206.5
—	7	—	—	6	201.0	—	1	20.9
1	—	—	—	7	198.3	—	1	55.3
2	—	—	1	7	176.7	—	2	110.6
3	—	—	2	7	155.0	—	3	166.0
4	—	—	3	7	133.3	—	5	1.3
5	—	—	4	7	111.7	—	6	56.6
6	—	—	5	7	90.0	—	7	111.9
7	—	—	6	7	68.3	1	—	167.2
8	—	—	7	7	46.7	1	2	2.5
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

81°

10°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.2
—	—	2	—	—	2.0	—	—	0.3
—	—	3	—	—	3.0	—	—	0.5
—	—	4	—	—	3.9	—	—	0.7
—	—	5	—	—	4.9	—	—	0.9
—	—	6	—	—	5.9	—	—	1.0
—	—	7	—	—	6.9	—	—	1.2
—	—	8	—	—	7.9	—	—	1.4
—	—	9	—	—	8.9	—	—	1.6
—	—	10	—	—	9.8	—	—	1.7
—	—	20	—	—	19.7	—	—	3.5
—	—	30	—	—	29.5	—	—	5.2
—	—	40	—	—	39.4	—	—	6.9
—	—	50	—	—	49.2	—	—	8.7
—	—	60	—	—	59.1	—	—	10.4
—	—	70	—	—	68.9	—	—	12.2
—	—	80	—	—	78.8	—	—	13.9
—	—	90	—	—	88.6	—	—	15.6
—	—	100	—	—	98.5	—	—	17.4
—	—	200	—	—	197.0	—	—	34.7
—	—	210	—	—	206.8	—	—	36.5
—	1	—	—	—	216.7	—	—	38.2
—	2	—	—	1	213.3	—	—	76.4
—	3	—	—	2	210.0	—	—	114.6
—	4	—	—	3	206.6	—	—	152.8
—	5	—	—	4	203.3	—	—	191.0
—	6	—	—	5	199.9	—	1	9.2
—	7	—	—	6	196.6	—	1	47.4
1	—	—	—	7	193.3	—	1	85.6
2	—	—	1	7	166.5	—	2	171.2
3	—	—	2	7	139.8	—	4	36.9
4	—	—	3	7	113.0	—	5	122.5
5	—	—	4	7	86.3	—	6	208.1
6	—	—	5	7	59.6	1	0	73.7
7	—	—	6	7	22.9	1	1	159.4
8	—	—	7	7	6.1	1	3	25.0
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

80°

Traverse Table for

11°

Distance.			Latitude.			Departure.		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	1.0	—	—	0.2
—	—	2	—	—	2.0	—	—	0.4
—	—	3	—	—	2.9	—	—	0.6
—	—	4	—	—	3.9	—	—	0.8
—	—	5	—	—	4.9	—	—	1.0
—	—	6	—	—	5.9	—	—	1.1
—	—	7	—	—	6.9	—	—	1.3
—	—	8	—	—	7.9	—	—	1.5
—	—	9	—	—	8.8	—	—	1.7
—	—	10	—	—	9.8	—	—	1.9
—	—	20	—	—	19.6	—	—	3.8
—	—	30	—	—	29.4	—	—	5.7
—	—	40	—	—	39.3	—	—	7.6
—	—	50	—	—	49.1	—	—	9.5
—	—	60	—	—	58.9	—	—	11.5
—	—	70	—	—	68.7	—	—	13.4
—	—	80	—	—	78.5	—	—	15.3
—	—	90	—	—	88.4	—	—	17.2
—	—	100	—	—	98.2	—	—	19.1
—	—	200	—	—	196.5	—	—	38.2
—	—	210	—	—	206.1	—	—	40.1
—	1	—	—	—	216.0	—	—	42.0
—	2	—	—	1	214.9	—	—	44.0
—	3	—	—	2	207.9	—	—	127.9
—	4	—	—	3	203.8	—	—	167.9
—	5	—	—	4	199.8	—	—	207.9
—	6	—	—	5	195.7	—	1	31.9
—	7	—	—	6	191.7	—	1	73.8
1	—	—	—	7	187.7	—	1	115.8
2	—	—	1	7	155.3	—	3	11.7
3	—	—	2	7	123.0	—	4	127.5
4	—	—	3	7	90.6	—	6	23.3
5	—	—	4	7	58.3	—	7	139.1
6	—	—	5	7	26.0	1	1	35.0
7	—	—	6	6	217.6	1	2	150.8
8	—	—	7	6	181.3	1	4	46.6
<i>Latitude.</i>			<i>Departure.</i>			<i>Latitude.</i>		

12^o

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.2
—	—	2	—	—	2.0	—	—	0.4
—	—	3	—	—	2.9	—	—	0.6
—	—	4	—	—	3.9	—	—	0.8
—	—	5	—	—	4.9	—	—	1.0
—	—	6	—	—	5.9	—	—	1.3
—	—	7	—	—	6.9	—	—	1.5
—	—	8	—	—	7.8	—	—	1.7
—	—	9	—	—	8.8	—	—	1.9
—	—	10	—	—	9.8	—	—	2.1
—	—	20	—	—	19.6	—	—	4.2
—	—	30	—	—	29.5	—	—	6.2
—	—	40	—	—	39.1	—	—	8.3
—	—	50	—	—	48.9	—	—	10.4
—	—	60	—	—	58.7	—	—	12.5
—	—	70	—	—	68.5	—	—	14.6
—	—	80	—	—	78.3	—	—	16.6
—	—	90	—	—	88.0	—	—	18.7
—	—	100	—	—	97.8	—	—	20.8
—	—	200	—	—	195.6	—	—	41.6
—	—	210	—	—	205.4	—	—	43.7
—	1	—	—	—	215.2	—	—	45.7
—	2	—	—	1	210.1	—	—	91.5
—	3	—	—	2	205.6	—	—	137.2
—	5	—	—	3	200.8	—	—	183.0
—	5	—	—	4	196.0	—	1	8.7
—	6	—	—	5	191.2	—	1	54.1
—	7	—	—	6	186.4	—	1	100.2
1	—	—	—	7	181.5	—	1	145.9
2	—	—	1	7	143.1	—	3	71.8
3	—	—	2	7	104.6	—	4	217.8
4	—	—	3	7	66.2	—	6	113.7
5	—	—	4	7	27.7	1	—	69.6
6	—	—	5	6	209.3	1	1	215.5
7	—	—	6	6	170.8	1	3	141.5
8	—	—	7	6	132.4	1	5	67.4
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

13°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.2
—	—	2	—	—	2.0	—	—	0.5
—	—	3	—	—	2.9	—	—	0.7
—	—	4	—	—	3.9	—	—	0.9
—	—	5	—	—	4.9	—	—	1.1
—	—	6	—	—	5.8	—	—	1.4
—	—	7	—	—	6.8	—	—	1.6
—	—	8	—	—	7.8	—	—	1.8
—	—	9	—	—	8.8	—	—	2.0
—	—	10	—	—	9.7	—	—	2.3
—	—	20	—	—	19.5	—	—	4.5
—	—	30	—	—	29.2	—	—	6.8
—	—	40	—	—	39.0	—	—	9.0
—	—	50	—	—	48.7	—	—	11.3
—	—	60	—	—	58.5	—	—	13.5
—	—	70	—	—	68.2	—	—	15.8
—	—	80	—	—	78.0	—	—	18.0
—	—	90	—	—	87.7	—	—	20.1
—	—	100	—	—	97.4	—	—	22.5
—	—	200	—	—	194.9	—	—	45.0
—	—	210	—	—	204.6	—	—	47.2
—	1	—	—	—	214.4	—	—	49.5
—	2	—	—	1	208.7	—	—	99.0
—	3	—	—	2	203.1	—	—	148.5
—	4	—	—	3	197.4	—	—	198.0
—	5	—	—	4	191.8	—	1	27.4
—	6	—	—	5	186.2	—	1	76.9
—	7	—	—	6	180.5	—	1	126.4
1	—	—	—	7	174.9	—	1	175.9
2	—	—	1	7	129.8	—	3	131.8
3	—	—	2	7	84.7	—	5	87.7
4	—	—	3	7	39.6	—	7	43.6
5	—	—	4	6	214.5	1	0	219.6
6	—	—	5	6	169.3	1	2	175.5
7	—	—	6	6	124.2	1	4	131.4
8	—	—	7	6	79.1	1	6	87.3
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

!4'

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.2
—	—	2	—	—	1.9	—	—	0.5
—	—	3	—	—	2.9	—	—	0.7
—	—	4	—	—	3.9	—	—	1.0
—	—	5	—	—	4.9	—	—	1.2
—	—	6	—	—	5.8	—	—	1.5
—	—	7	—	—	6.8	—	—	1.7
—	—	8	—	—	7.8	—	—	1.9
—	—	9	—	—	8.7	—	—	2.2
—	—	10	—	—	9.7	—	—	2.4
—	—	20	—	—	19.4	—	—	4.8
—	—	30	—	—	29.1	—	—	7.3
—	—	40	—	—	38.8	—	—	9.7
—	—	50	—	—	48.5	—	—	12.1
—	—	60	—	—	58.2	—	—	14.5
—	—	70	—	—	67.9	—	—	16.9
—	—	80	—	—	77.6	—	—	19.4
—	—	90	—	—	87.3	—	—	21.8
—	—	100	—	—	97.0	—	—	24.2
—	—	200	—	—	194.1	—	—	48.4
—	—	210	—	—	203.8	—	—	50.8
—	1	—	—	—	213.5	—	—	53.2
—	2	—	—	1	206.9	—	—	106.4
—	3	—	—	2	200.4	—	—	159.7
—	4	—	—	3	193.9	—	—	212.9
—	5	—	—	4	187.3	—	1	46.1
—	6	—	—	5	180.8	—	1	99.3
—	7	—	—	6	174.3	—	1	152.6
1	—	—	—	7	167.7	—	1	205.8
2	—	—	1	7	115.5	—	3	191.6
3	—	—	2	7	63.2	—	5	177.3
4	—	—	3	7	10.9	—	7	163.1
5	—	—	4	6	178.6	1	1	148.9
6	—	—	5	6	126.4	1	3	134.7
7	—	—	6	6	74.1	1	5	120.5
8	—	—	7	6	21.8	1	7	106.2
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

15°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.3
—	—	2	—	—	1.9	—	—	0.5
—	—	3	—	—	2.9	—	—	0.8
—	—	4	—	—	3.9	—	—	1.0
—	—	5	—	—	4.8	—	—	1.3
—	—	6	—	—	5.8	—	—	1.6
—	—	7	—	—	6.8	—	—	1.8
—	—	8	—	—	7.7	—	—	2.1
—	—	9	—	—	8.7	—	—	2.3
—	—	10	—	—	9.7	—	—	2.6
—	—	20	—	—	19.3	—	—	5.2
—	—	30	—	—	29.0	—	—	7.8
—	—	40	—	—	38.6	—	—	10.4
—	—	50	—	—	48.3	—	—	12.9
—	—	60	—	—	58.0	—	—	15.5
—	—	70	—	—	67.6	—	—	18.1
—	—	80	—	—	77.3	—	—	20.7
—	—	90	—	—	86.9	—	—	23.3
—	—	100	—	—	96.6	—	—	25.9
—	—	200	—	—	193.2	—	—	51.8
—	—	210	—	—	202.8	—	—	54.4
—	1	—	—	—	212.5	—	—	56.9
—	2	—	—	1	205.0	—	—	113.9
—	3	—	—	2	197.5	—	—	170.8
—	4	—	—	3	190.0	—	1	7.8
—	5	—	—	4	182.5	—	1	64.7
—	6	—	—	5	175.0	—	1	121.6
—	7	—	—	6	167.5	—	1	178.6
1	—	—	—	7	160.0	—	2	15.5
2	—	—	1	7	100.1	—	4	31.0
3	—	—	2	7	10.1	—	6	46.6
4	—	—	3	6	200.1	1	0	62.1
5	—	—	4	6	140.2	1	2	77.6
6	—	—	5	6	80.2	1	4	93.1
7	—	—	6	6	20.3	1	6	108.7
8	—	—	7	5	180.3	2	0	124.2
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

16'

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.3
—	—	2	—	—	1.9	—	—	0.6
—	—	3	—	—	2.9	—	—	0.8
—	—	4	—	—	3.9	—	—	1.1
—	—	5	—	—	4.8	—	—	1.4
—	—	6	—	—	5.8	—	—	1.7
—	—	7	—	—	6.7	—	—	1.9
—	—	8	—	—	7.7	—	—	2.2
—	—	9	—	—	8.7	—	—	2.5
—	—	10	—	—	9.6	—	—	2.8
—	—	20	—	—	19.2	—	—	5.5
—	—	30	—	—	28.8	—	—	8.3
—	—	40	—	—	38.5	—	—	11.0
—	—	50	—	—	48.1	—	—	13.8
—	—	60	—	—	57.7	—	—	16.5
—	—	70	—	—	67.3	—	—	19.3
—	—	80	—	—	76.9	—	—	22.1
—	—	90	—	—	86.5	—	—	24.8
—	—	100	—	—	95.1	—	—	27.6
—	—	200	—	—	192.3	—	—	55.1
—	—	210	—	—	201.9	—	—	57.9
—	1	—	—	—	211.5	—	—	60.6
—	2	—	—	1	203.0	—	—	121.3
—	3	—	—	2	194.4	—	—	181.9
—	4	—	—	3	185.9	—	1	22.6
—	5	—	—	4	177.4	—	1	83.2
—	6	—	—	5	168.9	—	1	143.8
—	7	—	—	6	160.3	—	1	204.5
1	—	—	—	7	151.8	—	2	45.1
2	—	—	1	7	83.6	—	4	90.3
3	—	—	2	7	15.5	—	5	135.4
4	—	—	3	6	167.3	1	0	180.5
5	—	—	4	6	99.1	1	3	5.6
6	—	—	5	6	30.9	1	5	50.8
7	—	—	6	5	182.7	1	7	95.9
8	—	—	7	5	114.5	2	1	141.0

Distance.

Departure.

Latitude.

74'

17°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.3
—	—	2	—	—	1.9	—	—	0.6
—	—	3	—	—	2.9	—	—	0.9
—	—	4	—	—	3.8	—	—	1.2
—	—	5	—	—	4.8	—	—	1.5
—	—	6	—	—	5.7	—	—	1.8
—	—	7	—	—	6.7	—	—	2.1
—	—	8	—	—	7.7	—	—	2.3
—	—	9	—	—	8.6	—	—	2.6
—	—	10	—	—	9.6	—	—	2.9
—	—	20	—	—	19.1	—	—	5.9
—	—	30	—	—	28.7	—	—	8.8
—	—	40	—	—	38.3	—	—	11.7
—	—	50	—	—	47.8	—	—	14.6
—	—	60	—	—	57.4	—	—	17.5
—	—	70	—	—	66.9	—	—	20.5
—	—	80	—	—	76.5	—	—	23.4
—	—	90	—	—	86.1	—	—	26.3
—	—	100	—	—	95.6	—	—	29.2
—	—	200	—	—	191.3	—	—	58.5
—	—	210	—	—	200.8	—	—	61.4
—	1	—	—	—	210.4	—	—	64.3
—	2	—	—	1	200.8	—	—	128.6
—	3	—	—	2	191.2	—	—	193.0
—	4	—	—	3	181.5	—	1	37.3
—	5	—	—	4	171.9	—	1	101.6
—	6	—	—	5	162.3	—	1	165.9
—	7	—	—	6	152.7	—	2	10.2
1	—	—	—	7	143.1	—	2	74.6
2	—	—	1	7	66.2	—	4	149.1
3	—	—	2	6	209.3	—	7	3.7
4	—	—	3	6	132.4	1	1	78.3
5	—	—	4	6	55.4	1	3	152.9
6	—	—	5	5	198.5	1	6	7.4
7	—	—	6	5	121.6	2	0	82.0
8	—	—	7	5	44.7	2	2	156.6
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

73°

18°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.3
—	—	2	—	—	1.9	—	—	0.6
—	—	3	—	—	2.9	—	—	0.9
—	—	4	—	—	3.8	—	—	1.2
—	—	5	—	—	4.8	—	—	1.6
—	—	6	—	—	5.7	—	—	1.9
—	—	7	—	—	6.7	—	—	2.2
—	—	8	—	—	7.6	—	—	2.5
—	—	9	—	—	8.6	—	—	2.8
—	—	10	—	—	9.5	—	—	3.1
—	—	20	—	—	19.0	—	—	6.2
—	—	30	—	—	28.5	—	—	9.3
—	—	40	—	—	38.0	—	—	12.4
—	—	50	—	—	47.6	—	—	15.5
—	—	60	—	—	57.1	—	—	18.5
—	—	70	—	—	66.6	—	—	21.6
—	—	80	—	—	76.1	—	—	24.7
—	—	90	—	—	85.6	—	—	27.8
—	—	100	—	—	95.1	—	—	30.9
—	—	200	—	—	190.2	—	—	61.8
—	—	210	—	—	199.7	—	—	64.9
—	1	—	—	—	209.2	—	—	68.0
—	2	—	—	1	198.5	—	—	136.0
—	3	—	—	2	187.7	—	—	204.0
—	4	—	—	3	176.9	—	1	51.9
—	5	—	—	4	166.2	—	1	119.9
—	6	—	—	5	155.4	—	1	187.9
—	7	—	—	6	144.6	—	2	35.9
1	—	—	—	7	133.8	—	2	103.8
2	—	—	1	7	47.7	—	4	207.7
3	—	—	2	6	181.5	—	7	91.5
4	—	—	3	6	95.4	1	1	195.4
5	—	—	4	6	9.2	1	4	79.2
6	—	—	5	5	143.0	1	6	183.0
7	—	—	6	5	56.9	2	1	66.9
8	—	—	7	4	190.7	2	3	170.7
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

19°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	1.0	—	—	0.3
—	—	2	—	—	1.9	—	—	0.7
—	—	3	—	—	2.8	—	—	1.0
—	—	4	—	—	3.8	—	—	1.3
—	—	5	—	—	4.7	—	—	1.6
—	—	6	—	—	5.7	—	—	2.0
—	—	7	—	—	6.6	—	—	2.3
—	—	8	—	—	7.6	—	—	2.6
—	—	9	—	—	8.5	—	—	2.9
—	—	10	—	—	9.5	—	—	3.3
—	—	20	—	—	18.9	—	—	6.5
—	—	30	—	—	28.1	—	—	9.8
—	—	40	—	—	37.8	—	—	13.0
—	—	50	—	—	47.3	—	—	16.3
—	—	60	—	—	56.7	—	—	19.5
—	—	70	—	—	65.9	—	—	22.8
—	—	80	—	—	75.6	—	—	26.1
—	—	90	—	—	85.1	—	—	29.3
—	—	100	—	—	94.6	—	—	32.6
—	—	200	—	—	189.1	—	—	65.1
—	—	210	—	—	198.6	—	—	68.4
—	1	—	—	—	208.0	—	—	71.6
—	2	—	—	1	196.0	—	—	143.3
—	3	—	—	2	184.0	—	—	214.9
—	4	—	—	3	172.0	—	1	66.5
—	5	—	—	4	160.0	—	1	138.1
—	6	—	—	5	148.0	—	1	209.7
—	7	—	—	6	136.1	—	2	61.3
1	—	—	—	7	124.1	—	2	134.0
2	—	—	1	7	23.2	—	5	47.9
3	—	—	2	6	152.2	—	7	181.9
4	—	—	3	6	56.3	1	2	95.8
5	—	—	4	6	60.4	1	5	9.8
6	—	—	5	5	84.5	1	7	143.8
7	—	—	6	4	208.6	2	2	57.7
8	—	—	7	4	112.6	2	4	191.7
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

20°

Distance.			Latitude.			Departure.		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	0.9	—	—	0.3
—	—	2	—	—	1.9	—	—	0.7
—	—	3	—	—	2.8	—	—	1.0
—	—	4	—	—	3.8	—	—	1.4
—	—	5	—	—	4.7	—	—	1.7
—	—	6	—	—	5.6	—	—	2.1
—	—	7	—	—	6.6	—	—	2.4
—	—	8	—	—	7.5	—	—	2.7
—	—	9	—	—	8.5	—	—	3.1
—	—	10	—	—	9.4	—	—	3.4
—	—	20	—	—	18.8	—	—	6.8
—	—	30	—	—	28.2	—	—	10.3
—	—	40	—	—	37.5	—	—	13.7
—	—	50	—	—	47.0	—	—	17.1
—	—	60	—	—	56.4	—	—	20.5
—	—	70	—	—	65.8	—	—	23.9
—	—	80	—	—	75.2	—	—	27.4
—	—	90	—	—	84.6	—	—	30.8
—	—	100	—	—	94.0	—	—	34.2
—	—	200	—	—	187.9	—	—	68.4
—	—	210	—	—	197.3	—	—	71.8
—	1	—	—	—	206.7	—	—	75.2
—	2	—	—	1	193.5	—	—	150.5
—	3	—	—	2	180.2	—	1	5.7
—	4	—	—	3	166.9	—	1	81.0
—	5	—	—	4	153.7	—	1	156.2
—	6	—	—	5	140.4	—	2	11.4
—	7	—	—	6	127.1	—	2	86.7
1	—	—	—	7	113.8	—	2	161.9
2	—	—	1	7	7.7	—	5	103.8
3	—	—	2	6	121.5	1	0	45.8
4	—	—	3	6	15.4	1	2	207.7
5	—	—	4	5	129.2	1	5	119.6
6	—	—	5	5	23.0	2	0	91.5
7	—	—	6	4	136.9	2	3	33.4
8	—	—	7	4	50.7	2	5	195.4
Distance.			Departure.			Latitude.		

70°

21°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.9	—	—	0.4
—	—	2	—	—	1.9	—	—	0.7
—	—	3	—	—	2.8	—	—	1.1
—	—	4	—	—	3.7	—	—	1.4
—	—	5	—	—	4.7	—	—	1.8
—	—	6	—	—	5.6	—	—	2.2
—	—	7	—	—	6.5	—	—	2.5
—	—	8	—	—	7.5	—	—	2.9
—	—	9	—	—	8.4	—	—	3.2
—	—	10	—	—	9.3	—	—	3.6
—	—	20	—	—	18.7	—	—	7.2
—	—	30	—	—	28.0	—	—	10.8
—	—	40	—	—	37.3	—	—	14.3
—	—	50	—	—	46.7	—	—	17.9
—	—	60	—	—	56.0	—	—	21.5
—	—	70	—	—	65.4	—	—	25.1
—	—	80	—	—	74.7	—	—	28.7
—	—	90	—	—	84.0	—	—	32.3
—	—	100	—	—	93.4	—	—	35.8
—	—	200	—	—	186.7	—	—	71.7
—	—	210	—	—	196.1	—	—	75.3
—	1	—	—	—	205.4	—	—	78.8
—	2	—	—	1	190.8	—	—	157.7
—	3	—	—	2	176.2	—	1	16.5
—	4	—	—	3	161.6	—	1	95.4
—	5	—	—	4	147.0	—	1	174.2
—	6	—	—	5	132.3	—	2	33.0
—	7	—	—	6	117.7	—	2	111.9
1	—	—	—	7	103.1	—	2	190.7
2	—	—	1	6	206.2	—	5	161.4
3	—	—	2	6	89.4	1	0	132.2
4	—	—	3	5	192.5	1	3	102.9
5	—	—	4	5	75.6	1	6	73.6
6	—	—	5	4	178.7	2	1	44.3
7	—	—	6	4	61.8	2	4	15.0
8	—	—	7	3	165.0	2	6	205.8
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

29"

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	0.9	—	—	0.4
—	—	2	—	—	1.9	—	—	0.8
—	—	3	—	—	2.8	—	—	1.1
—	—	4	—	—	3.7	—	—	1.5
—	—	5	—	—	4.6	—	—	1.9
—	—	6	—	—	5.6	—	—	2.3
—	—	7	—	—	6.5	—	—	2.6
—	—	8	—	—	7.4	—	—	3.0
—	—	9	—	—	8.3	—	—	3.4
—	—	10	—	—	9.3	—	—	3.8
—	—	20	—	—	18.5	—	—	7.5
—	—	30	—	—	27.8	—	—	11.2
—	—	40	—	—	37.1	—	—	15.0
—	—	50	—	—	46.4	—	—	18.7
—	—	60	—	—	55.6	—	—	22.5
—	—	70	—	—	64.9	—	—	26.2
—	—	80	—	—	74.2	—	—	30.0
—	—	90	—	—	83.5	—	—	33.7
—	—	100	—	—	92.7	—	—	37.5
—	—	200	—	—	185.4	—	—	74.9
—	—	210	—	—	194.7	—	—	78.7
—	1	—	—	—	204.0	—	—	82.4
—	2	—	—	1	183.0	—	—	164.8
—	3	—	—	2	171.9	—	1	27.2
—	4	—	—	3	155.9	—	1	109.6
—	5	—	—	4	139.9	—	1	192.1
—	6	—	—	5	123.9	—	2	54.5
—	7	—	—	6	107.9	—	2	136.9
1	—	—	—	7	91.8	—	2	219.3
2	—	—	1	6	183.7	—	5	218.5
3	—	—	2	6	55.5	1	0	217.8
4	—	—	3	5	147.4	1	3	217.1
5	—	—	4	5	19.2	1	6	216.4
6	—	—	5	4	111.0	2	1	215.7
7	—	—	6	3	202.9	2	4	215.0
8	—	—	7	3	74.7	2	7	214.2
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

23°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.9	—	—	0.4
—	—	2	—	—	1.8	—	—	0.8
—	—	3	—	—	2.8	—	—	1.2
—	—	4	—	—	3.7	—	—	1.6
—	—	5	—	—	4.6	—	—	2.0
—	—	6	—	—	5.5	—	—	2.3
—	—	7	—	—	6.4	—	—	2.7
—	—	8	—	—	7.4	—	—	3.1
—	—	9	—	—	8.3	—	—	3.5
—	—	10	—	—	9.2	—	—	3.9
—	—	20	—	—	18.4	—	—	7.8
—	—	30	—	—	27.6	—	—	11.7
—	—	40	—	—	36.8	—	—	15.6
—	—	50	—	—	46.0	—	—	19.5
—	—	60	—	—	55.2	—	—	23.4
—	—	70	—	—	64.1	—	—	27.4
—	—	80	—	—	73.6	—	—	31.3
—	—	90	—	—	82.9	—	—	35.2
—	—	100	—	—	92.1	—	—	39.1
—	—	200	—	—	184.1	—	—	78.2
—	—	210	—	—	193.3	—	—	82.1
—	1	—	—	—	202.5	—	—	86.0
—	2	—	—	1	185.0	—	—	171.9
—	3	—	—	2	167.5	—	1	37.9
—	4	—	—	3	150.0	—	1	123.8
—	5	—	—	4	132.6	—	1	209.8
—	6	—	—	5	115.1	—	2	75.8
—	7	—	—	6	97.6	—	2	161.7
1	—	—	—	7	80.1	—	3	27.7
2	—	—	1	6	160.2	—	6	55.4
3	—	—	2	6	20.2	1	1	83.0
4	—	—	3	5	100.3	1	4	110.7
5	—	—	4	4	180.4	1	7	138.4
6	—	—	5	4	40.5	2	2	166.1
7	—	—	6	3	120.6	2	5	193.8
8	—	—	7	2	200.6	3	1	1.4
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

24°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.9	—	—	0.4
—	—	2	—	—	1.8	—	—	0.8
—	—	3	—	—	2.7	—	—	1.2
—	—	4	—	—	3.7	—	—	1.6
—	—	5	—	—	4.6	—	—	2.0
—	—	6	—	—	5.5	—	—	2.4
—	—	7	—	—	6.4	—	—	2.9
—	—	8	—	—	7.3	—	—	3.3
—	—	9	—	—	8.2	—	—	3.7
—	—	10	—	—	9.1	—	—	4.1
—	—	20	—	—	18.3	—	—	8.1
—	—	30	—	—	27.4	—	—	12.2
—	—	40	—	—	36.5	—	—	16.3
—	—	50	—	—	45.7	—	—	20.3
—	—	60	—	—	54.8	—	—	24.4
—	—	70	—	—	64.0	—	—	28.5
—	—	80	—	—	73.1	—	—	32.5
—	—	90	—	—	82.2	—	—	36.6
—	—	100	—	—	91.4	—	—	40.7
—	—	200	—	—	182.7	—	—	81.4
—	—	210	—	—	191.8	—	—	85.4
—	1	—	—	—	201.0	—	—	89.5
—	2	—	—	1	182.0	—	—	179.0
—	3	—	—	2	162.9	—	1	48.4
—	4	—	—	3	143.9	—	1	137.9
—	5	—	—	4	124.9	—	2	7.4
—	6	—	—	5	105.9	—	2	96.9
—	7	—	—	6	86.9	—	2	186.4
1	—	—	—	7	67.8	—	3	55.8
2	—	—	1	6	135.7	—	5	111.7
3	—	—	2	5	203.5	1	1	167.5
4	—	—	3	5	51.4	1	5	3.4
5	—	—	4	4	119.2	2	0	59.2
6	—	—	5	3	187.0	2	3	115.0
7	—	—	6	3	34.9	2	6	170.9
8	—	—	7	2	102.7	3	2	6.8
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.9	—	—	0.4
—	—	2	—	—	1.8	—	—	0.9
—	—	3	—	—	2.7	—	—	1.3
—	—	4	—	—	3.6	—	—	1.7
—	—	5	—	—	4.5	—	—	2.1
—	—	6	—	—	5.4	—	—	2.5
—	—	7	—	—	6.3	—	—	3.0
—	—	8	—	—	7.3	—	—	3.4
—	—	9	—	—	8.2	—	—	3.8
—	—	10	—	—	9.1	—	—	4.2
—	—	20	—	—	18.1	—	—	8.5
—	—	30	—	—	27.2	—	—	12.7
—	—	40	—	—	36.3	—	—	16.9
—	—	50	—	—	45.3	—	—	21.1
—	—	60	—	—	54.4	—	—	25.4
—	—	70	—	—	63.4	—	—	29.6
—	—	80	—	—	72.5	—	—	33.8
—	—	90	—	—	81.6	—	—	38.0
—	—	100	—	—	90.6	—	—	42.3
—	—	200	—	—	181.3	—	—	84.5
—	—	210	—	—	190.3	—	—	88.8
—	1	—	—	—	199.4	—	—	93.0
—	2	—	—	1	178.8	—	—	186.0
—	3	—	—	2	158.2	—	1	58.9
—	4	—	—	3	137.6	—	1	151.9
—	5	—	—	4	117.0	—	2	24.9
—	6	—	—	5	96.3	—	2	117.9
—	7	—	—	6	75.7	—	2	210.9
1	—	—	—	7	55.1	—	3	83.8
2	—	—	1	6	110.2	—	6	167.7
3	—	—	2	5	165.4	1	2	31.5
4	—	—	3	5	0.5	1	5	115.4
5	—	—	4	4	55.6	2	0	199.2
6	—	—	5	3	110.7	2	4	63.0
7	—	—	6	2	165.8	2	7	146.9
8	—	—	7	2	1.0	3	3	10.7
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

26°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	0.9	—	—	0.4
—	—	2	—	—	1.8	—	—	0.9
—	—	3	—	—	2.7	—	—	1.3
—	—	4	—	—	3.6	—	—	1.8
—	—	5	—	—	4.5	—	—	2.2
—	—	6	—	—	5.4	—	—	2.6
—	—	7	—	—	6.3	—	—	3.1
—	—	8	—	—	7.2	—	—	3.5
—	—	9	—	—	8.1	—	—	4.0
—	—	10	—	—	9.0	—	—	4.4
—	—	20	—	—	18.0	—	—	8.8
—	—	30	—	—	27.0	—	—	13.2
—	—	40	—	—	36.0	—	—	17.5
—	—	50	—	—	44.9	—	—	21.9
—	—	60	—	—	53.9	—	—	26.3
—	—	70	—	—	62.9	—	—	30.7
—	—	80	—	—	71.9	—	—	35.1
—	—	90	—	—	80.9	—	—	39.5
—	—	100	—	—	89.9	—	—	43.8
—	—	200	—	—	179.8	—	—	87.7
—	—	210	—	—	188.8	—	—	92.1
—	1	—	—	—	197.7	—	—	96.4
—	2	—	—	1	175.5	—	—	192.9
—	3	—	—	2	153.2	—	1	69.3
—	4	—	—	3	130.9	—	1	165.8
—	5	—	—	4	108.7	—	2	42.2
—	6	—	—	5	86.4	—	2	139.5
—	7	—	—	6	64.1	—	3	15.1
1	—	—	—	7	41.8	—	3	111.5
2	—	—	1	6	83.7	—	7	3.1
3	—	—	2	5	125.5	1	2	114.6
4	—	—	3	4	167.4	1	6	6.1
5	—	—	4	3	209.2	2	1	117.6
6	—	—	5	3	31.0	2	5	9.2
7	—	—	6	2	72.9	3	0	120.7
8	—	—	7	1	114.7	3	4	12.2
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

64°

27°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.9	—	—	0.5
—	—	2	—	—	1.8	—	—	0.9
—	—	3	—	—	2.7	—	—	1.4
—	—	4	—	—	3.6	—	—	1.8
—	—	5	—	—	4.5	—	—	2.3
—	—	6	—	—	5.4	—	—	2.7
—	—	7	—	—	6.2	—	—	3.2
—	—	8	—	—	7.1	—	—	3.6
—	—	9	—	—	8.0	—	—	4.1
—	—	10	—	—	8.9	—	—	4.5
—	—	20	—	—	17.8	—	—	9.1
—	—	30	—	—	26.7	—	—	13.6
—	—	40	—	—	35.6	—	—	18.2
—	—	50	—	—	44.6	—	—	22.7
—	—	60	—	—	53.5	—	—	27.2
—	—	70	—	—	62.4	—	—	31.8
—	—	80	—	—	71.3	—	—	36.3
—	—	90	—	—	80.2	—	—	40.9
—	—	100	—	—	89.1	—	—	45.4
—	—	200	—	—	178.2	—	—	90.8
—	—	210	—	—	187.1	—	—	95.3
—	1	—	—	—	196.0	—	—	99.9
—	2	—	—	1	172.0	—	—	199.8
—	3	—	—	2	148.1	—	1	79.6
—	4	—	—	3	124.1	—	1	179.5
—	5	—	—	4	100.1	—	2	59.4
—	6	—	—	5	76.1	—	2	159.3
—	7	—	—	6	52.1	—	3	39.2
1	—	—	—	7	28.2	—	3	139.0
2	—	—	1	6	56.3	—	7	58.1
3	—	—	2	5	84.5	1	2	197.1
4	—	—	3	4	112.6	1	6	116.1
5	—	—	4	3	140.8	2	2	35.2
6	—	—	5	2	169.0	2	5	174.2
7	—	—	6	1	197.1	3	1	93.3
8	—	—	7	1	5.3	3	5	12.3

• *Distance.**Departure.**Latitude.*

28°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.9	—	—	0.5
—	—	2	—	—	1.8	—	—	0.9
—	—	3	—	—	2.7	—	—	1.4
—	—	4	—	—	3.5	—	—	1.9
—	—	5	—	—	4.4	—	—	2.4
—	—	6	—	—	5.3	—	—	2.8
—	—	7	—	—	6.2	—	—	3.3
—	—	8	—	—	7.1	—	—	3.8
—	—	9	—	—	8.0	—	—	4.2
—	—	10	—	—	8.8	—	—	4.7
—	—	20	—	—	17.7	—	—	9.4
—	—	30	—	—	26.5	—	—	14.1
—	—	40	—	—	35.3	—	—	18.8
—	—	50	—	—	44.2	—	—	23.5
—	—	60	—	—	53.0	—	—	28.1
—	—	70	—	—	61.8	—	—	32.9
—	—	80	—	—	70.6	—	—	37.6
—	—	90	—	—	79.5	—	—	42.3
—	—	100	—	—	88.3	—	—	47.0
—	—	200	—	—	176.6	—	—	93.9
—	—	210	—	—	185.4	—	—	98.6
—	1	—	—	—	194.3	—	—	103.3
—	2	—	—	1	168.5	—	—	206.6
—	3	—	—	2	142.8	—	1	89.8
—	4	—	—	3	117.0	—	1	193.1
—	5	—	—	4	91.3	—	2	76.4
—	6	—	—	5	65.5	—	2	179.7
—	7	—	—	6	39.8	—	3	63.0
1	—	—	—	7	14.0	—	3	166.2
2	—	—	1	6	28.0	—	7	112.5
3	—	—	2	5	42.0	1	3	58.7
4	—	—	3	4	56.0	1	7	5.0
5	—	—	4	3	70.0	2	2	171.2
6	—	—	5	2	84.0	2	6	117.4
7	—	—	6	1	98.0	3	2	63.7
8	—	—	7	0	112.0	3	6	9.9
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

62°

29°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	0.9	—	—	0.5
—	—	2	—	—	1.8	—	—	1.0
—	—	3	—	—	2.6	—	—	1.5
—	—	4	—	—	3.5	—	—	1.9
—	—	5	—	—	4.4	—	—	2.4
—	—	6	—	—	5.3	—	—	2.9
—	—	7	—	—	6.1	—	—	3.4
—	—	8	—	—	7.0	—	—	3.9
—	—	9	—	—	7.9	—	—	4.4
—	—	10	—	—	8.8	—	—	4.9
—	—	20	—	—	17.5	—	—	9.7
—	—	30	—	—	26.2	—	—	14.5
—	—	40	—	—	35.0	—	—	19.4
—	—	50	—	—	43.7	—	—	24.2
—	—	60	—	—	52.5	—	—	29.1
—	—	70	—	—	61.2	—	—	33.9
—	—	80	—	—	70.0	—	—	38.8
—	—	90	—	—	78.7	—	—	43.6
—	—	100	—	—	87.5	—	—	48.5
—	—	200	—	—	174.9	—	—	97.0
—	—	210	—	—	183.7	—	—	101.8
—	1	—	—	—	192.4	—	—	106.7
—	2	—	—	1	164.8	—	—	213.3
—	3	—	—	2	137.3	—	1	100.0
—	4	—	—	3	109.7	—	1	206.6
—	5	—	—	4	82.1	—	2	93.3
—	6	—	—	5	54.5	—	2	200.0
—	7	—	—	6	26.9	—	3	86.6
1	—	—	—	6	219.4	—	3	193.3
2	—	—	1	5	218.7	—	7	156.6
3	—	—	2	4	218.1	1	3	139.8
4	—	—	3	3	217.4	1	7	113.1
5	—	—	4	2	216.8	2	3	86.4
6	—	—	5	1	216.2	2	7	59.7
7	—	—	6	0	215.5	3	3	33.0
8	—	—	6	7	214.9	3	7	6.2
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

30'

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>P.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.9	—	—	0.5
—	—	2	—	—	1.7	—	—	1.0
—	—	3	—	—	2.6	—	—	1.5
—	—	4	—	—	3.5	—	—	2.0
—	—	5	—	—	4.3	—	—	2.5
—	—	6	—	—	5.2	—	—	3.0
—	—	7	—	—	6.1	—	—	3.5
—	—	8	—	—	6.9	—	—	4.0
—	—	9	—	—	7.8	—	—	4.5
—	—	10	—	—	8.7	—	—	5.0
—	—	20	—	—	17.3	—	—	10.0
—	—	30	—	—	26.0	—	—	15.0
—	—	40	—	—	34.0	—	—	20.0
—	—	50	—	—	43.3	—	—	25.0
—	—	60	—	—	52.0	—	—	30.0
—	—	70	—	—	60.6	—	—	35.0
—	—	80	—	—	69.2	—	—	40.0
—	—	90	—	—	77.9	—	—	45.0
—	—	100	—	—	86.6	—	—	50.0
—	—	200	—	—	173.2	—	—	100.0
—	—	210	—	—	181.9	—	—	105.0
—	1	—	—	—	190.5	—	—	110.0
—	2	—	—	1	161.1	—	1	—
—	3	—	—	2	131.6	—	1	110.0
—	4	—	—	3	102.1	—	2	—
—	5	—	—	4	72.7	—	2	110.0
—	6	—	—	5	43.2	—	3	—
—	7	—	—	6	13.7	—	3	110.0
1	—	—	—	6	204.2	—	4	—
2	—	—	1	5	188.5	1	—	—
3	—	—	2	4	172.7	1	4	—
4	—	—	3	3	157.0	2	—	—
5	—	—	4	2	141.2	2	4	—
6	—	—	5	1	125.4	3	—	—
7	—	—	6	0	109.7	3	4	—
8	—	—	6	7	93.9	4	—	—
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

60'

0

31°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	0.9	—	—	0.5
—	—	2	—	—	1.7	—	—	1.0
—	—	3	—	—	2.6	—	—	1.6
—	—	4	—	—	3.4	—	—	2.1
—	—	5	—	—	4.3	—	—	2.6
—	—	6	—	—	5.1	—	—	3.1
—	—	7	—	—	6.0	—	—	3.6
—	—	8	—	—	6.7	—	—	4.1
—	—	9	—	—	7.7	—	—	4.6
—	—	10	—	—	8.6	—	—	5.2
—	—	20	—	—	17.1	—	—	10.3
—	—	30	—	—	25.7	—	—	15.5
—	—	40	—	—	34.3	—	—	20.6
—	—	50	—	—	42.9	—	—	25.8
—	—	60	—	—	51.4	—	—	30.9
—	—	70	—	—	60.0	—	—	36.1
—	—	80	—	—	68.6	—	—	41.2
—	—	90	—	—	77.2	—	—	46.4
—	—	100	—	—	85.7	—	—	51.5
—	—	200	—	—	171.4	—	—	103.0
—	—	210	—	—	180.0	—	—	108.2
—	1	—	—	—	188.6	—	—	113.3
—	2	—	—	1	157.2	—	1	6.6
—	3	—	—	2	125.7	—	1	119.9
—	4	—	—	3	94.3	—	2	12.2
—	5	—	—	4	62.9	—	2	126.6
—	6	—	—	5	31.5	—	3	19.9
—	7	—	—	6	0.1	—	3	133.2
1	—	—	—	6	188.6	—	4	26.5
2	—	—	1	5	157.3	1	0	53.0
3	—	—	2	4	125.9	1	1	79.4
4	—	—	3	3	94.6	2	0	105.9
5	—	—	4	2	63.2	2	1	132.4
6	—	—	5	1	31.8	3	0	158.9
7	—	—	6	0	0.5	3	4	185.4
8	—	—	6	6	189.1	4	0	211.8
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

32²

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	0.9	—	—	0.5
—	—	2	—	—	1.7	—	—	1.1
—	—	3	—	—	2.5	—	—	1.6
—	—	4	—	—	3.2	—	—	2.1
—	—	5	—	—	4.2	—	—	2.7
—	—	6	—	—	5.1	—	—	3.2
—	—	7	—	—	5.9	—	—	3.7
—	—	8	—	—	6.8	—	—	4.2
—	—	9	—	—	7.6	—	—	4.8
—	—	10	—	—	8.5	—	—	5.3
—	—	20	—	—	17.0	—	—	10.6
—	—	30	—	—	25.4	—	—	15.9
—	—	40	—	—	33.9	—	—	21.2
—	—	50	—	—	42.4	—	—	26.5
—	—	60	—	—	50.9	—	—	31.8
—	—	70	—	—	59.4	—	—	37.1
—	—	80	—	—	67.8	—	—	42.4
—	—	90	—	—	76.3	—	—	47.7
—	—	100	—	—	84.8	—	—	53.0
—	—	200	—	—	169.6	—	—	106.0
—	—	210	—	—	178.1	—	—	111.3
—	1	—	—	—	186.6	—	—	116.6
—	2	—	—	1	153.1	—	1	13.2
—	3	—	—	2	119.7	—	1	129.7
—	4	—	—	3	86.3	—	2	26.3
—	5	—	—	4	52.9	—	2	142.9
—	6	—	—	5	19.4	—	3	39.5
—	7	—	—	5	206.0	—	3	156.1
1	—	—	—	6	172.6	—	4	52.6
2	—	—	1	5	125.1	1	0	105.3
3	—	—	2	4	77.7	1	4	157.9
4	—	—	3	3	30.2	2	0	210.6
5	—	—	4	1	202.8	2	5	43.2
6	—	—	5	0	155.4	3	1	95.8
7	—	—	5	7	107.9	3	5	148.5
8	—	—	6	6	60.5	4	1	201.1
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

Traverse Table for

35°

Distance.			Latitude.			Departure.		
M.	F.	Y.	M.	F.	Y.	M.	F.	Y.
—	—	1	—	—	0.8	—	—	0.5
—	—	2	—	—	1.7	—	—	1.1
—	—	3	—	—	2.5	—	—	1.6
—	—	4	—	—	3.4	—	—	2.2
—	—	5	—	—	4.2	—	—	2.7
—	—	6	—	—	5.0	—	—	3.3
—	—	7	—	—	5.9	—	—	3.8
—	—	8	—	—	6.7	—	—	4.4
—	—	9	—	—	7.6	—	—	4.9
—	—	10	—	—	8.4	—	—	5.5
—	—	20	—	—	16.8	—	—	10.9
—	—	30	—	—	25.2	—	—	16.3
—	—	40	—	—	33.6	—	—	21.8
—	—	50	—	—	41.9	—	—	27.2
—	—	60	—	—	50.3	—	—	32.7
—	—	70	—	—	58.7	—	—	38.1
—	—	80	—	—	67.1	—	—	43.6
—	—	90	—	—	75.5	—	—	49.0
—	—	100	—	—	83.9	—	—	54.5
—	—	200	—	—	167.7	—	—	108.9
—	—	210	—	—	176.1	—	—	114.4
—	1	—	—	—	181.5	—	—	119.8
—	2	—	—	1	149.0	—	1	19.6
—	3	—	—	2	113.5	—	1	139.5
—	4	—	—	3	78.0	—	2	39.3
—	5	—	—	4	42.6	—	2	159.1
—	6	—	—	5	7.1	—	3	58.9
—	7	—	—	5	191.6	—	3	178.7
1	—	—	—	6	156.1	—	4	178.6
2	—	—	1	5	92.2	1	1	137.1
3	—	—	2	4	28.2	1	6	95.7
4	—	—	3	2	184.3	2	3	51.2
5	—	—	4	1	120.4	3	0	12.8
6	—	—	5	0	56.5	3	4	191.4
7	—	—	5	6	212.6	4	1	149.9
8	—	—	6	5	148.6	4	6	108.5
Distance.			Departure.			Latitude.		

57°

34°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
M.	F.	V.	M.	F.	V.	M.	F.	V.
—	—	1	—	—	0.8	—	—	0.6
—	—	2	—	—	1.7	—	—	1.1
—	—	3	—	—	2.5	—	—	1.7
—	—	4	—	—	3.3	—	—	2.2
—	—	5	—	—	4.2	—	—	2.8
—	—	6	—	—	5.0	—	—	3.4
—	—	7	—	—	5.8	—	—	3.9
—	—	8	—	—	6.6	—	—	4.5
—	—	9	—	—	7.5	—	—	5.0
—	—	10	—	—	8.3	—	—	5.6
—	—	20	—	—	16.6	—	—	11.2
—	—	30	—	—	24.9	—	—	16.8
—	—	40	—	—	33.2	—	—	22.4
—	—	50	—	—	41.5	—	—	28.0
—	—	60	—	—	49.7	—	—	33.6
—	—	70	—	—	58.0	—	—	39.1
—	—	80	—	—	66.3	—	—	44.7
—	—	90	—	—	74.6	—	—	50.3
—	—	100	—	—	82.9	—	—	55.9
—	—	200	—	—	165.8	—	—	111.8
—	—	210	—	—	174.1	—	—	117.4
—	1	—	—	—	182.4	—	—	123.0
—	2	—	—	1	141.8	—	1	26.0
—	3	—	—	2	107.2	—	1	119.1
—	4	—	—	3	69.6	—	2	52.1
—	5	—	—	4	32.0	—	2	175.1
—	6	—	—	4	211.3	—	3	78.1
—	7	—	—	5	176.7	—	3	291.1
1	—	—	—	6	139.1	—	1	104.2
2	—	—	1	5	58.2	1	0	208.3
3	—	—	2	3	197.4	1	5	92.5
4	—	—	3	2	116.5	2	1	196.6
5	—	—	4	1	35.6	2	6	80.8
6	—	—	4	7	174.7	3	2	185.0
7	—	—	5	6	93.8	3	7	69.1
8	—	—	6	5	13.0	4	3	173.2
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

35°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.8	—	—	0.6
—	—	2	—	—	1.6	—	—	1.2
—	—	3	—	—	2.5	—	—	1.7
—	—	4	—	—	3.3	—	—	2.3
—	—	5	—	—	4.1	—	—	2.9
—	—	6	—	—	4.9	—	—	3.4
—	—	7	—	—	5.7	—	—	4.0
—	—	8	—	—	6.6	—	—	4.6
—	—	9	—	—	7.4	—	—	5.2
—	—	10	—	—	8.2	—	—	5.7
—	—	20	—	—	16.4	—	—	11.5
—	—	30	—	—	24.6	—	—	17.2
—	—	40	—	—	32.8	—	—	22.9
—	—	50	—	—	41.0	—	—	28.7
—	—	60	—	—	49.2	—	—	34.4
—	—	70	—	—	57.3	—	—	40.2
—	—	80	—	—	65.5	—	—	45.9
—	—	90	—	—	73.7	—	—	51.6
—	—	100	—	—	81.9	—	—	57.4
—	—	200	—	—	163.8	—	—	114.7
—	—	210	—	—	172.0	—	—	120.5
—	1	—	—	—	180.2	—	—	126.2
—	2	—	—	1	140.4	—	1	32.4
—	3	—	—	2	100.6	—	1	158.6
—	4	—	—	3	60.8	—	2	64.8
—	5	—	—	4	21.1	—	2	190.9
—	6	—	—	4	201.3	—	3	97.1
—	7	—	—	5	161.5	—	4	3.3
1	—	—	—	6	121.7	—	4	129.5
2	—	—	1	5	23.4	1	1	39.0
3	—	—	2	3	145.0	1	5	168.6
4	—	—	3	2	46.7	2	2	78.1
5	—	—	4	0	168.4	2	6	207.6
6	—	—	4	7	70.1	3	3	117.1
7	—	—	5	5	191.8	4	0	26.6
8	—	—	6	4	93.4	4	1	156.2
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

36°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.8	—	—	0.6
—	—	2	—	—	1.6	—	—	1.2
—	—	3	—	—	2.4	—	—	1.8
—	—	4	—	—	3.2	—	—	2.4
—	—	5	—	—	4.1	—	—	2.9
—	—	6	—	—	4.9	—	—	3.5
—	—	7	—	—	5.7	—	—	4.1
—	—	8	—	—	6.5	—	—	4.7
—	—	9	—	—	7.3	—	—	5.3
—	—	10	—	—	8.1	—	—	5.9
—	—	20	—	—	16.2	—	—	11.8
—	—	30	—	—	24.3	—	—	17.6
—	—	40	—	—	32.4	—	—	23.5
—	—	50	—	—	40.5	—	—	29.4
—	—	60	—	—	48.5	—	—	35.3
—	—	70	—	—	56.6	—	—	41.2
—	—	80	—	—	64.7	—	—	47.0
—	—	90	—	—	72.8	—	—	52.9
—	—	100	—	—	80.9	—	—	58.8
—	—	200	—	—	161.8	—	—	117.6
—	—	210	—	—	169.9	—	—	123.4
—	1	—	—	—	178.0	—	—	129.3
—	2	—	—	1	136.0	—	1	38.6
—	3	—	—	2	93.9	—	1	167.9
—	4	—	—	3	51.9	—	2	77.2
—	5	—	—	4	9.9	—	2	206.6
—	6	—	—	4	187.9	—	3	115.9
—	7	—	—	5	145.9	—	4	25.2
1	—	—	—	6	103.8	—	4	154.5
2	—	—	1	4	207.7	1	1	89.0
3	—	—	2	3	91.5	1	6	23.4
4	—	—	3	1	195.4	2	2	177.9
5	—	—	3	0	79.2	2	7	112.4
6	—	—	4	6	183.0	3	4	46.9
7	—	—	5	5	66.9	4	0	201.4
8	—	—	6	3	170.7	4	5	135.8
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

54°

37'

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.8	—	—	0.6
—	—	2	—	—	1.6	—	—	1.2
—	—	3	—	—	2.4	—	—	1.8
—	—	4	—	—	3.2	—	—	2.4
—	—	5	—	—	4.0	—	—	3.0
—	—	6	—	—	4.8	—	—	3.6
—	—	7	—	—	5.6	—	—	4.2
—	—	8	—	—	6.4	—	—	4.8
—	—	9	—	—	7.2	—	—	5.4
—	—	10	—	—	8.0	—	—	6.0
—	—	20	—	—	16.0	—	—	12.0
—	—	30	—	—	24.0	—	—	18.1
—	—	40	—	—	32.0	—	—	24.1
—	—	50	—	—	39.9	—	—	30.1
—	—	60	—	—	47.9	—	—	36.1
—	—	70	—	—	55.9	—	—	42.1
—	—	80	—	—	63.9	—	—	48.1
—	—	90	—	—	71.9	—	—	54.2
—	—	100	—	—	79.9	—	—	60.2
—	—	200	—	—	159.7	—	—	120.4
—	—	210	—	—	167.7	—	—	126.4
—	1	—	—	—	175.7	—	—	132.4
—	2	—	—	1	131.4	—	1	44.8
—	3	—	—	2	87.1	—	1	177.2
—	4	—	—	3	42.8	—	2	89.6
—	5	—	—	3	218.5	—	3	2.0
—	6	—	—	4	174.2	—	3	131.3
—	7	—	—	5	129.9	—	4	46.7
1	—	—	—	6	85.6	—	4	179.1
2	—	—	1	4	171.2	1	1	138.2
3	—	—	2	3	36.8	1	6	97.4
4	—	—	3	1	122.4	2	3	56.5
5	—	—	3	7	208.0	3	0	15.6
6	—	—	4	6	73.6	3	4	194.7
7	—	—	5	4	159.2	4	1	153.8
8	—	—	6	3	24.8	4	6	113.0
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

38°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.8	—	—	0.6
—	—	2	—	—	1.6	—	—	1.2
—	—	3	—	—	2.4	—	—	1.9
—	—	4	—	—	3.2	—	—	2.5
—	—	5	—	—	3.9	—	—	3.1
—	—	6	—	—	4.7	—	—	3.7
—	—	7	—	—	5.5	—	—	4.3
—	—	8	—	—	6.3	—	—	4.9
—	—	9	—	—	7.1	—	—	5.5
—	—	10	—	—	7.9	—	—	6.2
—	—	20	—	—	15.8	—	—	12.3
—	—	30	—	—	23.6	—	—	18.5
—	—	40	—	—	31.5	—	—	24.6
—	—	50	—	—	39.4	—	—	30.8
—	—	60	—	—	47.3	—	—	36.9
—	—	70	—	—	55.1	—	—	43.1
—	—	80	—	—	63.0	—	—	49.3
—	—	90	—	—	70.9	—	—	55.4
—	—	100	—	—	78.8	—	—	61.6
—	—	200	—	—	157.6	—	—	123.1
—	—	210	—	—	165.5	—	—	129.3
—	1	—	—	—	173.4	—	—	135.4
—	2	—	—	1	126.7	—	1	50.9
—	3	—	—	2	80.1	—	1	186.3
—	4	—	—	3	33.4	—	2	101.8
—	5	—	—	3	206.8	—	3	17.2
—	6	—	—	4	160.2	—	3	152.7
—	7	—	—	5	113.5	—	4	68.1
1	—	—	—	6	66.9	—	4	203.6
2	—	—	1	4	133.8	1	1	187.1
3	—	—	2	2	200.7	1	6	170.7
4	—	—	3	1	47.6	2	3	154.2
5	—	—	3	7	114.5	3	0	137.8
6	—	—	4	5	181.4	3	5	121.4
7	—	—	5	4	28.3	4	2	104.9
8	—	—	6	2	95.2	4	7	88.5
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

52°

Traverse Table for

39°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.8	—	—	0.6
—	—	2	—	—	1.6	—	—	1.3
—	—	3	—	—	2.3	—	—	1.9
—	—	4	—	—	3.1	—	—	2.5
—	—	5	—	—	3.9	—	—	3.2
—	—	6	—	—	4.7	—	—	3.8
—	—	7	—	—	5.4	—	—	4.4
—	—	8	—	—	6.2	—	—	5.0
—	—	9	—	—	7.0	—	—	5.7
—	—	10	—	—	7.8	—	—	6.3
—	—	20	—	—	15.5	—	—	12.6
—	—	30	—	—	23.3	—	—	18.9
—	—	40	—	—	31.1	—	—	25.2
—	—	50	—	—	38.9	—	—	31.5
—	—	60	—	—	46.6	—	—	37.8
—	—	70	—	—	54.4	—	—	44.1
—	—	80	—	—	62.2	—	—	50.3
—	—	90	—	—	69.9	—	—	56.6
—	—	100	—	—	77.7	—	—	62.9
—	—	200	—	—	155.4	—	—	125.9
—	—	210	—	—	163.2	—	—	132.2
—	1	—	—	—	171.0	—	—	138.5
—	2	—	—	1	121.9	—	1	56.9
—	3	—	—	2	72.9	—	1	195.4
—	4	—	—	3	23.9	—	2	113.8
—	5	—	—	3	194.9	—	3	32.3
—	6	—	—	4	145.8	—	3	170.7
—	7	—	—	5	96.8	—	4	89.2
1	—	—	—	6	47.8	—	5	7.6
2	—	—	1	4	95.5	1	2	15.2
3	—	—	2	2	143.3	1	3	22.8
4	—	—	3	0	191.0	2	4	30.4
5	—	—	3	7	18.8	3	1	38.0
6	—	—	4	5	66.6	3	6	45.6
7	—	—	5	3	114.3	4	3	53.2
8	—	—	6	1	162.1	5	0	60.8
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

40'

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.8	—	—	0.6
—	—	2	—	—	1.5	—	—	1.3
—	—	3	—	—	2.3	—	—	1.9
—	—	4	—	—	3.1	—	—	2.6
—	—	5	—	—	3.8	—	—	3.2
—	—	6	—	—	4.6	—	—	3.9
—	—	7	—	—	5.4	—	—	4.5
—	—	8	—	—	6.1	—	—	5.1
—	—	9	—	—	6.9	—	—	5.8
—	—	10	—	—	7.7	—	—	6.4
—	—	20	—	—	15.3	—	—	12.9
—	—	30	—	—	23.0	—	—	19.3
—	—	40	—	—	30.6	—	—	25.7
—	—	50	—	—	38.3	—	—	32.1
—	—	60	—	—	46.0	—	—	38.6
—	—	70	—	—	53.6	—	—	45.0
—	—	80	—	—	61.3	—	—	51.4
—	—	90	—	—	68.9	—	—	57.9
—	—	100	—	—	76.6	—	—	64.3
—	—	200	—	—	153.2	—	—	128.6
—	—	210	—	—	160.9	—	—	135.0
—	1	—	—	—	168.5	—	—	141.4
—	2	—	—	1	117.1	—	1	62.8
—	3	—	—	2	65.6	—	1	204.2
—	4	—	—	3	14.1	—	2	125.6
—	5	—	—	3	182.6	—	3	47.1
—	6	—	—	4	131.2	—	3	188.5
—	7	—	—	5	79.7	—	4	109.9
1	—	—	—	6	28.2	—	5	31.3
2	—	—	1	4	56.5	1	2	62.6
3	—	—	2	2	84.7	1	7	93.9
4	—	—	3	0	112.9	2	4	125.2
5	—	—	3	6	141.2	3	1	156.6
6	—	—	4	4	169.4	3	6	187.9
7	—	—	5	2	197.6	4	3	219.2
8	—	—	6	1	5.8	5	1	30.5
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

Traverse Table for

41°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.8	—	—	0.7
—	—	2	—	—	1.5	—	—	1.3
—	—	3	—	—	2.3	—	—	2.0
—	—	4	—	—	3.0	—	—	2.7
—	—	5	—	—	3.8	—	—	3.3
—	—	6	—	—	4.5	—	—	3.9
—	—	7	—	—	5.3	—	—	4.6
—	—	8	—	—	6.0	—	—	5.2
—	—	9	—	—	6.8	—	—	5.9
—	—	10	—	—	7.5	—	—	6.6
—	—	20	—	—	15.1	—	—	13.1
—	—	30	—	—	22.6	—	—	19.7
—	—	40	—	—	30.2	—	—	26.2
—	—	50	—	—	37.7	—	—	32.8
—	—	60	—	—	45.3	—	—	39.4
—	—	70	—	—	52.8	—	—	45.9
—	—	80	—	—	60.4	—	—	52.5
—	—	90	—	—	67.9	—	—	59.1
—	—	100	—	—	75.5	—	—	65.6
—	—	200	—	—	150.9	—	—	131.2
—	—	210	—	—	158.5	—	—	137.8
—	1	—	—	—	166.0	—	—	144.3
—	2	—	—	1	112.1	—	1	68.7
—	3	—	—	2	58.1	—	1	213.0
—	4	—	—	3	4.2	—	2	137.3
—	5	—	—	3	170.2	—	3	61.7
—	6	—	—	4	116.2	—	3	206.0
—	7	—	—	5	62.3	—	4	130.3
1	—	—	—	6	8.3	—	5	54.7
2	—	—	1	4	16.6	1	2	109.3
3	—	—	2	2	24.9	1	7	164.0
4	—	—	3	0	33.2	2	4	218.7
5	—	—	3	6	41.4	3	2	53.3
6	—	—	4	4	49.7	3	7	108.0
7	—	—	5	2	58.0	4	4	162.7
8	—	—	6	0	66.3	5	1	217.3
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

49°

42°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.7	—	—	0.7
—	—	2	—	—	1.5	—	—	1.3
—	—	3	—	—	2.2	—	—	2.0
—	—	4	—	—	3.0	—	—	2.7
—	—	5	—	—	3.7	—	—	3.4
—	—	6	—	—	4.5	—	—	4.0
—	—	7	—	—	5.2	—	—	4.7
—	—	8	—	—	6.0	—	—	5.4
—	—	9	—	—	6.7	—	—	6.0
—	—	10	—	—	7.4	—	—	6.7
—	—	20	—	—	14.9	—	—	13.4
—	—	30	—	—	22.3	—	—	20.1
—	—	40	—	—	29.7	—	—	26.8
—	—	50	—	—	37.2	—	—	33.5
—	—	60	—	—	44.6	—	—	40.2
—	—	70	—	—	52.0	—	—	46.8
—	—	80	—	—	59.5	—	—	53.5
—	—	90	—	—	66.9	—	—	60.2
—	—	100	—	—	74.3	—	—	66.9
—	—	200	—	—	148.6	—	—	133.8
—	—	210	—	—	156.1	—	—	140.5
—	1	—	—	—	163.5	—	—	147.2
—	2	—	—	1	107.0	—	1	74.4
—	3	—	—	2	50.5	—	2	1.6
—	4	—	—	2	214.0	—	2	148.8
—	5	—	—	3	157.5	—	3	76.0
—	6	—	—	4	100.9	—	4	3.2
—	7	—	—	5	44.4	—	4	150.5
1	—	—	—	5	207.9	—	5	77.7
2	—	—	1	3	195.9	1	2	155.3
3	—	—	2	1	183.8	2	0	13.0
4	—	—	2	7	171.7	2	5	90.7
5	—	—	3	5	159.6	3	2	168.3
6	—	—	4	3	147.6	4	0	26.0
7	—	—	5	1	135.5	4	5	103.7
8	—	—	5	7	123.4	5	2	181.4

Distance.

Departure.

Latitude.

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.7	—	—	0.7
—	—	2	—	—	1.5	—	—	1.4
—	—	3	—	—	2.2	—	—	2.1
—	—	4	—	—	2.9	—	—	2.7
—	—	5	—	—	3.7	—	—	3.4
—	—	6	—	—	4.4	—	—	4.1
—	—	7	—	—	5.1	—	—	4.8
—	—	8	—	—	5.9	—	—	5.5
—	—	9	—	—	6.6	—	—	6.1
—	—	10	—	—	7.3	—	—	6.8
—	—	20	—	—	14.6	—	—	13.6
—	—	30	—	—	21.9	—	—	20.5
—	—	40	—	—	29.3	—	—	27.3
—	—	50	—	—	36.6	—	—	31.1
—	—	60	—	—	43.9	—	—	40.9
—	—	70	—	—	51.2	—	—	47.7
—	—	80	—	—	58.5	—	—	51.6
—	—	90	—	—	65.8	—	—	61.4
—	—	100	—	—	73.1	—	—	68.2
—	—	200	—	—	146.3	—	—	136.4
—	—	210	—	—	153.6	—	—	143.2
—	1	—	—	—	160.9	—	—	150.0
—	2	—	—	1	101.8	—	1	80.1
—	3	—	—	2	42.7	—	2	10.1
—	4	—	—	2	203.6	—	2	160.2
—	5	—	—	3	144.5	—	3	90.2
—	6	—	—	4	85.4	—	4	20.2
—	7	—	—	5	26.3	—	4	170.3
1	—	—	—	5	187.2	—	5	100.3
2	—	—	1	3	154.4	1	2	200.6
3	—	—	2	1	121.5	2	0	81.0
4	—	—	2	7	88.7	2	5	181.3
5	—	—	3	5	55.9	3	3	61.6
6	—	—	4	3	23.1	4	0	161.9
7	—	—	5	0	210.2	4	6	42.2
8	—	—	5	6	177.4	5	3	142.6
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

44°

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.7	—	—	0.7
—	—	2	—	—	1.4	—	—	1.4
—	—	3	—	—	2.2	—	—	2.1
—	—	4	—	—	2.9	—	—	2.8
—	—	5	—	—	3.6	—	—	3.5
—	—	6	—	—	4.3	—	—	4.2
—	—	7	—	—	5.0	—	—	4.9
—	—	8	—	—	5.8	—	—	5.6
—	—	9	—	—	6.5	—	—	6.3
—	—	10	—	—	7.2	—	—	7.0
—	—	20	—	—	14.4	—	—	13.9
—	—	30	—	—	21.6	—	—	20.8
—	—	40	—	—	28.8	—	—	27.8
—	—	50	—	—	36.0	—	—	34.7
—	—	60	—	—	43.2	—	—	41.7
—	—	70	—	—	50.4	—	—	48.6
—	—	80	—	—	57.6	—	—	55.6
—	—	90	—	—	64.7	—	—	62.5
—	—	100	—	—	71.9	—	—	69.5
—	—	200	—	—	143.9	—	—	138.9
—	—	210	—	—	151.1	—	—	145.9
—	1	—	—	—	158.3	—	—	152.8
—	2	—	—	1	96.5	—	1	85.7
—	3	—	—	2	34.8	—	2	18.5
—	4	—	—	2	193.0	—	2	171.3
—	5	—	—	3	131.3	—	3	104.1
—	6	—	—	4	69.5	—	4	37.0
—	7	—	—	5	7.8	—	4	189.8
1	—	—	—	5	166.0	—	5	122.6
2	—	—	1	3	112.1	1	3	25.2
3	—	—	2	1	58.1	2	0	147.8
4	—	—	2	7	4.2	2	6	50.4
5	—	—	3	4	170.2	3	3	173.0
6	—	—	4	2	116.2	4	1	75.6
7	—	—	5	0	62.3	4	6	194.2
8	—	—	5	6	8.3	5	4	100.8

Distance.

Departure.

Latitude.

46°

45'

<i>Distance.</i>			<i>Latitude.</i>			<i>Departure.</i>		
<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>	<i>M.</i>	<i>F.</i>	<i>Y.</i>
—	—	1	—	—	0.7	—	—	0.7
—	—	2	—	—	1.4	—	—	1.4
—	—	3	—	—	2.1	—	—	2.1
—	—	4	—	—	2.8	—	—	2.8
—	—	5	—	—	3.5	—	—	3.5
—	—	6	—	—	4.2	—	—	4.2
—	—	7	—	—	5.0	—	—	5.0
—	—	8	—	—	5.7	—	—	5.7
—	—	9	—	—	6.4	—	—	6.4
—	—	10	—	—	7.1	—	—	7.1
—	—	20	—	—	14.1	—	—	14.1
—	—	30	—	—	21.2	—	—	21.2
—	—	40	—	—	28.3	—	—	28.3
—	—	50	—	—	35.4	—	—	35.4
—	—	60	—	—	42.4	—	—	42.4
—	—	70	—	—	49.5	—	—	49.5
—	—	80	—	—	56.6	—	—	56.6
—	—	90	—	—	63.6	—	—	63.6
—	—	100	—	—	70.7	—	—	70.7
—	—	200	—	—	141.4	—	—	141.4
—	—	210	—	—	148.5	—	—	148.5
—	1	—	—	—	155.6	—	—	155.6
—	2	—	—	1	91.1	—	1	91.1
—	3	—	—	2	26.7	—	2	26.7
—	4	—	—	2	182.3	—	2	182.3
—	5	—	—	3	117.8	—	3	117.8
—	6	—	—	4	53.4	—	4	53.4
—	7	—	—	4	208.9	—	4	208.9
1	—	—	—	5	144.5	—	5	144.5
2	—	—	1	3	69.0	1	3	69.0
3	—	—	2	0	213.5	2	0	213.5
4	—	—	2	6	138.1	2	6	138.1
5	—	—	3	4	62.6	3	4	62.6
6	—	—	4	1	207.1	4	1	207.1
7	—	—	4	7	131.6	4	7	131.6
8	—	—	5	5	56.1	5	5	56.1
<i>Distance.</i>			<i>Departure.</i>			<i>Latitude.</i>		

In this Traverse Table the differences of latitude and departure are given for every degree of the Quadrant, for distances of from 1 yard to 8 miles, and these differences may conveniently serve for greater distances, by doubling, trebling, quadrupling, &c. &c. If the various deviations of course from the first meridian are carefully noted down in the Field Book, as in the above example, as well as the Northing and Southing in any survey measured with the Perambulator, the present Traverse Table will afford the means of readily reducing them to simple quantities, and will thus enable the Surveyor to lay down his route with accuracy and expedition. As such we feel that the Traverse Table will be most acceptable to many of our readers, and we beg to express our grateful thanks to Captain Garrard for his communication.

EDITOR.

ARTICLE IV.

On Indian Sieges.

AT this early period of the establishment of our Repository, we consider ourselves peculiarly fortunate in having obtained much valuable matter, upon so interesting and important a head as that upon which we now enter.

Details of the most important circumstances, connected with the principal Sieges, undertaken within the last twenty years in Bengal, have been lately placed in our hands; and we trust these may be a prelude to similar communications from the sister Presidencies.

The papers from which we now offer an extract to our readers, form a Journal of the Sieges of Deig and Bhurt-poor, drawn up after the form adopted by Lieutenant Colonel Jones in his instructive account of the Sieges in the Spanish Peninsula.

These have been compiled from a variety of authorities, including private manuscript journals and public records, as well as printed works already before the public, by a brother officer of Artillery, now residing in the vicinity of Dum Dum, and form the commencement of a series, which, beside the above mentioned, includes those of Kumonah, Gunowrie, Adjee-Ghurr, Calinger and Hatrass.

The following is an extract from the Compiler's Introduction:

“It must to many appear unaccountable that the armies of the Supreme Government of British India, possessed of means decidedly superior to those of any

Native State, should yet have been often baffled in their attempts to reduce Indian Fortifications."

"The failures experienced by the British on such occasions have led to various conjectures, and it has even been surmised that the fortified works of Hindoostan have something peculiar in their construction, which renders them more formidable than the more regular fortifications of Europe. This conjecture, however, it is not difficult to refute, although dear bought experience has evinced, that when resolutely defended, the Native Forts are not to be despised with impunity."

"An investigation of some of the operations conducted by the British against the Native Forts of Hindoostan, may shew that the repulses they have suffered, have not originated from any superiority in the construction of their enemies' works; and by exhibiting the real causes of failure, may assist in guarding against future disappointments. But to inquire into the presumptive cause of any disaster in a siege, we ought to be possessed of the most authentic and minute details of operations, particularly in the Engineer and Artillery departments—we ought to be able to discuss the journal of every day's proceedings, and the inquiry which should follow every failure, ought to serve as a guide to our final judgment. In the voluminous records of the Bengal army, among the various and accumulating public papers required from its Officers, we may however search in vain for such documents. No regular or connected public journal of any of our sieges is now to be found, nor are there, we believe, any official records of them, beyond the details contained in Orderly Books, or in the hurried dispatches of Commanding Officers, framed after each success or defeat."

“Having collected from private journals (particularly from those of the late Sir John Horsford) that which could not be obtained from public records, and having compared the matter in them with all the information we have been able to collect; not only from some of the printed works before the public, but also from the records of the Supreme Government, to which, through the kindness of the Marquess of Hastings, we have been permitted access; we have been able to prepare the following account of some of our Indian Sieges.”

“Endeavouring to avoid errors, both in detailing facts and in offering opinions, we earnestly court correction for any mistakes into which we may appear to have fallen.”

With a view of rendering the matter both interesting and instructive, we have thought it right to preface the details of each siege, with a concise account (prepared by the Compiler) both of the circumstances which led to it, and of the Native Power against which the attack has been directed.

Introduction to the Sieges of Deig and Bhurtpoor.

The Rajah of Bhurtpoor is Chief of the Jauts, a Hindoo tribe noted for warlike habits at an early period of the Mahomedan conquest.

The original seat of the Jauts appears to have been near the banks of the Indus, in the lower parts of the province of Moultan, from whence Churamun, a chief of the Sewenee sect, with others of his tribe, emigrated about the middle of the 16th century, and having obtained a grant of land in the neighbourhood of Agra, acquired considerable wealth by plundering all who passed near his estates. In 1658 the treasure sent by the Emperor Shaw Jehan to assist his favourite son Da-

ra, against Aurungzebe, was captured by the Jauts; and after Aurungzebe's successful usurpation of the Mogul throne, Churamun, taking advantage of his absence in the Deccan, ravaged the surrounding country.

At the head of a predatory tribe, whose numbers were daily strengthened by the vagabond banditti of the neighbouring districts, Churamun carried his incursions into every part of the territories adjacent to his estate. Whenever the Aumils in the vicinity assembled to offer any opposition, he sought refuge in the hills; where, flying from place to place, he tired out the patience of his pursuers, hiding himself till they were called away by some duty of more importance.

The plunder obtained from the baggage of the Imperial army during Aurungzebe's last march into the Decan, enabled Churamun in 1668 to erect the fortress of Bhurtpoor as an asylum for his family, having bribed the Soubahdar of Agra to connive at the undertaking.

After the death of Aurungzebe, and during the subsequent contentions for the succession to the empire, the Jauts, hovering on the rear of the rival armies, plundered from each.

Their lawless expeditions seem about this period to have brought them into considerable notice, but the unsettled state of affairs prevented the Mogul government from taking any efficient measures against them. Some weak attempts to subdue them were however made, but these appear to have served only to consolidate their power, for in conjunction with the Mewatties of the hilly districts in the province of Delhi, they continued to enrich themselves on the plunder of the adjacent provinces.

In the reign of the Emperor Bahadar Shah, Churamun was received into the service of Zoolficar Khan, the

Imperial Generalissimo, and served that nobleman with great fidelity, distinguishing himself highly in the battle which gave the throne to Feroksere and proved fatal to his patron.

Fortunately for Churamun, the cabals about Court did not afford Feroksere leisure to notice his conduct, and enabled the Jaut to return to Bhurtpoor, ladened with plunder.

Enriched by robbery abroad, and pursuing with much success the avocations of husbandry at home, the Jauts increasing their strong holds, now began to spread gradually north of the Chumbul, along both banks of the Jumna, from the vicinity of Agra to that of Delhi, the Rajpoot States forming their boundary to the west.

Churamun was succeeded by his son Mohum, or Mohun Sing, who became tributary to Jeypoor; but another son, Bodun Sing followed, who throwing off all dependence, was the first of his race who assumed the title of Rajah.

During the reign of the Emperor Mahomed Shaw, Bodun Sing carried his inroads to the very walls of Agra, and left his son Soraje Mull a very considerable principality.

Increasing in strength and audacity, the Jauts under Soraje Mull never failed amid the feuds of the empire, to take advantage of the weak condition of the government, always attaching themselves to those factions which best suited the interests of their chiefs.

Soraje Mull soon after his accession to the Raje, introduced a considerable degree of order into his government, and demanded titles from the Emperor, who, unable to reduce so powerful a rebel to obedience, granted him the honorary distinctions of an independent Prince, to grace the ill acquired wealth of his ancestors.

Possessed of a number of fortified places near the capital, with a strong military force and considerable wealth, Soraje Mull soon acquired great influence, and was much caressed by the various parties about the Court of Delhi. In 1752 he was induced to join Sufdar Jung, the degraded vizier, in rebellion against the emperor Ahmed Shaw. Defeated in his attempts to depose the Emperor, Sufdar Jung retired to his Soubahdary of Oude, the Jauts were thus left to shift for themselves; and Soraje unable, single handed to keep the field against the new Vizier, Gazee-ul-Dein, and his Mahratta confederates, fled to his fort of Komeer, or Combhere, and was there attacked by a detachment from Gazee-ul-Dein's force under Akebut Mahomed. Finding no impression made by this party against Komeer, Gazee took the field in person, and intent upon the ruin of the Jauts, carried with him about 50,000 Mahrattas under Mulhar and Rogonauth Row; but the Nobles at Court, envious of his rising reputation, having during his absence from Delhi, reconciled the Emperor to Sufdar Jung, Gazee-ul-Dein, after reducing Komeer to the greatest extremity, was forced to raise the siege.

Hastening from Komcer to Delhi, the young Vizier, with the assistance of the Mahrattas, quickly overturned the plots of his enemies. Dethroning his sovereign, he deprived him of sight, and proclaiming a son of Jehander Shaw Emperor, placed him on the Musnud, by the title of Alumgeer the second.

Shortly after this event, profiting by Gazee-ul-Dein's being called away by affairs in the north, Soraje Mull recovered the districts of which he had been deprived; and taking the utmost advantage of the defenceless state of the country, seized upon almost the whole of the Agra Soubahdary.

About this time Alungeer the second, finding himself a mere instrument in the hands of Gazee-ul-Dein, called in the Abdallie King to his assistance, in hopes by his means to extricate himself from the state of dependence in which he was retained by his Vizier.

Ahmed Shaw with his Afghans readily attended this summons, but on his arrival at Delhi, regarding only his own interests, the Shaw having ordered the whole of the surrounding States to pay him a tribute proportionate to their several incomes, and Soraje Mull not obeying this arbitrary mandate, the Dooranies were let loose upon his country. Aiming however only at plunder, they contented themselves with destroying the open districts, without attacking the fortifications, in which the Jauts prudently shut themselves up.

Pleased with the daring spirit displayed by Gazee-ul-Dein, who accompanied him in this invasion of the Jaut territory, and charmed by his talents and address, the Abdallie King caused the Mogul to continue him in the Vizierut; and being soon after recalled to his own dominions by an invasion from Balk, left the Emperor again in the hands of that young chief.

After the departure of the Dooranie, Gazee endeavoured by means of the Mahrattas and Furruckabad Afghans, to establish his ascendancy in the Empire, but was opposed by Najeeb Khan, the Rohillah, and Shujah Dowlah, Subahdar of Oude.

These rival parties contended for power for some time with various success, and it was not till after many ineffectual attempts to settle their differences that the Rohillah Chief and Nawaub of Oude, resorted again to the measure of calling in the foreign aid of the Abdallies.

On the re-approach of Ahmed Shaw's army, Gazee-ul-Dein, rendered desperate by the Emperor Alumgeer refusing to oppose its advance, caused that Prince to be treacherously assassinated.

Arrived a second time at Delhi, the Abdallie moved on to Agra, where, having defeated Gazee and the Mahrattas, he raised the eldest son of Alumgeer to the throne, by the title of Shaw Allum, and remained on the frontier, supporting the Mahomedan ascendancy, and controuling the affairs of the ruined Empire.

The weakness of the Mogul government at this period appears to have been the real cause of a vast Army of Mahrattas being called up from the Deccan, under pretence of assisting Mulhar Row, Gazee-ul-Dein's ally. It has indeed been asserted that the Mahrattas at this time cherished the hope of being enabled entirely to subvert the Mussulman government, and intended in such case to have placed Biswas Row, of the Bonselah family, (whom they had brought from Satárrah) on the Mogul throne.

Whatever may have been their real object, Shujah Dowlah and the Jauts were the means of a negotiation between them and the Abdallies, which ended in Gazee-ul-Dein's seeking refuge with his old enemies the Jauts, after being deserted by all parties, Shaw Allum being acknowledged Emperor both by Hindoos and Mahomedans. The immense force collected on this occasion did not however separate without a final trial of strength. The chiefs of both armies, each contending for the supreme controul of affairs in Hindoostan, soon found cause for open warfare.

Soraje Mull at first joined the Mahrattas, and was treated by them with great distinction; but on the Ab-

dallie moving against them at Paniput, he deemed it more politic to take the other side; and leaving the Mahrattas, under pretence of securing them supplies of grain from his own country, he joined the Dooranie King, requesting permission to wash out the stain of his past offences in the blood of his late allies.

After the great battle of Paniput, from which few of 50,000 Mahrattas escaped, and in which they were defeated completely, the Abdallie, grateful for the assistance he had received from Soraje Mull, obtained for him from the Emperor a grant of the city and Soubahdary of Agra.

On the final departure of the Abdallie King from Hindoostan, Soraje Mull, having collected a very large force, became a competitor with Shujah Dowlah, then acting as Vizier and Captain General of the Empire.

Confident of success and despising his opponent, Soraje Mull seems on this occasion to have acted without his usual political caution, for having quitted his camp on a hunting party with only 300 attendants, he was attacked in the course of his diversion by nearly the same number under Afzul Khan, detached for this purpose by Najeeb-ul-Dowlah, and was killed in the skirmish, A. D. 1763.

Jowahere Sing succeeded his father in the Raje, and to revenge his death, accompanied by Gazee-ul-Dein, led an army of Mahrattas under Mulhar Row against Delhi, and reduced that city to the greatest extremities; but Nujeeb-ul-Dowlah by bribing the Mahratta, having prevailed on him to draw off his troops, the Jaut chief entered into a treaty. .

Jowahere Sing moved next against Jeypoor, the Rajah of which sending one of his chiefs with an inferior

force against him, the Jaut received a total defeat, and would have been taken prisoner had he not been rescued by Soomro* and his troops. Fortunately the Jeypoor Rajah did not follow up his victory, so that although Jowahere Sing suffered the disgrace of a defeat, he escaped the mortification of being forced to cede any part of his country. It is said he was finally assassinated by a Mogul to whom he had offered some injury.

Ruttun Sing, his brother, succeeded, but did not rule long, being stabbed by a Mahomedan Fakeer, who he took into his service, to obtain the secret of the philosopher's stone. The murder is said to have been committed in a room into which no one was ever admitted, but the Rajah and his tutor; so that the assassin escaped unhurt, and the fact was not discovered for some hours.

Kefrec Sing, an infant of one year old, was now raised to the Jaut Raje, by the friends of Ruttun Sing, his father; but the other chiefs disliking a minority, acknowledged the authority of his uncle Nawil Sing, who however took only the title of Regent for his nephew.

Nujuff Khan, Shaw Allun's Captain General, had by this time made considerable progress in the invasion of the Jaut territory; and Nawil Sing, distracted by the divisions which about this period took place between the heads of the family, and unable to stem the torrent of bad fortune, after suffering several defeats took shelter in the Fort of Deig, where he died of a dropsy, while Nujuff Khan was besieging it in the year 1773 of our era.

Runject Sing, his brother, was now raised to the Raje, but Daan Shaw, a disaffected chief, assuming that autho-

* The husband of the present Begum Sumroo who resides at Lirdhana near Meerut.

rity, Runjeet quitted Deig, and with his followers retired to Komeer.

The government being thus divided, Nujuff Khan gradually subdued all opposition. Daan Shaw was driven from Deig, of which possession was obtained after a siege which lasted a whole year, subsequent to which Nujuff Khan marched to Komeer, on the capture of which, the Jaut Raje was nearly subverted, and the Rajah Runjeet Sing reduced to the possession of Bhurtpoor, and a small district round it.

The Mahratta chief Madajee Scindeah, who some time after the death of Nujuff Khan obtained a complete ascendancy over the Court of Delhi, having in the latter years of the last century, undertaken the conquest of the western provinces of Hindoostan, derived considerable assistance from the Jauts under Runjeet Sing, who was in consequence enabled to regain a considerable portion of the possessions of his family.

In 1803 the British government, then under the administration of the Marquess Wellesley, engaged in a war with the Mahratta confederacy, at the head of which was Dowlut Row Scindeah, the adopted heir and successor of Madajee.* The British government having obtained possession of all Scindeah's territories in upper Hindoostan, the Marquess Wellesley entered into an alliance with the Rajah of Bhurtpoor, whose possessions being situated between those restored to or retained by Scindeah, and those conquered from him by the British, formed an excellent barrier against an enemy advancing to the British frontier on the side of the Jumna.

On the 9th of October 1803, the army of the Commander in Chief, General Lake, being then before

* Dowlut Row was the son of Madajee's youngest nephew. *Compiler.*

Agra, previous to undertaking the siege of that fortress, which is only two long days march from Bhurtpoor; his Excellency, empowered by the Marquess Wellesley, formally presented the treaty which had been concluded between the British government and Runjeet Sing, by which the friends and enemies of the one State were to be considered the friends and enemies of the other,—the British government engaging never to interfere in the concerns of the Jaut Rajah's territory, nor to demand tribute from him; while the Bhurtpoor Rajah on the other hand engaged, that if an enemy invaded the British territory, he would assist with his force to expel him. The British government in like manner undertook to assist the Rajah in defending his dominions from external attack.*

* Treaty concluded between his Excellency Lieutenant General Gerard Lake, Commander in Chief of His Majesty's and the Honourable Company's Forces in the East Indies, on the part of the Honourable Company, and Maha Rajah Bishounder Sewace Runjeet Sing Bahauder, Rajah of Bhurtpoor.

Article 1st.—Perpetual friendship shall be maintained between Maha Rajah Bishounder Sewace Runjeet Sing Bahauder Jung and the Honourable Company.

Article 2nd.—The friends and enemies of either State, shall be the friends and enemies of both.

Article 3rd.—The British Government shall never interfere in the concerns of the Maha Rajah's country, nor exact any tribute from him.

Article 4th.—If any enemy should invade the territories of the Honourable Company, the Maha Rajah hereby engages to furnish to the English the aid of his Troops, in the expulsion of such an enemy, and in like manner the Honourable Company engages to assist the Maha Rajah with its Forces in defending his dominions against external attack.

Pursuant to this alliance which had been sought for on the part of the Rajah by Vakeels sent to General Lake on the 25th of September 1803, when on his march from Delhi to Agra, the Rajah immediately sent 1,200 Cavalry to co-operate with the British army, then engaged in the siege of the latter Fortress; and General Lake declared to the Supreme government, that he considered it a matter of importance to be on friendly terms with a Chief, whose character throughout the country and amongst his tribe was of great weight.

At this time the dominions of the Rajah yielded between twelve and fifteen lacs of rupees per annum, and this territory (in the independent possession of which he was guaranteed by the treaty), was afterwards increased by a gratuitous gift on the part of the British, of lands nearly equal to one-third of his ancient possessions, for the purpose of confirming him in his attachment to their government. By this connection the Rajah was permanently relieved from the payment of tribute to the Mahrattas, and was also freed from all apprehension of exactions or encroachments on the part of any other State.

In the month of August 1804, about the period of Colonel Monson's disastrous retreat from the Mahratta army under Jeswunt Row Holkar, a secret correspondence was discovered between Holkar and the Rajah, the object of which was the subversion of the British power, by the union of the resources of the State of Bhurtpoor,

The sincerity of this engagement is attested on the Holy Bible, dated the 29th day of September, in the year of our Lord 1803, corresponding with the 11th day of the month of Jemma-Decoossannee, in the year 1215 Hijree.

with those of Holkar; both proposing to engage in their cause all the neighbouring chiefs over whom they had any influence, or exercised any authority.

In aggravation of this conspiracy, it appears from the date of the intercepted letters, that this correspondence had commenced very soon after the conclusion of the treaty between the Rajah and the British government, (in October 1803,) when the former was bound by every tie of gratitude to keep his engagement inviolate.

The Rajah himself, though deeply implicated in these designs against the British government, appeared rather as an instrument in the hands of some designing agents of Holkar's, and servants of his own, than as a principal. These men naturally looked with abhorrence at the establishment of a power in their vicinity, the regularity of whose government appeared likely to be a bar against their ambitious views: they therefore represented the British as anxious to controul the Rajah's affairs, and to deprive him of all independence—as determined, contrary to treaty, to establish their Civil Regulations and Courts of Law in his country—as defiling sanctified places of Hindoo worship with the blood of sacred animals, and thus instigated the Rajah to contend for the right and power of independent dominion.

To the petty Chieftains of upper Hindoostan, many of whom during the troubles and confusion attendant on the weakness of the Imperial government, had obtained or usurped all the absolute power, with the title of independent Princes; nothing could appear more likely to strike at the root of all their influence and interests, than the sudden introduction of a system of law founded on the principle of perfect equality amongst men, and administered to them without any regard to the rank

of individuals, while the religious prejudices of the Hindoos, were no doubt seriously outraged by the daily destruction of their sacred animal (the cow), as food for the European troops stationed in the vicinity of Bindra-bund, Muttra, the birth place of Krishna, being considered by them one of the principal incarnations of the deity.

On the arrival of General Lake at Agra, in the latter end of September 1804, his Excellency then preparing to attack Holkar, (who encouraged by his success over Colonel Monson's detachment, had advanced into the heart of the Doab, and threatened to overrun the provinces lately acquired from Scindeah) treated the Rajah of Bhurtpoor as a friend, although at this time he was known not only to have been tardy in assisting the British army with supplies, but to have entered into a conspiracy with their enemies, and even endeavoured to stir up the subordinate Jaut Chiefs in the Doab to rebellion against the British government, then paramount in the conquered provinces.

In the month of October 1804, in consequence of Holkar's actual invasion of the British territories, General Lake at last called upon the Rajah of Bhurtpoor to furnish the Military force stipulated in the treaty of alliance, but this the Rajah evaded:

The conduct of the Rajah's troops rendered it at length impossible for the British government to continue any longer on those terms of amity, which he was only employing to their injury. At the battle of Deig, on the 13th November 1804, the Bhurtpoor Cavalry, in concert with the troops of Holkar, fought against the British; and during the battle, when Holkar's forces fled to the Rajah's fortress, the garrison which was composed

entirely of the Bhurtpoor troops, opened a fire of musketry and cannon on the British army, thereby protecting a part of Holkar's artillery, which lay near the walls of the fort.

From this time, Holkar and the Rajah were open confederates; their interests were completely identified, and the former depended entirely upon his friend for supplies of grain, money, and military stores.

Of the two, Holkar was undoubtedly the most formidable enemy, his object being to carry on a predatory warfare, to destroy the cantonments, and lay waste the territories of the British; and by the rapidity and extent of his marches, to avoid any decisive engagement. The first object of the English General was, therefore, the reduction of his power.

In the battles of Futtu Ghur and Deig, a severe impression had been made upon the forces of this Chief; but the fortresses of the Rajah of Bhurtpoor* served as a rallying point to his scattered forces, and as depôts for his bazars; while by entering them, and taking shelter within the range of their cannon, his cavalry could always evade any decisive attack.

Under such circumstances the commencement of hostilities against the Bhurtpoor Chief, became indispensably necessary, not only as the effectual means of extinguishing the remnant of Holkar's power, but to serve as a salutary example to other petty Chiefs. General Lake therefore, having received discretionary power from the Supreme government to that effect, resolved on the immediate attack of those Forts within the Bhurtpoor territory, which constituted the principal dependencies

* Bhurtpoor, Deig, Komeer, and Waer are all within a few miles of each other on the Agra and Muttra frontier.

of the Rajah, and accordingly moved on the 1st December, with his army from Muttra towards Deig, which was now garrisoned by the troops of Holkar, in conjunction with those of the Rajah, and strengthened by that portion of Holkar's artillery which had escaped capture after the battle of the 13th November.

The British army reached Keeralhsamy on the 3rd, and encamped within sight of the fortress of Deig. During nine days the army remained in position, and the Commander in Chief occasionally moved out with the Cavalry to reconnoitre the country near the Fort. On one of these occasions, the enemy's horse, commanded by Holkar in person, hovered round in large bodies, and on returning to camp, one of their divisions had the boldness to advance upon the rear of the British columns, charging through the intervals of the second and sixth Bengal Native Cavalry, but on the Horse Artillery moving out, they quickly made off.

The army which had been joined on the 10th by the reserve under Lieutenant Colonel Don, with the battering train from Agra, marched on the 11th of December in two columns parallel to each other, covered in front by the reserve forming the advanced guard, while the intermediate space, a distance of about 600 yards between the two columns was occupied by the Artillery, baggage, and provision train; the flanks and rear were covered by the assembled piquets of the army, strengthened by a regiment of Cavalry, forming the rear guard. This compact mode of marching and encamping in an oblong square, the front and rear formed by the Infantry and Cavalry, and the flanks closed by the piquets, rendered every attempt of the enemy's horse, whether on the line of march or in camp, ineffectual, and ensured

the safety of the camp followers. "Of these non-combatants," says Major Thorn, "there were not less than 60,000 with the army; and the public cattle might at a very moderate rate be estimated at 200 elephants, 2,000 camels, and 100,000 bullocks, for carrying grain, equipage, and baggage."*

On the 11th of December the army encamped near to the fortified village, where the attack of the 13th of November (the day of the battle of Deig) commenced, having its left on the lake which runs along the foot of the hill adjoining Gopaul Ghur; and after proceeding round the hill the next day (12th), in the same order of march, and passing through a thick jungle of about a mile in length, the army on the 13th of December took up its final position before the fortress of Deig. The plain chosen for encampment being occupied by the enemy's horse, they were dislodged after some trifling appearance of resistance.

Siege of Deig.

The town of Deig is a place of considerable size, being enclosed within walls which are four miles and three quarters in extent.—(See Plate 15.). It is situated in north latitude $27^{\circ} 3'$, east longitude $77^{\circ} 17'$, about 44 miles W. N. W. from Agra.

Almost surrounded by morasses and artificial lakes, it was chosen by Soraje Mull, on account of its natural strength, as his family residence, and many handsome buildings, besides a magnificent palace, were erected

* Major Dirom, in his account of the operations of Lord Cornwallis's army in 1791-2, truly observes, that an army in India resembles the emigration of a nation guarded by its troops: so great is the proportion of camp followers!

within its walls. Nujuff Khan, the Captain General of the empire, obtained possession of it in 1776, but it subsequently fell into the hands of the Rajah of Bhurtpoor.

The town, at the period of our attack, was defended by 31 guns of various calibres, from 74 to 4-pounders, which were mounted upon round bastions, connected with each other by strong earthen ramparts, of from 25 to 30 feet high.—(See Sections, Plate 16.). The remains of a ditch were perceptible all round, except at the south-west angle, which terminated in a high rocky mount and outwork, called the Shah Bourge.—(C, Plate 15). This eminence, which from its commanding situation was deemed the fittest point of attack, had a small interior area of about 50 yards square, and several commanding bastions, in one of which was a 74-pounder, mounted upon a block carriage. The wall of the town at this angle was entirely of masonry, forming a perpendicular ascent of 36 feet, (See Sections, Plate 16); but the ramparts of the Shah Bourge were of earth, the same as those of the other sides of the town, excepting a large bastion of masonry at its N. W. side. About a mile from the Shah Bourge, and in the interior of the town, was the citadel (A), strongly built, and in good preservation, with 28 guns and 20 swivels mounted upon its walls. The guns were of various calibres, from 60 to 1-pounders: the swivels, which were iron, were 1-pounders. The ramparts of the citadel were from 70 to 100 feet high, and from 20 to 50 feet thick, of stone masonry, surrounded by a wet ditch, not very deep. The enemy had also 21 guns and howitzers outside the town; which, with the 31 guns in the town, 28 in the citadel, and 20 1-pounder swivels, made altogether 100 pieces of ordnance.

The besieged, greatly surpassed the besieging army in numerical strength within the walls; and Holkar's infantry were entrenched in front and in the vicinity of the Shah Bourge, (at HH,) while his Cavalry were on the east side of a low range of hills, of which Deig itself forms the termination, and which lay between them and the British camp.

The British army consisted of 8 regiments of Cavalry, and 11 battalions of Infantry. In the Cavalry were 27 squadrons, comprising 750 Europeans and 1650 Natives. The Infantry was composed of 2 European corps, altogether 650 rank and file, and 9 Native corps: shewing 5,000 men on parade.

This army, thus consisting of 8,050 men, with a small proportion of Artillery and Pioneers*, encamped on the 13th of December 1804, with the centre nearly opposite the Shah Bourge.

Journal of the Siege.

Night between the 13th and 14th December.

At 9 P. M. the reserve, consisting of 3 battalions of Native Infantry, with six 6-pounder field pieces, and the European regiment, with four 12-pounder field pieces, the whole under Colonel Don, took possession without resistance of a large grove (Z, Plate 15), situated between the British camp and the spot called Sumroo Begum's garden, or Ram Baug (K), and there entrenched themselves.

The Infantry of Holkar lay entrenched outside, about the walls of the town (at HH), and between that and the British camp, behind natural ravines and chasms in the

* The exact numerical strength of the Artillery and Pioneer details has not been ascertained, but the proportion was very small.

ground; while his Cavalry were in the neighbourhood, about 2 miles distant: the whole of the British Cavalry was therefore kept on the alert all night, in readiness to mount at a moment's warning.

14th December. •

Before sunrise a trench (X), of 300 yards long, and a mortar battery (F), at a small village within the grove, with a battery for two 6-pounders (W), on the right of the trenches, were in a state of considerable forwardness.

In the forenoon two 5½-inch howitzers were opened from the village upon the enemy's trenches outside the Fort; but the enemy commencing a heavy fire of cannon, and the two howitzers being much exposed, they were withdrawn.

Two Officers of Artillery in the Battery.

Orders of the Day.—Relief of the trenches, 100 Europeans and 2 battalions of native infantry. The relief of the trenches to set off at sunrise daily. A General Officer (Brigadier), will command in the trenches, and mount every evening. The battalions on trench duty not to take their guns with them.*

Night between the 14th and 15th December.

A breaching battery (DD) for six 18-pounders, was this night commenced upon; computed distance, 800 yards from the Shah Bourge; four 8-inch mortars were placed in the battery (F 1) in the village, distance 1,100 yards from the Shah Bourge. On the right of our batteries is a small mud fort, called Gopaul Ghur, which is

* At this period two 6-pounder field pieces were attached to each Battalion of Infantry in Bengal, and termed battalion guns, a system which was exploded during the government of the Marquess of Hastings.

in possession of the enemy, being crowded with matchlock men and musketeers of Holkar's infantry, who are constantly firing from the ravines and quarries outside, below the fort, and annoy our working parties very much. Some of our men, looking over the parapet of the trenches, have been killed and wounded by the fire kept up from thence, which in some degree commands the rear of the breaching battery.

15th December.

Opened the battery of four 8-inch mortars (F. 1) this morning—3 Officers of Artillery in the battery.

Orders of the day.—Relief of the trenches, 200 Europeans, and 2 battalions of Native Infantry. In future Brigadiers of Cavalry are to take the duties of the camp, and Brigadiers of Infantry, the duty of the trenches. The Field Officer, Brigade Major, and Adjutant of Cavalry on duty, to be under the General Officer of the day. The Brigade Major of Infantry, under the General Officer of the trenches.

Night between the 15th and 16th December.

Working at the breaching battery, (DD)

16th December.

Several of the relief for the trenches being killed and wounded from the direction of Gopaul Ghur, a party of sepoys was sent among the ravines and quarries, to check the enemy's fire in this quarter. One European Officer (Lieutenant Dickson) was killed on this service in the course of the day. Three Officers of Artillery were on duty in the battery.

Orders of the day.—Relief for the trenches, one battalion of Europeans and two battalions of Native Infan-

try. The General Officer in the trenches is always to send a non-commissioned officer from each party posted in the trenches to the parade at sunset. The parties of each different post to be told off before they move down, and the non-commissioned officer is to conduct the relieving party to the place of destination, as soon as they get near to the grove. Each non-commissioned officer to be furnished with a note, specifying the post to which he belongs, and the number of companies at the post.

Night between the 16th and 17th December.

The 18-pounder battery (DD) was completed, and four 18-pounders were placed in it during the night. A battery for four 5½-inch mortars (F. 2) was erected to the right of the breaching battery. Two of the 5½-inch howitzers and two of the brass 12-pounders were placed near the breaching battery, to answer a fire which the enemy kept up not only from the ravines and the works outside, but from the face of the Fort fronting the camp.

17th December.

Four 18-pounders from the breaching battery (DD) were opened this morning: their fire was directed on a wall of masonry near to the principal bastion of the Shah Bourge.

For duty in the batteries, 4 Officers of Artillery.

Orders of the day.—Relief of the trenches 200 Europeans and 2 battalions of Native Infantry, also 40 Dragoons (volunteers) as a working party.

Night between the 17th and 18th December.

Two more 18-pounders were placed in the breaching battery (DD.)

18th December.

The breach was ordered to be made in the bastion, instead of in the wall. The enemy have entrenched themselves under this bastion, parallel to our battery, and have brought a number of guns to bear on the battery and trenches. One gun completely enfilades the left trench (Y), a constant fire of musketry is kept up during the night on both sides: about 10,000 rounds of our musket ammunition have been expended each night. Holkar's battalions are encamped near the south-west walls of the town, and he is himself, with the whole of his Cavalry, about 2 miles from our right flank, said to be waiting until the assault of the breach takes place.

Three Officers of Artillery in the Batteries.

Orders of the day.—Relief of the trenches, 200 Europeans, and 2 battalions of Native Infantry, and 40 Dragoons, a volunteer working party.

19th December.

Three Officers of Artillery in the batteries.—Relief of the trenches, the same as yesterday.

Orders of the day.—When the General Officer is relieved from the trenches, he is to return a list of the casualties which may have occurred among the troops under his command. All occurrences of an unusual nature to be immediately reported to Head Quarters.

20th December.

Three Officers of Artillery in the batteries.

Orders of the day.—Relief of the trenches, same as yesterday.—One Officer of Artillery (Lieutenant Grove) killed while on duty in the battery.

Night between the 20th and 21st December.

A new breaching battery (E) for three 18-pounders, was erected this night, about 700 yards distant from the Shah Bourge, its range forming an angle with that of the original 18-pounder battery.

21st December.

The new breaching battery (E) opened this morning with good effect. Four Officers of Artillery on duty in the batteries.

Orders of the day.—Relief of the trenches, 200 Europeans and two battalions of Native Infantry; for the new battery, 50 Europeans and 200 Native Infantry. All reports of the trenches and piquets to be made in ink, and not in pencil, as also all notes sent from the relieving parties.

22nd December.

Firing from both parties as yesterday. Four officers of Artillery in the batteries.

Orders of the day.—Relief the same as yesterday, and a working party of 40 Dragoons.

23rd December.

Firing from both batteries continued. Breach reported practicable, and assault ordered.

Orders of the day, the same as yesterday.

Night between the 23rd and 24th December.

The storming party moved down to the trenches about $\frac{1}{2}$ past 11 P. M. divided into three columns, and on reaching the breach, the first column gained possession of the Shah Bourge; while the two remaining columns, diverging outwards, attacked the enemy under

the walls, carrying all their batteries at the point of the bayonet, under a very heavy fire. The enemy's native Artillery stood firmly to their guns, defending themselves to the last; and when they could no longer fire, they used their swords with such desperate resolution, that most of them were bayoneted. Several parties of the enemy rallied, and favoured by the darkness of the night, tried to recover their guns; but the moon rising at half past 12, shed a very seasonable light upon the scene, and enabled the British columns to secure what they had gained. Repeated endeavours however were made by the enemy to recover the Shah Bourge. Bodies of picked troops were detached from the side of the town, to which the Bourge communicated by a long narrow neck or passage, between two ramparts, which though lower than the Bourge, overlooked the passage, while other parties were pushed along the town walls. An archway in the Bourge, with a massy gate, terminated this passage; the gates had been removed, and thrown down the descent to the lower level of the terre-plain of the town; the entrance to the Shah Bourge was therefore open to the town, and the enemy were with difficulty repulsed in their frequent attempts to regain possession of it. They desisted however about 4 in the morning, leaving the archway choaked with dead, and early on the 24th of December the British troops were in full possession of the Shah Bourge, with 28 guns in the enemy's exterior works.

The loss of the enemy must have been considerable, for their extensive entrenchments were occupied by a large force, consisting of several of the Rajah of Bhurt-poor's battalions, and the Infantry of Jeswunt Row Holkar; the British loss consisted of 43 killed, and 184

wounded; among whom were 18 Officers, viz. 5 killed and 13 wounded.

24th December.

Our troops obtained possession of the town, and took post in the palace (B), which formed an excellent point of observation, from which the enemy's movements in the citadel (A) could be distinctly watched. The inhabitants commenced evacuating the town, and the advanced guards being pushed on to the very gates of the citadel, preparations were made for assaulting it. Two 12-pounders were ordered into the town for the purpose of blowing open its gates, but circumstances caused this to be deferred;* while the enemy, under evident apprehension of its fall, were seen going off in straggling parties to take refuge in Bhurtpoor. In the afternoon, the second brigade of Cavalry, and the troop of Horse Artillery, the whole commanded by Lieutenant Colonel Thomas Browne, moved out under particular orders, and fell in with Holkar's horse a few miles from camp; but not discovering any baggage going from Deig, the party returned. This-day the Commander in Chief addressed the following letter to government:—

*To His Excellency the Most Noble Marquis Wellesley,
Governor General, &c. &c.*

“MY LORD,

“I have sincere satisfaction in informing your Lordship, that the town of Deig is now occupied by our

* Christmas-day was close at hand, and the disorderly and intoxicated state of some of the Europeans, who were wandering without controul over the deserted city, was, we believe, the principal, if not the sole cause of this delay. *Compiler.*

We regret that justice obliges us to record this humiliating reflection upon a part of the European portion of our Army. ED.

troops, and that the principal part of the remaining Artillery of Jeswunt Row Holkar is now in my possession.

“The outworks of the town, and the several batteries erected by the enemy under its walls, were carried by assault last night; and the consequence has been the evacuation of the town: and I expect the Fort will in a very short time be in our possession.

“It is with extreme regret that I have to inform your Lordship, that many Officers have been seriously wounded on this occasion. I have however reason to believe that on the whole our loss has not been so great as might have been expected from the nature of the attack.

“I shall have the honour of transmitting to your Lordship a more full detail, but I cannot conclude without assuring your Lordship, that the gallantry of the troops engaged on this arduous service, has been most conspicuous, and I feel infinitely indebted to Lieutenant Colonel McCrae, who commanded the storming party, as well as to every other Officer engaged.”

“I have the honour to be, &c.

(Signed) G. LAKE.”

Night between the 24th and 25th December.

The enemy evacuated the Citadel.

25th December.

Our troops entered the wicket of the citadel soon after daylight, and found that the gates had been blocked up by a massy pile of stones.

The Commander in Chief this-day issued the following order:—

“The Commander in Chief having received a detailed report of the assault of the Shah Bourge, and the attack

of the enemy's trenches on the night of the 3rd instant, feels infinite satisfaction in publishing his highest approbation of the meritorious behaviour of the troops employed on that occasion.

“To Lieutenant Colonel McCrae, who commanded the troops, his Excellency feels the most particular obligations, for the great judgment with which he directed the several attacks, and the gallantry he displayed in the assault of the breach.

“Lieutenant Colonel Ball, who so handsomely volunteered his services in the storming party, demands his Excellency's warmest thanks, for the uncommon zeal and energy he evinced throughout.

“Major Radcliffe, who led the left, and Captain Kelly, who led the right attack on the enemy's trenches, are entitled to his Excellency's best thanks for the conduct and gallantry with which they executed the duties that had been assigned them.

“Captain Lindsay,—the Officers and men of the flank companies of his Majesty's 22nd regiment,—the Officers and men of the flank companies of his Majesty's 76th regiment, and the whole of the 1st battalion 8th regiment, which formed the storming party;—the Officers and men of the European regiment, and 1st battalion 12th regiment in the attack of the enemy's trenches;—Captain Raban and the Artillery;—Lieutenant Swinton and the Pioneers, and the whole of the troops employed on this occasion, are deserving of the highest praise and commendation, for the uncommon courage and intrepidity with which they carried the different works of the enemy, defended as these were by a numerous army, and supported by a powerful Artillery.

“ His Excellency would be wanting in justice, were he not to express his highest sense of the merits of the whole of the Officers and men of the army employed at Deig, more particularly to Lieutenant Colonel Hoisford and the Artillery ; the handsome manner in which the British Dragoons volunteered their services as working parties, commands his Excellency’s warmest thanks.”

26th December.

The following is a copy of the Commander in Chief’s letter of this-day’s date to government.

*To His Excellency the Most Noble Marquess Wellesley,
Governor General, &c. &c.*

“ MY LORD,

“ My dispatches of the 24th and 25th instant, will have informed your Lordship of the complete success of our operations against the town and fort of Deig.

“ I attribute our early possession of this strong fortress, entirely to the panic which the garrison experienced on witnessing the irresistible valour and intrepidity of our troops, in carrying by assault the outworks, and storming the numerous batteries under the walls of the town, which were supported by extensive entrenchments, occupied by a large force, consisting of several of the Rajah of Bhurtpoor’s battalions, and the remaining Infantry of Jeswunt Row Holkar. The number of the enemy killed on the night of the 24th instant, is immense.

“ The ardent zeal, energy, and irresistible valour which has marked the conduct of our Officers and men employed upon this occasion, under circumstances of peculiar difficulty and danger, must ever reflect on them

the highest credit; and the benefit th^e nation has received by their exemplary and heroic behaviour, must be matter of proud exaltation to every well-wisher of the British Empire.

“Too much praise cannot be bestowed on every corps engaged, for the perfect regularity with^o which this service was performed.

“I found it necessary to divide the force destined for this service into three columns; the whole moving off so as to reach the different points of attack, a little before 12 at night.

“The right column, under Captain Kelly, consisting of 4 battalion companies of the Honorable Company's European regiment, and 5 companies of the 1st battalion 12th regiment native infantry, was ordered to carry the enemy's batteries and trenches on the high ground to the left of the town. The success of this party was complete, and entitles Captain Kelly to every praise for the manner in which it was conducted, and for the coolness and gallantry which he displayed under very distressing circumstances, exposed to a heavy fire from artillery, which was defended with desperate resolution. Captain Raban of the artillery, who accompanied this party for the purpose of spiking or bringing off the captured ordnance, particularly signalized himself on this dangerous service.”*

“The left column, under Major Radcliffe, consisting of the remaining four battalion companies of the Honourable Company's European regiment, and 5 companies of the 1st battalion 12th regiment of native infantry, was destined to carry the enemy's trenches and batteries to

* The reader will perceive that Major Thorn has borrowed largely from this letter. See pages 409 and 410, Thorn's War in India. Ed.

the right. This column was equally successful with that opposed to their left, and the service was performed with equal gallantry and spirit, and reflects infinite credit on Major Radcliffe.

“The centre column, led by Lieutenant Colonel McCrae, (who had the general command of the whole) consisting of the flank companies of his Majesty’s 22nd, and 76th, and of the Honourable Company’s European regiment, and of the 1st battalion 8th regiment of native infantry, composed the storming party.

“I have hardly words to express my sense of the conduct of this party, who, under a galling fire on their flanks from cannon and musketry, from the enemy’s batteries and trenches, and over broken and extremely unfavourable ground, rushed on to the breach and gained possession of the works, with a spirit and ardour which must have ensured success, whatever might have been the opposition.

“I feel myself under the greatest obligations to Lieutenant Colonel McCrae, to whose conduct on the occasion I attribute the ultimate success of the attack.

“Lieutenant Colonel Ball, who commanded the 1st battalion 8th regiment of native infantry, is entitled to the greatest praise for the spirit and activity he displayed in leading on his men, and for the able assistance he rendered Colonel McCrae in the adoption of such measures as afterwards became necessary to secure us in possession of the place. It is with sincere grief that I add, that this valuable Officer received a severe, though I trust not dangerous wound, but which will I fear deprive me of his services for some time.

“The conduct of Captain Lindsay, of his Majesty’s 22nd regiment, has been represented to me as highly

meritorious. I lament to add, that this gallant Officer is also wounded.

“It is unnecessary for me to detail more fully the conduct of individuals, on a service where merit has been through all ranks so eminently conspicuous; but I feel it my duty to draw your Lordship’s attention to the services rendered by Lieutenant Colonel Horsford, commanding the Artillery, to whose professional knowledge and activity, throughout the siege, and on every other occasion, I feel infinitely indebted, as well as to the whole of that corps for their spirited and unremitting attention.

“The Officers of the Engineer department, Captain Robertson and Lieutenant Smyth have peculiar merit, and are entitled to my best thanks and approbation.

“The corps of Pioneers, under the orders of Captain Swinton, commanded my warmest praise, for the cheerfulness with which they performed their laborious duties, and particularly for the alacrity they displayed on the night of the 23rd instant:—too much credit cannot be bestowed on Captain Swinton, who on this, and on every other occasion, has been most zealous and active. I am sorry to add that this excellent Officer is severely wounded, as is Lieutenant Forrest of the same corps, whose conduct was equally meritorious.

“Your Lordship will, I am confident, receive much pleasure in learning the highly exemplary conduct of the three corps of British Cavalry in camp, the whole of whom volunteered their services as working parties for the trenches and batteries, and assisted very materially in accelerating our operations against this place. They have received my sincere thanks for their exertions, and for a zeal so honourable to the British character.

“ I have the honour to enclose returns of the killed and wounded during the siege, and on the night of the assault, with a return of the captured ordnance.

“ The fugitives, composed of the Rajah of Bhurtpoor’s battalions, and his garrison, with the remainder of Jeswunt Row Holkar’s infantry, appeared generally to have taken the direction of Bhurtpoor. By every information, great numbers have deserted, and I do not imagine they will again attempt to oppose us.

“ I shall move towards Bhurtpoor as soon as possible.

“ Before I conclude this dispatch, I beg leave to mention the very spirited conduct of Mr. Metcalf, of the Civil Service. He volunteered to accompany the storming party, and was, I am informed, among the foremost who ascended the breach.”

“ I have the honour to be, &c.

(Signed) G. LAKE.”

The British loss in this achievement consisted of 43 killed and 184 wounded, amongst whom were the following Officers :

KILLED.

Lieut. Dickson, 12th native inf. killed on the 16th.

Lieut. Grove, artillery, killed on the 20th.

Captain Young, 8th native inf. } killed in the storm.
Lieut. Boyer, 12th do. do. }

WOUNDED.

Lieutenant Smyth, artillery.

Captain Lindsay,

Captain McNight,

Lieutenant Sweetenham,

Lieutenant Cresswell,

• Captain Scott, H. M.’s 76th regiment.

} H. M.’s 22nd regiment.

Lieut. Merriman, H. C.'s European regiment.

Lieut. Col. Ball,	}	1st battalion 8th regt. nat. inf.
Lieut. Col. Basset,		
Lieut. Abernethy,		
Lieut. Anderson,		
Captain Swinton,	}	corps of pioneers.
Lieut. Forrest,		

Expenditure of Ammunition at the Siege of Deig.

18-pounder round shot,	4,560
12-ditto ditto,	204
	Total round shot, 4,764
18-pounder case,	14
Shells, 8-inch,	342
Ditto, 5½ ditto,	797
	Total Shells, 1,149

and 276 barrels, each containing 100 lbs. of Gun Powder.

Having placed Deig in a state of security, and leaving a garrison of the 1st battalion 4th native infantry, Lord Lake marched with the army on the 28th of December towards Bhurtpoor.

Observations by the Compiler.

In this operation the British were totally wanting in the means necessary for a regular siege. The limited extent of their siege equipment, and the paucity of pioneers and artillery, obliged them to attempt an attack "brusqué;" and it was a fortunate circumstance that the high walls of the Shah Bourge, not being defended by a ditch, or covered by a glacis, were open to assault after being breached from a considerable distance. This post

was, from its situation, a key to the place, and possession of it secured the evacuation of the town, and a close approach to the citadel.

The occupation of Gopaul Ghur would however have been a proper preliminary to any attack on the Shah Bourge, as amongst the casualties which occurred during the reliefs of the troops, or their tour of duty as guards or working parties in the batteries or trenches, the greater part may be traced to the enemy's retaining possession of Gopaul Ghur.

This petty fortification not only afforded the enemy a considerable command of the ground occupied by our works; but served also as a point d'appui to their exterior entrenchments, from which a fire was kept up, causing a loss of life, as well during the assault, as throughout the whole course of the operations.

The enemy did not attempt to repair the breach in the Shah Bourge. Although bold and vigorous to repel the assault when made, they neglected some of those precautions which might have been taken under the circumstances in which they were placed, such as stockading the breach, &c. &c.

Our assault was from this neglect, on the part of the besieged, rendered more easy than it otherwise would have been, and success was facilitated, by there being no serious obstacles to prevent the troops coming at once into close contact with the enemy.—“By means of the darkness of the night,” says General Lake in a letter, on the 1st of January 1805, addressed to the Governor General, “the enemy were taken by surprise and prevented from availing themselves of the advantages they possessed of making a very formidable resistance.” Thus the darkness of the night at the commencement of the

attack, and the circumstance of the several columns distracting the attention of the enemy materially contributed to the result; while the opportune rising of the moon at the very moment when the desperate resistance of the enemy required united exertion on the part of the British, was singularly fortunate. These observations however are not intended to derogate from the conduct of the troops, which was highly spirited and praiseworthy.

References explanatory of Plate XV.

The Town walls measure along the top of the Ramparts, 4 miles, 6 furlongs, 28 poles, exclusive of the Bastions, which run out from the walls.

- A. The Fort or Citadel.
- B. The Palace.
- C. The Shah Bourge or Royal Bastion.
- D. D. The 6-gun Battery and Trenches, commenced 13th December 1804, and four 18-pounders opened their fire from it on the 17th December.
- E. The 3-gun Battery commenced the 20th December, and opened on the 21st
- F. 1. Four 8-inch Mortar Battery opened on the 15th.
- F. 2. Four 5½-inch Mortar Battery opened on the 17th.
- G. G. G. G. Holes, Quarries, and Hillocks.
- H. H. The Enemies' Trenches.
- J. Gopaul Ghur.
- K. The Ram Baug, or Begum Sumroo's Garden.
- L. The Boora Gate: is very strong, with a wicket 2½ feet square, is 15 feet wide, and is covered by a ravelin in front; the outer gate of which is built up with a stone wall, by order of Lieutenant Colonel Browne.
- M. The Comur Gate: is strong, has a wicket 2½ feet square.
- N. Ramchura Gate or Kirkie: it was 8 feet wide, but is built up with a stone wall 4 feet thick.
- O. The Goverdun Gate: is very strong, 14 feet wide, has a wicket of 2½ feet square, is covered in front by a small square work.
- P. Delhi Gate: is very strong, 19 feet wide, wicket 2½ feet square, is covered in front by a square work, in which is an outer gate.
- Q. The Kameah Gateway: seems to have been left in an unfinished state.
- R. Bunda Gate: has been built up with a stone wall, 3 feet thick, but the wicket is left open. It is covered by a work in front.
- S. Shah-poorā Gate: has been built up like the former, by the order of Lieutenant Colonel Browne. The wicket is left open. It is covered by a square work in front.

- T.** Part of an extensive lake: it is nearly dry in the hot season.
- U. U.** A.1 extensive swamp: in the rainy and cold season, impassable.
- W.** Battery for two 6-pounders.
- X.** Trench opened on the 14th.
- Y.** The left Trench, enfiladed by the enemy's fire 18th December.
- Z.** The large grove taken possession of by Colonel Don on the night of the 13th.
- a. A small mud redoubt, 22 yards square, in ruins.
- b. A ditto ditto, 10 yards, ditto.
- c. A ditto ditto.
- d. A stone Redoubt.
- e. Remains of a small circular Redoubt.
- f. A stone Redoubt in ruins: it has a ronnee, with a ditch from 29 to 25 feet wide, and from 2 to 5 feet deep.
- g. The remains of a small circular Redoubt.
- h. A stone Redoubt, 22 yards square: resembles f.
- i. & j. Ditto ditto.
- k. A circular mud Redoubt.
- l. The remains of a ditto.
- m. A stone Redoubt, but in a ruinous condition: resembles f.
- 1 & 2. Within the citadel are high cavaliers of earth, which considerably overlook the walls of the Citadel.
3. Is a Bastion: upon which is a stone tower, 36 feet high and 50 feet in diameter. There is an iron gun upon this tower, and also two others upon the cavaliers 1 and 2. The calibres of these guns are 6.2 inches, or about 32-pounders, they are mounted upon carriages which turn upon strong iron pivots, fixed in a terrace of masonry.
4. This Bastion has a cavalier of earth, 4 feet high, and 40 in diameter. There is an iron gun of 4 inches calibre, (8½-pounder), mounted upon a traversing carriage, upon this cavalier.
5. A Bastion with a stone cavalier, 4 feet high and 32 in diameter, upon which is an iron gun of the same calibre, and mounted in the same way as on cavaliers 1 and 2.
6. The gate of the Citadel: is very strong, and in good repair.
7. An irregular work, covering the gate of the Citadel.
- 8 & 9. Are two outer gates leading to the citadel: very strong and in good repair.
14. The Panowric Gate: is very strong, with a wicket 2½ feet square. It is covered by a square work, in which is an outer gate.
- The remainder of the figures in this Plate refer to the Sections given in Plate XVI.
- N. B.** The gates are all strongly secured by bars of iron rivetted across, within 8 inches of each other.
- All the gates are fastened with strong chains across.
- There are no communications between the outworks covering the gateways and the Ramparts of the town. The Bunds serve for passages for men or cattle over the swampy ground surrounding the place.
- All these references and remarks apply to the state of the Fort, Town, &c. soon after the capture of the place in 1804, as they were then made by an Engineer Officer on the spot.

* * * *The Siege of Bhurtpoor will be given in our next.*

ARTICLE V.

Remarks on the Medical Regulations in force for the Native branch of the Bengal Army, by an Adjutant of Bengal Native Infantry.

To the Editor of the Military Repository.

SIR,

I AM well aware that I run a great risk of having my motives for offering these remarks to the public greatly misrepresented, and nothing but a perfect conviction of the advantages which would attend some alterations in the Medical Regulations at present in force for the Native portion of this army, could have induced me to undertake the task of noticing them.

It shall be my earnest endeavours to avoid, as far as practicable, all observations calculated to give offence; and I do not feel (at which I am very happy) that it will be at all necessary to support the expediency of the charges I am about to advocate by any allusion to the particular circumstances, (arising out of the present system), which have come under my observation, and contribute to satisfy me that some change is absolutely necessary, as I am well assured the defects I am about to notice, are felt and acknowledged by almost every Officer in the army.

Since the present Medical Regulations were established, the situation and employment of the Native troops have undergone material changes. Formerly they were quartered, (except on occasions of actual service,) in or

near the Provinces in which they were raised, and they served in a climate suited to their constitutions. If an individual contracted a complaint of more than ordinary violence, a few days carried him to his house, where the care of his friends soon restored him to his former health and vigour; it was therefore merely necessary to remove the cause of the disease.

The different circumstances under which a large portion of the Native army is now employed, must be too obvious to require illustration here; every Officer who has served in the districts occupied by our troops since the last Mahratta and Pindarree campaigns, must be acquainted with the sickness which usually prevails among the men, and that a sepoy who has once suffered from the fever so common in these districts, seldom or never regains his strength, unless sent to his own home.

The distance at which the corps employed in these districts are quartered from Hindoostan, renders the journey home a formidable undertaking to men reduced and weakened by sickness, and many after leaving their corps on medical certificate, fall victims on the road to debility, or a return of their complaints. Having said thus much on the change in the nature of the service, since the present Medical Regulations were established, I shall proceed to notice some of the defects in the present system, and to suggest such alterations as appear to me calculated to meet the changes in the service above alluded to.

In the first place, the Regulations now in force are defective, inasmuch as no provision is made for securing to the convalescent patient, the use of wine or such strengthening and nourishing articles of diet, as the habits and prejudices of the Native soldier would admit of

his using if presented as medicine by the Surgeon. The consequence of this defect is, that the sepoy, the moment he is freed from his complaint, is discharged from the hospital, and sent to his lines, where he arrives weakened and reduced to a degree scarcely to be imagined by those who have never witnessed it; and, in some instances from penuriousness, but in most from want of means, he is unable to afford any thing but his usual food—flour and water. It would therefore be a great improvement in the Medical Regulations, if wine and such articles of diet as the Native soldier would have no objection to use, but which his pay does not enable him to procure, were supplied by the Commissariat, (as is now the case in the European hospitals,) in all cases when the Surgeon and senior Medical Staff might consider such articles requisite.

I would also recommend, that such men as are quartered in the distant Provinces, when they obtain leave on medical certificate, and are unable to proceed without assistance, should be supplied with such aid as the Surgeon, under the sanction of the senior Medical Staff, might deem necessary. I know this indulgence is at present occasionally granted, in very extreme cases, by Officers commanding frontier posts, but it would be better were it authorized by a regulation of Government.

The present method of supplying medicine to the Native army, should also undergo a complete change. The supply of medicine, instead of being considered a source of emolument to the Surgeon, should be put on the same footing as in the European portion of the army: the Surgeon receiving such allowance for every man under his charge, as might be deemed an adequate remuneration for his services: and if this rule were to be extended to

bazar people, or public camp followers, who from wounds or accidents might require the assistance of a European Surgeon, and be sent for that purpose to a Regimental hospital, under the sanction of the Commanding Officer of the troops, it would at once put an end to any doubts which may at present exist, as to the proper person to afford such description of people the assistance they occasionally require.

The effects these changes might have on the expense of the hospitals of native corps, I do not pretend to judge of, neither do I consider it a matter of any moment, when the health and efficiency of the army are under consideration; and that these changes would greatly improve both, I have no doubt.

Before I conclude, I beg to remark, that considerable benefit would also result to the service generally, if Assistant Surgeons, prior to their being appointed to the Medical-charge of a native corps, were examined in the Hindoostanee language, to ascertain if they were capable of understanding the men they might be called upon to attend, and to give the necessary instructions to the Native doctors under their orders.

Medical men who have a very limited, if any knowledge of the Hindoostanee, often receive charge of Native corps; and the presumption is, that in such cases, the duty must be imperfectly performed; and having thus obtained all they can for some years expect, the instances of any zealous attempt to acquire a knowledge of the language or customs of the men are, I am sorry to say, very rare.

Feeling the importance of the subject upon which I have ventured to touch, I have to solicit a place for these remarks in the pages of the Military Repository; and if

the statements I have advanced, are ever inquired into, the existence of the defects and evils resulting from them, which in this place I could only hint at, will be fully and clearly established.

I am, Sir, &c. &c. &c.

AN ADJUTANT,

of Bengal Native Infantry.

ARTICLE VI.

Artillery Depôt of Instruction formed at Bombay.
30th July, 1822.

WE are truly grateful to a kind correspondent for copies of the following orders regarding the establishment of an Artillery Depôt of Instruction at Bombay, an event, upon which we most sincerely congratulate the Bombay Artillery.

If on this side of India we express our full conviction of the utility and great ultimate benefit which may be anticipated from this Establishment, we *can* do no more than accord with the impression which the Government of Bombay must have received, in acceding to the adoption of a plan which is so excellent in its design, and so honourable to the promoters of it.

In the theory and practice of artillery, there is so much to be learnt of what may be considered useful knowledge to an artillerist, and there is so wide a field for investigation and experimental research, that we may safely say, and do so under a full conviction of its truth, that it is hardly possible to suppose any individual capable of being a complete 'Master of Artillery.'

The *Tacts* for theoretical research and practical application, are rarely to be found combined in the same person; but should it be the case, that nature has so far blessed him, there are a thousand chances to one against that same individual having enjoyed opportunities for a full acquirement of every branch of *practical* professional knowledge. It is far from our intention to reflect in

the slightest degree upon the plan which has been adopted at Bombay, of appointing one Officer to be Superintendent of the establishment. Such an appointment, from the nature of the service, was actually necessary.

Captain Millar will no doubt adopt that excellent motto, "Docendo, disco;" and while the young Officers, Non-commissioned Officers and Privates of the Bombay Artillery, have the satisfaction of knowing that their Government have stepped forward thus liberally to promote their scientific character, they will feel the duty of making an adequate return, as incumbent on as it will be grateful to them.*

The attention of all Indian Artillerists will no doubt be turned towards this Establishment, and if the spirit of zeal and ambition to excel is awakened, without which nothing great was ever achieved in science or in virtue, we may safely anticipate the most gratifying result to all parties who may be interested in its success.

It is well known that all enlightened European Governments, since the modern introduction of artillery, have devoted a considerable share of attention and of revenue, to promote the efficient education of the young men destined to fill the situations of Officers of this branch of their armies: and it would not be difficult to prove, that this expense and care, has seldom met with an adequate return. The fault has been in the system of education pursued—the course of instruction has

* We will venture to hint that the principle of the Lancastrian system of Education is admirably suited to the duties of this Depôt: those young Officers and men, who best qualify themselves, being made Deputy Superintendents of classes, an honour of which due mention should be made on their leaving the Depôt.

usually closed, and the pupil is separated from his tutors just at the age when the student's mind begins to expand, and is open to receive forcible and lasting impressions—all subsequent improvement has been left to chance and inclination:—yet, as artillery is a scientific profession, there is no more reasonable ground for claiming advance in it without study, than there is in the Law, or in Medicine. The Depôt at Bombay is an institution calculated to remedy the evil, and it will no doubt introduce a laudable spirit of inquiry and emulation; but if it proves beneficial to the young Officers, much more will it be so to the Non-commissioned Officers and Privates: their value to the State will increase in proportion as professional science is cultivated in their minds, and their individual happiness and comfort will probably be increased tenfold.

We could say much upon this subject, as connected with every European Soldier in India, but for the present we must defer the subject, having in this volume far exceeded the number of pages which, on the first establishment of the Repository, we limited ourselves to.

We trust the excellent example of the Bombay Presidency may be followed, both here and at Madras; and with this hope we beg that Colonel Hessman will pardon us in giving further publication to his excellent explanatory Regimental order, which must ever bear with it the most honourable testimony to his name, and to the period of his Commandantship.

HEAD QUARTERS, BOMBAY, 1ST AUGUST, 1822.

General Order by the Honourable the Governor in Council.

Bombay Castle, 30th July, 1822.

“The Honourable the Governor in Council having established an institution at the Head Quarters of the

giment of Artillery, for the purposes of perfecting the professional education of the younger officers of artillery as they join, and of imparting to the non-commissioned officers, and a portion of selected private soldiers, a degree of instruction in the theoretical parts of their profession, is pleased to appoint Captain Miller to the situation of Director of the Artillery Depôt of Instruction."

"(Signed) W. MEALE,

A. A. A. GEN. OF THE ARMY."

*Extract from Artillery Orders by Lieutenant Colonel
Commandant Hessman.*

Artillery Head Quarters, Matoongha, 17th Aug. 1822.

"Government having been pleased to approve and order to be carried into effect a plan for the establishment of a Depôt at the Head Quarters of the Regiment, for the purpose of completing the instruction of young Officers when they join, and of improving the non-commissioned officers and men in the scientific knowledge and practice of their profession; the Commandant anticipates the zealous co-operation of Officers of every rank, as well as the willing efforts of the non-commissioned officers and men, in promoting an object of so much importance to the professional character of the corps at large, and from which the service may ultimately be expected to derive the greatest advantages.

"That the nature of the Institution may be generally understood, the Commandant deems it necessary to explain, that this new establishment may be comprehended under the two following heads:

"First.—As far as regards the Officers, the principal objects in view are: .

“ 1st. To give them opportunities of applying practically the theoretical knowledge they have acquired, previous to their entering the service. ”

“ 2nd. To instruct them systematically in many professional duties and operations, which hitherto have either been left to individual inclination, or acquired by chance.

“ 3rd. To induce them to extend and improve their scientific attainments, by study and practice combined.

“ With reference to the latter and ultimate object, the Commandant takes this early opportunity of declaring, that a zealous endeavour to attain it will be the only road to preferment, or to any of the advantages in his power to bestow, or in his province to recommend to higher authority to confer. He expects therefore from all those placed under the tuition of the Director of the Depôt, a cheerful and implicit obedience to all the instructions or directions they may receive from him, assured as they must be, that with their increased knowledge, their respectability will be enhanced, and their prospects in the service essentially furthered.

“ Secondly.—With regard to the non-commissioned officers and privates. This branch may be divided as follows:—

“ 1st. The school for the instruction of non-commissioned officers and men in the elements of practical Gunnery.

“ 2nd. Laboratory, for instructions in Arsenal and Laboratory duties of all kinds.

“ 3rd. Repository, in which will be taught the uses of all kinds of carriages and machines used by the Artillery—the different modes of overcoming obstacles of any kind that may occur on service—the construction

and use of such field works as Artillerymen are employed in—and generally, in all those operations of Artillery which are not usually, or cannot conveniently be taught at the parades and ordinary practice of the regiment.

“ From the sketch above given of the Institution, the non-commissioned officers and men of the regiment will perceive, that ample opportunities will be afforded to all to perfect themselves in the knowledge essentially necessary for good Artillerists; and particularly, for qualifying themselves for the respectable situation of warrant officers in the ordnance department; and the Commandant desires it may be understood, that no man who has had the opportunity, and hereafter aspires to any situation of rank or emolument, unless he brings satisfactory testimonials of his conduct and acquirements while attending the Institution, will be recommended.

“ A knowledge of reading and writing, and the first rules of arithmetic, being indispensable to enable the soldiers to go through the course of instruction proposed, the Commandant trusts that the desire of acquiring information so necessary for their profession, and the numerous rewards which the service offers to their industry and intelligence, will induce many, who may now be ignorant, to come forward and apply themselves to the attainment of these simple, but useful branches of knowledge in the Regimental school.

—“ Although circumstances prevent the plan from being at once carried into effect, and more detailed instructions being immediately issued, the Commandant is pleased to direct the following arrangements for the present, to which the Officer commanding cantonments will be pleased to give effect.

“ 1st. The following Officers are placed under the orders of the Director, at all times when not required for battalion or cantonment duty; and Officers commanding battalions to which they belong, are requested to give every facility in their power, towards their devoting as much time as possible to the objects of instruction, to which their attention may be directed.

(Here follow the names of 18 young Officers.)

“ 2nd. All non-commissioned officers of the Regiment, excepting those on duty, from which their presence cannot be dispensed with, will attend under the orders of the Director at the Laboratory, on Tuesdays and Thursdays, from 10 till 12 o'clock, commencing from Tuesday next. The Officer in waiting for cantonment duty will attend regularly at the same hours, and march the non-commissioned Officers to and from the spot.

“ The Director of the Depôt being charged with the care of all Ordnance and Stores at Matoongha, indents for stores and repairs will continue to be made on him as hitherto, but the batteries at present in use for the drill of battalions, will continue under the charge of battalions to which they were before attached, and Officers commanding battalions are responsible for their state and appearance.”

“ (Signed) W. MILLER,
M. B.”

ARTICLE VII.

Description of an Experimental Mortar Platform.

(Plate XIV.)

A D B C. Plan, Plate XIV, represents the ground plan of the Platform, formed of two pieces of saul timber A B, 9 inches by 6, each $5\frac{1}{2}$ feet long. C, a plank 3 inches thick, $4\frac{1}{2}$ feet long, and 1 foot broad, to lie under the trail of the Mortar bed.

D. Fig. 1, represents the form of an iron socket let into the Platform.

E. Fig. 3, shews the form of an iron fastened to the fore transom of the bed, as shewn in the elevation.

F. Fig. 2, represents an iron pin to connect the bed and Platform, as shewn in the elevation.

b c, a sleeper; but this was not used in the experiment.

a a, are two iron bolts passing through the side pieces of the platform, to hold them firmly together.

Under an impression that a Mortar bed, from its solid and compact construction, will securely resist the shock of the discharge of the Mortar, notwithstanding the bed is so fixed upon the Platform as to prevent any recoil, I lately solicited and obtained the sanction of the Military Board, through the Commandant of Artillery, for the construction of an experimental Platform, having the following objects in view in the project, viz.

Greater certainty and precision in the ranges of the shells towards a given object than with a common Platform, on which the Mortar and its bed is allowed to recoil.

Greater facility and quickness in loading, laying, and firing a Mortar.

Equal precision of fire by day and night.

These are points, the accomplishment of which may be considered as desiderata in Mortar practice.

The Military Board having liberally acceded to the proposition, a Platform similar to that represented in Plate XIV, was constructed, and the experiment is now before the Select Committee of Artillery Officers at Dum Dum.*

Four hundred and ninety-six rounds of shells have been fired from an 8-inch Mortar, mounted upon this Platform, without either the Mortar bed or Platform shewing the least symptoms of having sustained any injury by the recoil being prevented. The charge used was 1 lb. 4 oz. of powder, and the ranges of the shells from 850 to 1050 yards.

It was ascertained that the Mortar could be loaded, laid, and fired with ease, in less than a minute; but several circumstances which came to my observation during the experiment, prevented the fire, though equal to that of common Mortar practice, from being so accurate as I could have wished, and as I feel fully sanguine of accomplishing, by a few slight, but important alterations which are now making.

The pin F was too small for the holes in the iron socket E, and the iron sockets D, of the platform, so that the Mortar bed was allowed a play of 3-8ths of an inch in front, which affected the precision of the fire consi-

* A Committee formed of the two senior Officers of Artillery next to the Commandant at Head Quarters, and four Artillery Officers; who hold certain staff situations, which keeps them at, or in the vicinity of the Head Quarters of the Corps.

derably. The Platform itself being small, and not having long sleepers under it, sunk in the soft soil of the terre-plain of the battery, and lost its level. These two defects I am now about to remedy, by placing two long and broad sleepers under the Platform, by making the pin F, a fixture in the platform, and turning the latter so as to fit the iron socket D accurately. The result of the experiment shall be faithfully detailed in our next Number.

SAMUEL PARLBY, CAPTAIN,
Model Master, Dum Dum.

In the next No. we are happy to have it in our power to promise our readers some valuable papers on Military Law, which have been kindly placed in our hands for publication. They contain useful extracts from the various Writers on Military Law, clearly and perspicuously arranged, with comments by the Compiler.

We beg to mention that only a certain number of copies of the Repository are printed, and that it is not the intention of the present Editor to reprint any of the past Numbers. Early applications for copies are therefore recommended. Subscribers who have not received their copies, are requested to send for them before the year expires, and to authorize their agents to pay for the same on delivery.

Applications for copies to be made to SAMUEL SMITH AND Co. Hurkaru Library, Calcutta; MESSRS. BATTLE AND Co. Madras; and MESSRS. EDULJEE CURSETJEE, SONS AND Co. Bombay, who will receive payment for the same.

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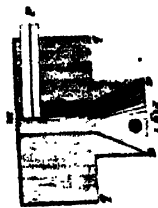


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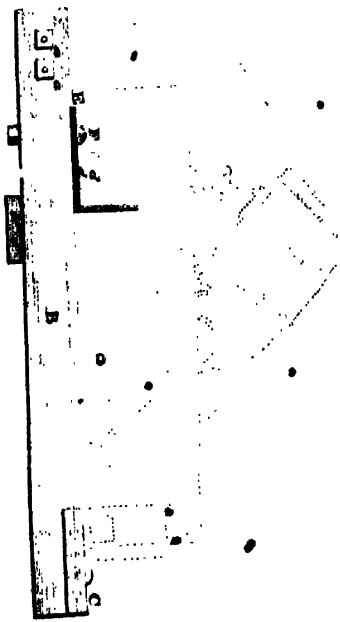
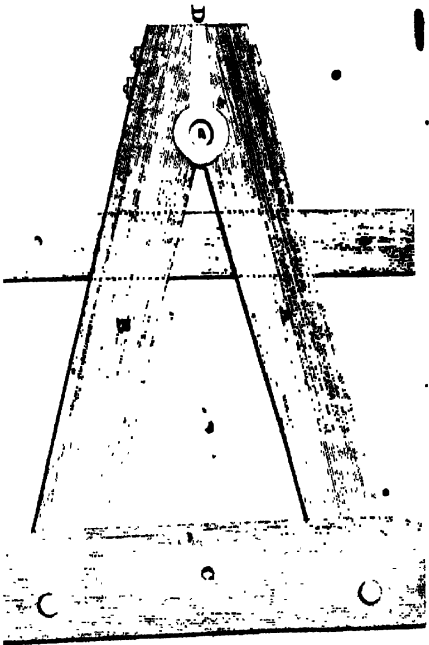
PLAN EXPERIMENTAL FIELD PLATFORM

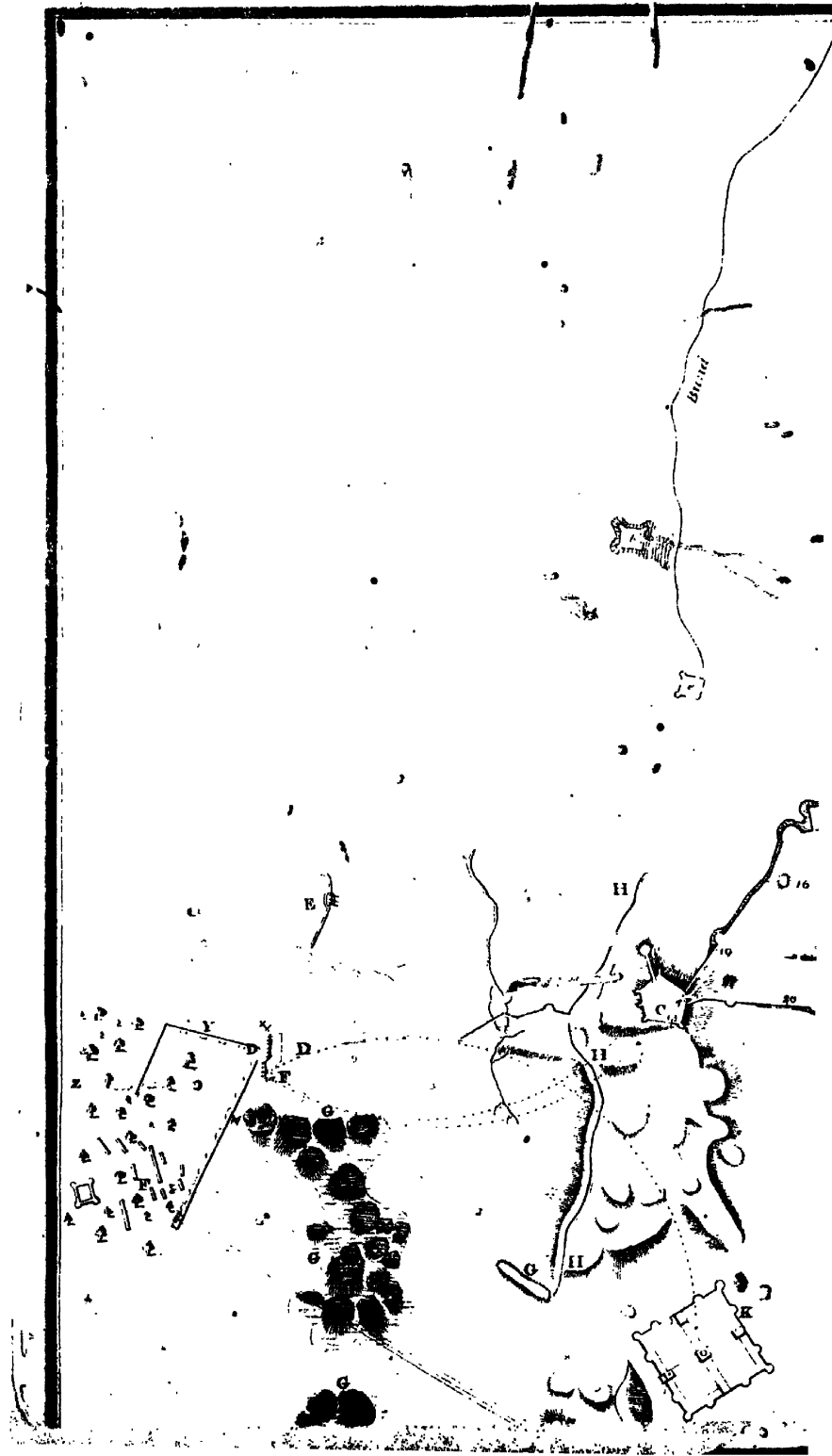
MORTAR

ELEVATION



Section of Mortar showing for a mortar

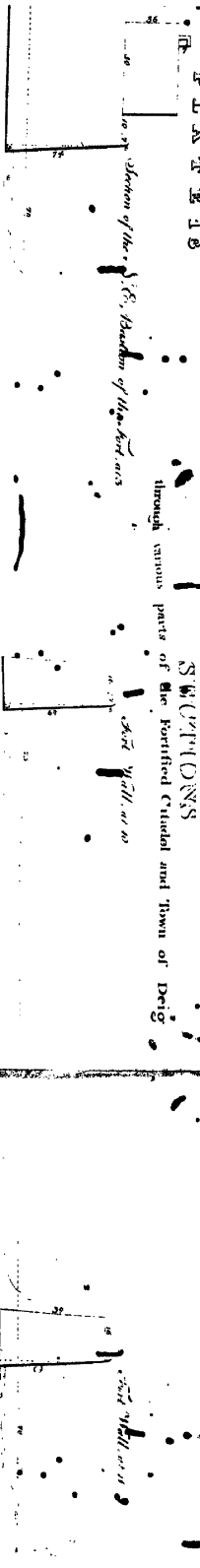




through various parts of the Fortified Citadel and Town of Derig

Section of the S.E. Bastion of the fort at 18

Section Wall at 18



Wall of the flank Battery at 18

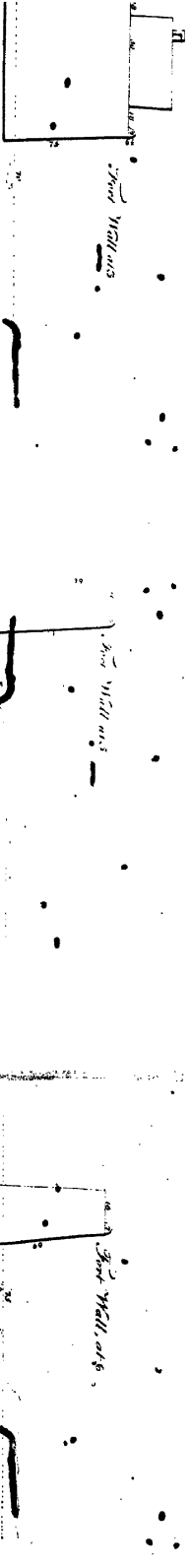
Section Wall at 19

Section Wall at 20

Section Wall at 21

Section Wall at 22

Section Wall at 23



Wall of the flank Battery at 17

Section Wall at 15

Section Wall at 12

Section Wall at 6

Section Wall at 10

