VARIOUS

CONTINENTAL MONTHLY , VOL. 6, NO. 1, JULY, 1864

Various

Continental Monthly , Vol. 6, No. 1, July, 1864

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Continental Monthly , Vol. 6, No. 1, July, 1864 / Various — «Public Domain»,

Содержание

Various
Continental Monthly , Vol. 6, No. 1, July, 1864 / Devoted to Literature and National Policy

AN ARMY: ITS ORGANIZATION AND MOVEMENTS

SECOND PAPER

Having, in the preceding paper, described the general organization[1] of an army, we proceed to give a succinct account of some of the principal staff departments, in their relations to the troops.

Army organization—notwithstanding the world has always been engaged in military enterprises—is of comparatively recent institution. Many of the principles of existing military systems date no farther back than to Frederic the Great, of Prussia, and many were originated by Napoleon. Staff departments, particularly, as now constituted, are of late origin. The staff organization is undergoing constant changes. Its most improved form is to be found in France and Prussia. Our own staff system is of a composite, and, in some respects, heterogeneous character—not having been, constructed on any regular plan, but built up by gradual accretions and imitations of European features, from the time of our Revolution till the present. It has, however, worked with great vigor and efficiency.

The staff of any commander is usually spoken of in two classes—the departmental and the personal—the latter including the aides-de-camp, who pertain more particularly to the person of the commander, while the former belong to the organization. Of the departmental staff, the assistant adjutant-generals and assistant inspector-generals are denominated the 'general staff,' because their functions extend through all branches of the organization, while the other officers are confined exclusively to their own departments.

The *chief of staff* is a recent French imitation. The first officer assigned in that capacity was General Marcy, on the staff of General McClellan, in the fall of 1861. Previous to that time the officers of the adjutant-general's department—on account of their intimate relations with commanding officers, as their official organs and the mediums through which all orders were transmitted—had occupied it. The duties of these officers, however, being chiefly of a bureau character, allowing them little opportunity for active external supervision, it has been deemed necessary to select for heads of the staffs, officers particularly qualified to assist the commander in devising strategical plans, organizing, and moving troops, etc.; competent to oversee and direct the proceedings of the various staff departments; untrammelled with any exclusive routine of duty, and able in any emergency, when the commander may be absent, to give necessary orders. For these reasons, although the innovation has not been sanctioned by any law, or any standing rule of the War Department, and although its propriety is discussed by many, the custom of assigning officers as chiefs of staff has become universal, and will probably be permanent. The extent and character of their duties depend, however, upon themselves, being regulated by no orders, and the high responsibilities attached to the position in France have not thus far been assumed by the officers occupying it here. In the French service, the chief of staff is the actual as well as the nominal head of the organization; he supervises all its operations; he is the *alter ego* of the commander. In the Waterloo campaign, for instance, Marshal Soult was the chief of Napoleon's staff, and the emperor attributed his disaster, in part, to some of the orders issued by the marshal.

[1] Since that article was written, some changes of detail have been made, but the principles remain the same.

Our limits will not permit a description of the duties pertaining to the various members of the staff, but we pass to the consideration of those departments, the operations of which most directly affect the soldier, are indispensable to every army, and are most interesting to the public.

Let us first consider the *quartermaster's department*, which, from the character and diversity of its duties, the amount of its expenditures, and its influence upon military operations, may be ranked as among the most important. This department provides clothing, camp and garrison equipage, animals and transportation of all kinds, fuel, forage, straw, and stationery, an immense variety of the miscellaneous materials required by an army, and for a vast amount of miscellaneous expenditures. It is, in fact, the great business operator of a military organization. In an active army, the success of movements depends very much on its efficiency. Unless the troops are kept properly clothed, the animals and means of transportation maintained in good condition, and the immense trains moved with regularity and promptness, the best contrived plans will fail in their development and execution.

The department, at the commencement of the war, had supplies in store only for the current uses of the regular army. When the volunteer forces were organized it became necessary to make hasty contracts and purchases to a large amount; but as even the best-informed members of the Government had no adequate prevision of the extent and duration of the war, and of the necessary arrangements for its demands, a considerable period elapsed before a sufficient quantity of the required materials could be accumulated. Those were the days of 'shoddy' cloth and spavined horses. The department, however, exhibited great administrative energy, under the direction of its able head, General M. C. Meigs, and has amply provided for the enormous demands upon it.

Depots for the reception of supplies are established in the large cities, whence they are transferred as required to the great issuing depots near the active armies, and from them to the depots in the field. Thus, the main depots of the Army of the Potomac are at Washington and Alexandria—a field depot being established at its centre, when lying for any length of time in camp. Only current supplies are kept on hand at the latter, and no surplus is transported on the march, except the required amounts of subsistence and forage.

A great deal is said in connection with military movements, of 'bases of operation.' These are the points in the rear of an army from which it receives supplies and reënforcements, and with which its communications must at all hazards be kept open, except it has means of transportation sufficient to render it independent of its depots for a considerable period, or unless the country traversed is able to afford subsistence for men and animals. When an army marches along a navigable river, its secondary base becomes movable, and it is less confined to the necessity of protecting its rear. In Virginia, however, the connection of the Army of the Potomac with Washington is imperative, and this fact explains the contracted sphere of the operations of that army.

The transportation of supplies is limited by the ability of the Government to provide trains, and by the ability of the army to protect them; for large trains create large drafts on the troops for teamsters, pioneers, guards, etc. An army train, upon the most limited allowance compatible with freedom of operations for a few days, away from the depots, is an immense affair. Under the existing allowances in the Army of the Potomac, a corps of thirty thousand infantry has about seven hundred wagons, drawn by four thousand two hundred mules; the horses of officers and of the artillery will bring the number of animals to be provided for up to about seven thousand. On the march it is calculated that each wagon will occupy about eighty feet—in bad roads much more; consequently a train of seven hundred wagons will cover fifty-six thousand feet of road—or over ten miles; the ambulances of a corps will occupy about a mile, and the batteries about three miles; thirty thousand troops need six miles to march in, if they form but one column; the total length of the marching column of a corps is therefore *twenty miles*, even without including the cattle herds and trains of bridge material. Readers who have been accustomed to think that our armies have not exhibited sufficient energy in surmounting the obstacles of bad roads, unbridged streams, etc., will be able to estimate, upon the above statements, the immense difficulty of moving trains and artillery. The trains

of an army have been properly denominated its *impedimenta*, and their movement and protection is one of the most difficult incidental operations of warfare—particularly in a country like Virginia, where the art of road making has attained no high degree of perfection, and where the forests swarm with guerillas.

To an unaccustomed observer the concourse of the trains of an army, in connection with any rapid movement, would give the idea of inextricable confusion. It is of course necessary to move them upon as many different roads as possible, but it will frequently happen that they must be concentrated in a small space, and move in a small number of columns. During the celebrated 'change of base' from Richmond to Harrison's Landing, the trains were at first obliged to move upon only one road—across White Oak Swamp—which happened fortunately to be wide enough for three wagons to go abreast. There were perhaps twenty-five hundred vehicles, which would make a continuous line of some forty or fifty miles. While the slow and toilsome course of this cumbrous column was proceeding, the troops were obliged to remain in the rear and fight the battles of Savage Station and White Oak Swamp for its protection. A similar situation of trains occurred last fall when General Meade retired from the Rappahannock, but fortunately the country presented several practicable routes. It is on a retreat, particularly, that the difficulty of moving trains is experienced, and thousands of lives and much valuable material have been lost by the neglect of commanding officers to place them sufficiently far in the rear during a battle, so as to permit the troops to fall back when necessary, without interruption.

A march being ordered, supplies according to the capacity of the trains, are directed to be carried. The present capacity of the trams of the Army of the Potomac is ten days' subsistence and forage, and sixty rounds of small-arm ammunition—the men carrying in addition a number of days' rations, and a number of rounds, upon their persons. When the wagons reach camp each evening, such supplies as have been expended are replenished from them. As a general rule the baggage wagons camp every night with the troops, but the exigencies are sometimes such that officers are compelled to deny themselves for one or even two weeks the luxury of a change of clothing—the wagons not reaching camp, perhaps, till after midnight, and the troops resuming their march an hour or two afterward. Those who indulge in satires upon the wearers of shoulder straps would be likely to form a more correct judgment of an officer's position and its attendant hardships, could they see him at the close of a fortnight's campaign. Like the soldier, he can rely on nothing for food or clothing except what is carried by himself, unless he maintains a servant, and the latter will find a few blankets, a coffee pot, some crackers, meat, sugar, coffee, etc., for his own and his employer's consumption, a sufficient burden.

Let us see how the supplies of the quartermaster's department are distributed.

At stated periods, if circumstances permit—usually at the first of each month—the regimental quartermasters, after consultation with the company officers, forward through their superiors to the chief quartermasters of corps, statements of the articles required by the men. These are consolidated and presented to the chief quartermaster of the army, who orders them from Washington, and issues them from the army depot—the whole operation requiring about a week. The number of different *kinds* of articles thus drawn monthly is about five hundred; the *quantity* of each kind depends on the number of men to be supplied, and the nature of the service performed since the previous issue. If there has been much marching, there will be a great demand for shoes; if a battle, large quantities of all kinds of articles to replace those lost on the battle field will be required.

An infantry soldier is allowed the following principal articles of clothing during a three years' term of service:

	1st Year.	*2d Year.*	*3d Year.*
Cap,	1	1	1
Coat,	2	1	2
Trowsers,	3	2	3
Flannel shirt,	3	3	3
Drawers,	3	2	2
Shoes,	4	4	4
Stockings,	4	4	4
Overcoat,	1	0	0
Blanket,	1	0	1
Indiarubber blanket,	1	1	1

The prices of these are stated each year in a circular from the department, and, as the soldier draws them, his captain charges him with the prices on the company books. The paymaster deducts from his pay any excess which he may have drawn, or allows him if he has drawn less than he is entitled to. The clothing is much cheaper than articles of the same quality at home. Thus, according to the present prices, a coat costs $7.30; overcoat, $7.50; trowsers, $2.70; flannel shirt, $1.53; stockings, 32 cents; shoes, $2.05.

The *commissary department* provides exclusively the subsistence of the troops. Each soldier is entitled to the following daily ration:

> Twelve ounces of pork or bacon, or one pound four ounces of fresh beef.
>
> One pound six ounces of soft bread or flour, or one pound of hard bread, or one pound four ounces of corn meal.
>
> To every one hundred men, fifteen pounds of beans or peas, and ten pounds of rice or hominy.
>
> To every one hundred men, ten pounds of green coffee, or eight pounds of roasted, or one pound and eight ounces of tea.
>
> To every one hundred men, fifteen pounds of sugar, four quarts of vinegar, one pound four ounces of candles, four pounds of soap, three pounds twelve ounces of salt, four ounces of pepper, thirty pounds of potatoes, when practicable, and one quart of molasses.
>
> Fresh onions, beets, carrots, and turnips, when on hand, can be issued in place of beans, peas, rice, or hominy, if the men desire.
>
> They can also take in place of any part of the ration an amount equal in value of dried apples, dried peaches, pickles, etc., when on hand.

A whiskey ration of a gill per day per man can be issued on the order of the commander, in cases of extra hardship. It is, however, rarely issued, on account of the difficulty of finding room for its transportation in any considerable quantities. Moreover, whiskey, in the army, is subject to extraordinary and mysterious *leakages*, and an issue can scarcely be made with such care that some drunkenness will not ensue. When lying in camp, sutlers and others sell to the soldiers contrary to law, so that old topers usually find methods of gratifying their appetites—sometimes sacrificing a large proportion of their pay to the villains who pander to them. The utmost vigilance of the officers fails to detect the methods by which liquor is introduced into the army. When a cask is broached in any secluded place, the intelligence seems communicated by a pervading electrical current, and the

men are seized with a universal desire to leave camp for the purpose of washing, or getting wood, or taking a walk, or other praise-worthy purposes.

The total weight of a ration is something over two pounds, but in marching, some articles are omitted, and but a small quantity of salt meat is carried—fresh beef being supplied from the herds of cattle driven with the army. A bullock will afford about four hundred and fifty rations, so that an army of one hundred thousand men needs over two hundred cattle daily for its supply.

In camp the men can refrain from drawing portions of their rations, and the surplus is allowed for by the commissaries in money, by which a company fund can be created, and expended in the purchase of gloves, gaiters, etc., or luxuries for the table. A hospital fund is formed in the same way—by an allowance for the portions of the rations not consumed by the patients—and is expended in articles adapted to diet for the sick. The rations are ample and of good quality, though the salt meat is rather tough occasionally, and the consistency of the hard bread is shot-proof. Company cooks are allowed, and in camp they contrive to furnish quite appetizing meals. Their position is rather difficult to fill, and woe is the portion of the cook not competent for his profession. The practical annoyances to which he is subject make him realize to the fullest extent 'the unfathomable depths of human woe.' On the march the men usually prefer to boil their coffee in tin cups, and to cook their meat on ram-rods—without waiting for the more formal movements of the cooks. To reach camp before sunset, after a twenty-mile march, to pitch his little shelter tent, throw in it his heavy arms and accoutrements, collect some pine twigs for a couch, wash in some adjacent stream, drink his cup of hot, strong coffee, eat his salt pork and hard bread, and then wrap himself in his blanket for a dreamless slumber, is one of the most delicious combinations of luxurious enjoyment a soldier knows. To-morrow, perhaps, he starts up at the early *reveille*, takes his hasty breakfast, is marshalled into line before the enemy, there is a shriek in the air rent by the murderous shell, and the soldier's last march is ended.

The next department we shall consider is that of *ordnance*, which supplies the munitions and portions of accoutrements.

The subject of *artillery* is perhaps the most interesting of the great number connected with warfare. In the popular estimation it overshadows all others. All the poetry of war celebrates the grandeur of

> 'Those mortal engines whose rude throats
> The immortal Jove's dread clamors counterfeit.'

The thunder of great guns and the dashing of cavalry are the incidents which spontaneously present themselves to the mind when a battle is mentioned. Perhaps the accounts of Waterloo are responsible for this. The steady fighting of masses of infantry, having less particulars to attract the imagination, is overlooked; the fact, preëminent above all others in military science, that it is the infantry which contests and decides battles, that artillery and cavalry are only subordinate agencies—is forgotten. So splendid have been the inventions and achievements of the last few years in respect to artillery, as illustrated particularly at Charleston, that some excuse may easily be found for the popular misconception. A few remarks presenting some truths relative to the appropriate sphere of artillery and its powers, and stating succinctly the results which have been accomplished, may be found interesting.

Without entering into the history of artillery, it will be sufficient to state that the peculiar distinguishing excellence of modern improvements in cannon is the attainment of superior efficiency, accuracy, and mobility, with a decrease in weight of metal. A gun of any given size is now many times superior to one of the same size in use fifty or a hundred years ago. It is not so much in *big guns* that we excel our predecessors—for there are many specimens of old cannon of great dimensions; but by our advance in science we are able so to shape our guns and our projectiles that with less weight of material we can throw larger shot to a greater distance and with more accuracy. A long course of

mathematical experiment and calculation has determined the exact pressure of a charge of powder at all points in the bore of a cannon during its combustion and evolution into gas. These experiments have proved that strength is principally required near the breech, and that a cannon need not be of so great length as was formerly supposed to be necessary. We are thus able to construct guns which can be handled, throwing balls of several hundred pounds' weight. Another splendid result of scientific investigation is the method adopted for casting such monster guns. In order that the mass of metal may be of uniform tenacity and character, it should cool equably. This has been secured by a plan for introducing a stream of water through the core of the casting, so that the metal cools both within and without simultaneously.

About the time that the Italian war commenced, the subject of rifled cannon excited much popular interest. Exaggerated expectations were formed of the changes to be produced by them in the art of warfare. Many saw in them the means of abolishing war entirely. Of what use is it, they said, to array armies against each other, if they can be destroyed at two or three miles' distance? At the commencement of our own contest there was an undue partiality for rifled ordnance. Almost every commander of a battery desired to have rifled guns. The more correct views of the thoroughly accomplished artillery officers to whom was confided the arrangement of this branch of the service, and actual experience, have dissipated the unfounded estimate of their utility for field service, and established the proper proportions in an artillery force which they should compose. It has been ascertained that fighting will never be confined to long ranges—that guns which can throw large volumes of spherical case and canister into lines only a few hundred yards distant are as necessary as ever.

The necessity for rifled cannon arose from the perfection of rifled muskets. When these arms reached such a degree of excellence that horses and gunners could be shot down at a distance of one thousand yards, the old-fashioned smooth-bore artillery was deprived of its prestige. To retrieve this disadvantage and restore the superiority of artillery over musketry in length of range, methods of rifling cannon for field service became an important study. For assailing distant lines of troops, for opening a battle, for dispersing bodies of cavalry, for shelling intrenchments, for firing over troops from hills in their rear, rifled guns are of invaluable service. But, notwithstanding troops are now universally armed with muskets of long range, no battle of importance is fought without close engagements of the lines. The alternate advances and retreats of the infantry, firing at distances of less than one hundred yards, charging with fixed bayonets and frantic shouts, will always characterize any battle fought with vigor and enthusiasm. In such conflicts, wide-mouthed smooth bores, belching their torrents of iron, must play a conspicuous part.

Another fact, which will perhaps surprise the general reader, is that the form and character of *projectiles* have been matters of as much difficulty, have received as much investigation, and are of as much importance, as the shape and character of the guns. In fact, rifled pieces would be comparatively ineffective except projectiles adapted to them had been invented. It was necessary that projectiles of greater weight, of less resistance to the atmosphere, and of more accuracy of flight, than the old round shot, should be introduced. To accomplish these ends several things were necessary: 1st, the projectiles should be elongated; 2d, they should have conical points; 3d, the centre of gravity should be at a proper distance in front of the centre; 4th, there should be methods of *steering* them so that they should always go point foremost through the whole curve of their flight; 5th, they should fit the gun so as to take the rifles, yet not so closely as to strain it. To attain these and other requisites, innumerable plans have been devised. The projectile offering the best normal conditions is the *arrow*; it has length, a sharp point, centre of gravity near the head, and feathers for guiding it (sometimes so arranged that it shall rotate like a rifled ball). Improved projectiles, therefore, both for muskets and cannon, correspond in these essentials to the first products of man in the savage state.

We cannot, in this article, further discuss either such general principles or those of a more abstruse character, in their application to artillery, but will briefly state a few facts relative to its employment—confining ourselves exclusively to the *field service*.

The guns now principally used for battles, in the Northern armies, are 10 and 12-pounder Parrotts, three-inch United States rifles, and light 12-pounder smooth bores. The distinguishing characteristic of the Parrott guns is lightness of construction, secured by strengthening the breech (in accordance with the principles mentioned a few paragraphs back) with a band of wrought iron. This has been applied to guns of all sizes, and its excellence has been tested by General Gillmore in the reduction of Forts Pulaski and Sumter. The three-inch guns are made of wrought iron, are of light weight, but exceedingly tenacious and accurate. The 12-pounders, sometimes called Napoleons, are of bronze, with large caliber, and used chiefly for throwing shell and canister at comparatively short distances.

The greatest artillery conflict of the war (in the field) occurred at Gettysburg. For two hours in the afternoon of the memorable third day's battle, about four hundred cannon were filling the heavens with their thunder, and sending their volleys of death crashing in all directions.

It was estimated that the discharges numbered five or six a second; in fact, the ear could hardly detect any cessations in the roar. The air was constantly howling as the shells swept through it, while the falling of branches, cut from the trees by the furious missiles, seemed as if a tornado was in the height of its fury: every few minutes, a thunder heard above all other sounds, denoted the explosion of a caisson, sweeping into destruction, with a cataract of fire and iron, men and animals for hundreds of feet around it. The effect of such a fire of artillery is, however, much less deadly than any except those who have been subject to it can believe. The prevalent impression concerning the relative destructiveness of cannon and musketry is another instance of popular error. In the first place, all firing at over a mile distance contains a large proportion of the elements of chance, for it is impossible to get the range and to time the fuses so accurately as to make any considerable percentage of the shots effective; and in the next place, except when marching to a close conflict, the men are generally protected by lying down behind inequalities of the ground, or other accidental or designed defences. The proportion killed in any battle by artillery fire is very small. Lines of men frequently lie exposed to constant shelling for hours, with small loss; in fact, in such cases, old soldiers will eat their rations, or smoke their pipes, or perhaps have a game of poker, with great equanimity.

No portion of the military service has been more misrepresented than the *medical department*. An opinion seems to prevail quite extensively that the army surgeon is generally a young graduate, vain of his official position, who cares little for the health of the soldier, and glories in the opportunities afforded by a battle for reckless operations. Such an opinion is altogether fallacious. In the regiments there are undoubtedly many physicians who have adopted the service as a resource for a living which they were unable to find at home, but the majority are exactly the same class of professional men as those who pursue useful and honorable careers in all our cities and villages. When a physician is called upon at home, it happens in a majority of cases—as every honest member of the profession will admit—that there is little or no necessity for his services. Too sagacious to avow this, he gravely makes some simple prescription, and as gravely pockets his fee. In camp, however, the potent argument of the fee does not prevail, and men who run to the doctor with trifling ailments, by which they hope to be relieved from duty, receive a rebuff instead of a pill. They instantly write letters complaining of his inhumanity. In regard to operations, it is a frequent remark by the most experienced surgeons that lives are lost from the hesitancy to amputate, more frequently than limbs are removed unnecessarily.

The medical department of an army, like every other, is controlled by a *system*, and it is this which regulates its connections with the soldier more than the qualifications of individual surgeons. In the army the *system* takes care of everything, even to the minutest details. Hygienic regulations for preserving the salubrity of camps and the cleanliness of the troops and their tents, are prescribed and enforced. Every day there is a 'sick call' at which men who find themselves ill present themselves to

the surgeons for treatment. If slightly affected, they are taken care of in their own quarters; if more seriously, in the regimental hospitals; if still more so, in the large hospitals established by the chief medical officer of the corps; and if necessary, sent to the Government hospitals established at various places in the country. To the latter almost all the sick are transferred previous to a march. To be ill in the army, amid the constant noises of a camp, and with the non-luxurious appliances of a field hospital, is no very pleasant matter; but the sick soldier receives all the attention and accommodation possible under the circumstances.

To every corps is attached a train of ambulances, in the proportion of two or three to a regiment. They are spring wagons with seats along the sides, like an omnibus, which can, when necessary, be made to form a bed for two or three persons. With each train is a number of wagons, carrying tents, beds, medicine chests, etc., required for the establishment of hospitals. On the march, the ambulances collect the sick and exhausted who fall out from the columns and have a surgeon's certificate as to their condition. When a battle is impending, and the field of conflict fixed, the chief medical officers of the corps take possession of houses and barns in the rear, collect hay and straw for bedding, or, if more convenient, pitch the tents at proper localities. A detail of surgeons is made to give the necessary attendance. While the battle proceeds, the lightly wounded fall to the rear, and are there temporarily treated by the surgeons who have accompanied the troops to the field, and then find their way to the hospitals. If the fighting has passed beyond the places where lie the more dangerously wounded, they are brought to the rear by the 'stretcher bearers' attached to the ambulance trains, and carried to the hospitals in the ambulances. Sometimes it happens that the strife will rage for hours on nearly the same spot, and it may be night before the 'stretcher bearers' can go out and collect the wounded. But the surgeons make indefatigable exertions, often exposed to great danger, to give their attention to those who require it. At the best, war is terrible—all its 'pomp, pride, and circumstance' disappear in the view of the wounded and dead on the field, and of the mangled remnants of humanity in the hospitals. But everything that can be devised and applied to mitigate its horrors is provided under the systematized organization of the medical department. In the Army of the Potomac, at least, and undoubtedly in all the other armies of the North, that department combines skill, vigor, humanity, and efficiency to an astonishing degree. Its results are exhibited not only in the small mortality of the camps, but in the celerity of its operation on the field of battle, and the great proportion of lives preserved after the terrible wounds inflicted by deadly fragments of shell and the still more deadly rifle bullet. Military surgery has attained a degree of proficiency during the experiences of the past three years which a layman cannot adequately describe; its results are, however, palpable.

ÆNONE:

A TALE OF SLAVE LIFE IN ROME

CHAPTER VIII

Raising himself with an assumed air of careless indifference, in the hope of thereby concealing the momentary weakness into which his better feelings had so nearly betrayed him, Sergius strolled off, humming a Gallic wine song. Ænone also rose; and, struggling to stifle her emotion, confronted the new comer.

She, upon her part, stood silent and impassive, appearing to have heard or seen nothing of what had transpired, and to have no thought in her mind except the desire of fulfilling the duty which had brought her thither. But Ænone knew that the most unobservant person, upon entering, could not have failed at a glance to comprehend the whole import of the scene—and that therefore any such studied pretence of ignorance was superfluous. The attitude of the parties, the ill-disguised confusion of Sergius, her own tears, which could not be at once entirely repressed—all combined to tell a tale of recrimination, pleading, and baffled confidence, as plainly as words could have spoken it. Apart, therefore, from her disappointment at being interrupted at the very moment when her hopes had whispered that the happiness of reconciliation might be at hand, Ænone could not but feel indignant that Leta should thus calmly stand before her with that pretence of innocent unconsciousness.

'Why do you come hither? Who has demanded your presence?' Ænone cried, now, in her indignation, caring but little what or how she spoke, or what further revelations her actions might occasion, as long as so much had already been exposed.

'My lady,' rejoined the Greek, raising her eyes with a well-executed air of surprise, 'do I intrude? I came but to say that in the antechamber there is—'

'Listen!' exclaimed Ænone, interrupting her, and taking her by the hand. 'Not an hour ago you told me about your quiet home in Samos—its green vines—the blue mountains which encircled it—the little chamber where your mother died, and in which you were born—and the lover whom you left weeping at your cruel absence. You spoke of your affection for every leaf and blade of grass about the place—and how you would give your life itself to go back thither—yes, even your life, for you would be content to lie down and die, if you could first return. Do you remember?'

'Well, my lady?'

'Well, you shall return, as you desired. You have been given to me for my own; and whether or not the gift be a full and free one, I will claim my rights under it and set you free. In the first ship which sails from Ostia for any port of Greece, in that ship you may depart. Are you content, Leta?'

Still holding her by the hand, Ænone gazed inquiringly into the burning black eyes which fastened themselves upon her own, as though reading the bottom of her soul. She could not as yet believe that even if the Greek had actually begun to cherish any love for Sergius, it could be more than a passing fancy, engendered by foolish compliments or ill-judged signs of admiration, and therefore she did not doubt that the offer of freedom and restoration would be gratefully received. Her only uncertainty was with regard to the manner in which it would be listened to—whether with tears of joy or with loud protestations of gratitude upon bended knees; or whether the prospect of once again visiting that cottage home and all that had so long been held dear, would come with such unpremeditated intensity as to stifle all outward manifestations of delight, except, perhaps, that trembling of the lip or ebb and flow of color which is so often the surest sign of a full and glowing heart.

For a moment Leta stood gazing up into the face of her mistress, uttering no word of thanks, and with no tear of joy glistening in her eye, but with the deepened flush of uncontrollable emotion overspreading her features. And yet that flush seemed scarcely the token of a heart overpowered with sudden joy, but rather of a mind conscious of being involved in an unexpected dilemma, and puzzled with its inability to extricate itself.

'My mistress,' she responded at length, with lowered gaze, 'it is true that I said I would return, if possible, to that other home of mine. But now that you offer me the gift, I would not desire to accept it. Let me stay here with you.'

Ænone dropped the hand which till now she had held; and an agony of mingled surprise, suspicion, disappointment, and presentiment of evil swept across her features.

'Are you then become like all others?' she said with bitterness. 'Has the canker of this Roman life already commenced to eat into your soul, so that in future no memory of anything that is pure or good can attract you from its hollow splendors? Are thoughts of home, of freedom, of friends, even of the trusted lover of whom you spoke—are all these now of no account, when weighed against a few gilded pleasures?'

'Why, indeed, should I care to return to that home?' responded the girl. 'Have not the Roman soldiers trodden down those vines and uprooted that hearth? Is it a desolated and stricken home that I would care to see?'

'False—false!' cried Ænone, no longer regardful of her words, but only anxious to give utterance—no matter how rashly—to the suspicions which she had so long and painfully repressed. 'It is even more than the mere charms of this imperial city which entice you. It is that you are my enemy, and would stay here to sting the hand that was so truly anxious to protect you—that for your own purposes you would watch about my path, and ever, as now, play the spy upon my actions, and—'

'Nay, nay!' cried the Greek, her flashing eye and erect attitude in strong contrast with the softened tone in which, more from habit than from prudence, she had spoken. 'When have I played the spy upon you? Not now, indeed, for I have come in, not believing that I was doing harm, but simply because my duty has led me hither. I came to tell you that there is a stranger—an old man—standing in the court below, and that he craves audience with you. Is this a wrong thing for me to do? Were I to forbear performance of this duty, would not my neglect insure me punishment?'

Ænone answered not, but, by a strong effort, kept back the words that she would have uttered. Still angry and crushed with the sense of being deceived, and yet conscious that it was not a noble or dignified thing to be in disputation with her own slave, and that there was, moreover, the remote possibility that the girl was not her enemy, and might really dread returning to a desolated and devastated home, what could she say or do? And while she pondered the matter, the door again opened.

'And this is he of whom I spoke. Do you doubt me now?' exclaimed the Greek, in a tone in which a shade of malicious triumph mingled with soft reproach. And she moved away, and left the room, while Ænone, lifting her eyes, saw her father standing before her.

'A plague take the wench who has just left you!' he muttered. 'Did she not tell you that I was below? I sent word by her, and here she has left me for half an hour kicking my heels together in the courtyard. And I might have stayed there forever, if I had not of myself found my way up. Even then, there were some who would have stopped me, deeming me, perhaps, too rough in appearance to be allowed to ascend. But I told them that there was a time when members of the house of Porthenus did not wait in antechambers, but stood beside the consuls of the old republic, and I touched the hilt of my dagger; and whether it was the one argument or the other which prevailed, here I am.'

With a grim smile the centurion then threw himself down upon a settee near the door, arranged as properly as possible the folds of his coarse tunic, drew his belt round so as to show more in front his dagger with richly embossed sheath—the sole article of courtly and ceremonious attire in which he indulged—and endeavored to assume an easy and imposing attitude. For an instant he gazed around

the room, observantly taking in its wealth of mosaic pavement, paintings, statuary, and vases. Then, as he began to fear lest he might be yielding too much of his pride before the overbearing influence of so much luxury, he straightened himself up, gathered upon his features a hard and somewhat contemptuous expression, and roughly exclaimed:

'Yes, by the gods, the Portheni lived with consuls and proconsuls long before the house of Vanno began to rise from the dregs and become a house at all. And the imperator knows it, and is jealous of the fact, too, or else he would the better acknowledge it. What, now, is that?' he added, pointing to the central fresco of the ceiling.

'It is—I know not for certain, my father—but I think—'

'Nay, but I know what it is. It is the old story of the three Vanni overcoming the five Cimbri at the bridge of Athesis. No great matter, nor so very long ago, even if it were true. But why did he not paint up, instead, how the founder of the Portheni, with his single arm, slew the ten Carthaginians under the aqueduct of Megara? Is not now your family history a portion of his own? His jealousy prevented him, I suppose; though I doubt not that, when in his cups with his high associates, he often boasts of his connection with the house of Porthenus. And yet he would let the only relic of the family starve before assisting him.'

Ænone stood as in a maze of confusion and uncertainty. Were the trials of the day never to end? First her unsatisfactory strife and pleading with her husband; then the undignified contest with her own slave into which she had been betrayed; and now came this old man—her father, to be sure—but so much the more mortifying to her, as his vulgarity, querulous complaining, and insulting strictures were forced upon her ears.

'Are you not comfortable? What more can he or I do for you?' she said, with some impatience.

'Ay, ay; there it is,' growled the centurion. 'One person must have all luxuries—paintings, silver, and the like; but if the other has only mere comforts, an extra tunic, perhaps, or a spare bit of meat for a dog, what more can he want? But I will tell you what you can do? And it is not as a gift, I ask it. Poor and despised as he may be, no one can say that the centurion Porthenus is a beggar. It is as a fair matter of business that I offer it.'

'Well, my father?'

'It is this: I have two slaves, and can afford to keep only one of them, particularly as but one can be of use to me. Will the imperator purchase the other? I will give it for a fair price, and therefore no one can say that I have asked for anything beyond a proper trade, with which either side should be well satisfied.'

Ænone listened with a blush of shame for her father overspreading her face. It did not occur to her that the slave rejected as useless could be any other than the hunchback, whom her husband had bestowed upon the centurion a few days before; and for the receiver to try to sell back a gift to the giver was a depth of meanness for which no filial partiality or affection could find an excuse.

'I will show him to you,' cried the centurion, losing a little of his gruffness in his eagerness to effect a transaction, whereby, under the thin guise of a simple trade, he could extort a benefit. 'I have brought him with me, and left him below. You will see that he is of good appearance, and that the imperator will be pleased and grateful to me for the opportunity of possessing him.'

So saying, Porthenus strode to the head of the stairway, and issued his commands in a stern voice, which made the vaulted ceilings of the palace ring. A faint, weak response came up in answer, and in a moment the slave entered the room.

'Is this the one of whom you spoke?' faltered Ænone, unable for the moment to retain her self-possession as she beheld, not the angular, wiry form of the hunchback, but the careworn and slim figure of Cleotos. 'I thought—indeed I thought that you spoke of the inferior of the two.'

'Ay, and so I do,' responded her father. 'Of what use to me can this man be? The other one, indeed, is of tenfold value. There is no slave in Rome like unto him for cleaning armor or sharpening a weapon, while to run of an errand or manage any piece of business in which brains must bear their

part, I will trust him against the world. But as for this man here, with his weak limbs and his simple face—do you know that I did but set him to polish the rim of a shield, and in his awkwardness he let it fall, and spoiled the surface as though a Jewish spear had stricken it.'

Ænone remained silent, scarcely listening to the words of her father, while, in a troubled manner, she again mentally ran over, as she had done hundreds of times before, the chances of recognition by the man who stood before her.

'But listen to me still further,' continued the centurion, fearful lest his disparaging comments might defeat the projected sale. 'I only speak of him as he is useful or not to me. To another person he would be most valuable; for, though he cannot polish armor, he can polish verses, and he can write as well as though he were educated for a scribe. For one favored of fortune like the imperator Sergius Vanno,' and here again the centurion began to roll the high-sounding name upon his tongue with obvious relish, 'who wishes an attendant to carry his wine cup, or to bear his cloak after him, or to trim his lamps, and read aloud his favorite books, where could a better youth than this be found?'

Ænone, still overpowered by her troubled thoughts, made no response.

'Or to yourself,' eagerly continued the centurion, 'he would be most suitable, with his pale, handsome face, and his slender limbs. Have you a page?'

'I have my maidens,' was the answer.

'And that amounts to nothing at all,' asserted her father. 'A plebeian can have her maidens in plenty, but it is not right that the wife of a high and mighty imperator,' and here again the words rolled majestically off his tongue, 'should not also have her male attendants. And the more so when that wife has been taken from an ancient house like that of Porthenus,' he added, with a frown in derogation of any tendency to give undue importance to her present position. 'But with this Cleotos—come forward, slave, and let yourself be seen.'

Cleotos, who, partly from natural diffidence, and partly from being abashed at the unaccustomed splendor about him, had, little by little, from his first entrance, shrunk into a corner, now advanced; and Ænone, once more resolutely assuring herself that, with the changes which time, position, difference of place and costume had thrown about her, she could defy recognition, summoned all her courage, and looked him in the face. It may have been with an unacknowledged fear lest, now that she saw him so freely in the broad daylight, some latent spark of the old attachment might burst into a flame, and withdraw her heart from its proper duty; but at the first glance she felt that in this respect she had nothing to dread. In almost every particular, Cleotos had but little changed. His costume was but slightly different from that which he had always been accustomed to wear; for the centurion, in view of the chance of effecting a profitable sale, had, for that occasion, made him put on suitable and becoming attire. The face was still youthful—the eye, as of old, soft, expressive, and unhardened by the ferocities of the world about him. As Ænone looked, it seemed as though the years which had passed rolled back again, and that she was once more a girl. But it also seemed as though something else had passed away—as though she looked not upon a lover, but rather upon a quiet, kindhearted, innocent friend—one who could ever be dear to her as a brother, but as nothing else. What was it which had so flitted away that the same face could now stir up no fire of passion, but only a friendly interest? Something, she could not tell what; but she thanked the gods that it was so, and drew a long breath of relief.

But it was none the less incumbent upon her, for the sake of that present friendship and for the memory of that old regard, to cast her protection over him. For an instant the thought flashed across her that it would be well to purchase him, not simply for a page, but so that she could have him in the way of kind treatment and attention until some opportunity of restoring him to his native land might occur. But then again was the danger that, if any great length of time should meanwhile elapse, unconsidered trifles might lead to a recognition. No, that plan could not be thought of. She must keep a protecting eye upon him from a distance, and trust to the future for a safe working out of the problem.

'It cannot be,' she murmured, in answer, half to her father, half to her own suggestion.

"Tis well,' muttered the centurion, rising with an air of displeasure which indicated that he thought it very ill. 'I supposed that it would be a kindness to the imperator or to yourself to give the first offer of the man. But it matters little. The captain Polidorus will take him any moment at a fair price.'

'You will not send him to the captain Polidorus?' exclaimed Ænone in affright. For at once the many atrocities of that man toward his slaves rose in her mind—how that he had slain one in a moment of passion—how that he had deliberately beaten another to death for attempting to escape to the catacombs—how that stripes and torture were the daily portion of the unfortunates in his power—and that, not by reason of any gross neglect of their duty, but for the merest and most trifling inadvertencies. Better death than such a fate.

'Pah! What can I do?' retorted Porthenus, skilfully touching the chord of her sympathies, as he saw how sensitive she was to its vibrations. 'It is true that Polidorus is no fawning woman, and that he greets his slaves with the rod and the brand, and what not. It is true that he thinks but little of sending one of them to Hades through the avenue of his fishponds. But that, after all, is his affair, and if he chooses to destroy his property, what should it matter to me? Am I so rich that I can afford to lose a fair purchaser because he may incline to hang or drown his bargain? Such self-denial may suit the governor of a province, but should not be expected of a poor centurion.'

Ænone trembled, and again the impulse to make the purchase came upon her. Better to risk anything for herself—recognition, discovery, suspicion, or misconstruction, than that her friendship should so far fail as to allow this poor captive to fall into the hands of a brutish tyrant. There was a purse of gold in the half-opened drawer of a table which stood near her; and, in sore perplexity, she raised it, then let it fall, and again lifted it. As the centurion listened to the ring of the metal, his eyes sparkled, and he prepared to apply new arguments, when Cleotos himself sprang forward.

'I know nothing about this Polidorus of whom they speak,' said he, dropping upon one knee at her feet. 'And it is not to save myself from his hands that I ask your pity, most noble lady. There is much that I have already suffered, and perhaps a little more might make no difference, or, better yet, might close the scene with me forever. It is for other reasons that I would wish to be in this house—even as the lowest, meanest slave of all, rather than to live in the halls of the emperor Titus himself. There is one in this house, most noble lady, from whom I have long been cruelly separated, and who—what can I say but that if, when I was a free man, she gave me her love, now, in my abasement, she will not fail with that love to brighten my lot?'

Ænone started. At hearing such words, there could be but one thought in her mind—that he had actually recognized her, and that, without waiting to see whether or not she had forgotten him, and certainly knowing that in any event her position toward him had become changed, he was daring to covertly suggest a renewal of their old relationship. But the next words reassured her.

'We lived near each other in Samos, my lady. I was happy, and I blessed the fates for smiling upon us. How was I then to know that she would be torn away from me upon the very day when I was to have led her to my own home?'

'You say that she is here? Is it—do you speak of Leta?' cried Ænone.

'Leta was her name,' he responded, in some surprise that his secret had been so promptly penetrated before he had more than half unfolded it. 'And she is here.'

There was to Ænone perhaps one instant of almost unconscious regret at learning that she had been forgotten for another. But it passed away like a fleeting cloud—banished from her mind by the full blaze of happiness which poured in upon her at the thought that here at last was what would counteract the cruel schemes which were warring against her peace, and would thereby bring sure relief to her sorrow.

'And she is here,' repeated Cleotos. 'When at the first she was torn from my side, most noble lady, I would have died, if I could, for I did not believe that life had any further blessing in store for

me. But, though the Roman armies were cruel, the fates have been kind, and have again brought us near. It was but a week ago that, as I looked up by the moonlight at these palace walls, I saw her. Can it be, that after so long a time, the gods meant I should be brought near, to have but this one glimpse of happiness, and then again be sundered from it?'

'It cannot be—it was not meant to be,' exclaimed Ænone, with energy; and again lifting the purse of gold, she placed it in the centurion's hand. 'There, I will purchase your slave,' she said. 'Take from this his proper price, and leave him with me.'

CHAPTER IX

The centurion received the purse with ill-dissembled joy. Had he been fully able to control himself, he would doubtless have maintained a quiet air of dignified self-possession, befitting one giving full value for what he had received, and therefore not expected to exhibit any peculiarly marked or lively satisfaction. But the affair had been concluded so suddenly, and with such a liberal confidence in his discretion, that, for the moment, his hands trembled with excitement, and his face shone with avaricious pleasure.

Then he began to count out the gold pieces, gleefully dropping some into his pouch, and reluctantly putting others back into the purse. From the first he had established in his own mind the valuation which he would place upon the slave; and he had taken care to make his calculation upon such a liberal scale that he could well afford to consent to a large deduction, if it were required of him. Now he reasoned that, as his child had merely told him to take out what was proper, there could be no impropriety in paying himself at the highest possible price. She would never mind, and there were many comforts which he needed, and which an extra gold piece or two would enable him to procure for himself.

Then, as he weighed the purse and pondered over it, numerous wants and requirements, which he had hardly known until that time, came into his mind. He might supply them all, if he were not too timid or scrupulous in availing himself of an opportunity such as might never come to him again. Had even his first valuation of the slave been a sufficient one? He ought certainly to consider that the man could read and write, and was of such beauty and grace that he could be trained to a most courtly air; and it was hardly proper to sell him for no more than the price of a couple of gladiators, mere creatures of bone and brawn. And, in any event, it was hardly probable that Ænone knew the true value of slaves, or even remembered how much her purse had contained.

Thus meanly reflecting, the centurion dropped more of the gold pieces into his pocket, all the while eying the slave with keen scrutiny, as though calculating the market value of every hair upon his head. Then, with a sigh, he handed back the purse, most wofully lightened of its contents, and turned from the room, endeavoring to compose his features into a decent appearance of sober indifference, and muttering that he would not have allowed himself to be betrayed into giving up such a prize so cheaply had it not been that he had an especial regard for the imperator Sergius Vanno, and that the house of Porthenus had never nourished mere traders to wrangle and chaffer over their property.

In one of his conjectures he had been correct. It was little that Ænone knew or cared about the price she was paying. Had the purse been returned to her entirely empty, she would have thrown it unheedingly into the drawer, and have never dreamed but that all had been rightly done. There was now but one idea filling her heart. She thought not about money nor any imprudence which she was committing, nor yet upon the chance of recognition. She only reflected that the day of her triumph had come—that at the sight of the long-absent lover, Leta would abandon the wrong path in which she had been straying, would throw herself into his arms, would tell him how, through the loss of him, she had become reckless, and had allowed her suffering mind to become perverted from the right—but that now all was again well; and thus confessing and being forgiven, would, in the ever-

present joy of that forgiveness, lead for the future a different life, and, instead of a rival, become to her mistress a friend and ally.

Glowing with this bright hope, Ænone scarcely noticed the shuffling departure of the centurion, but, fixing her eyes upon the captive, keenly scrutinized his appearance. Not that it was likely that Leta, in the first flush of her joy at meeting him, would notice or care in what guise he was presented, so long as the soul which had so often responded to her own was there. But it was well that there should be nothing neglected which, without being directly essential to the production of a proper impression, might be tributary to it.

The inspection was satisfactory. Not only was the dress of the captive clean, neat, becoming, and suitable to his station, but his appearance had undergone visible improvement since Ænone had last seen him. The rest and partial composure of even the few intervening days had sufficed to restore tone to his complexion, roundness to his cheeks, and something of the old merry smile to his eyes. And though complete restoration was not yet effected, enough had been accomplished to show that there was much latent beauty which would not fail to develop itself under the stimulant of additional rest and kindly treatment.

'Go in, thither,' said Ænone, pointing to the adjoining room, in which Leta was occupied. 'When you are there, you will—it will be told you what you are to do.'

Cleotos bowed low, and passed through into the other room; and Ænone followed him with a glance which betrayed the longing she felt to enter with him and witness the meeting of the two lovers. But a sense of propriety outweighed her curiosity and restrained her. It was not right, indeed, that she should intrude. Such recognitions should be sacred to the persons directly interested in them. She would therefore remain outside, and there await Cleotos's return. And as she took into her hands a little parchment ode which lay upon her table, and nervously endeavored to interest herself in it, she delightedly pictured the sudden transport of those within the next room, and the beaming joy with which, hand in hand, they would finally emerge to thank her for their newly gained happiness.

In the mean time, Leta, having delivered her message, and received her rebuke for the interruption, had retired to the other room, and there, as usual, resumed her daily task of embroidery. Bending low over the intricate stitches and counting their spaces, her features, at a casual glance, still bore their impress of meek and unconscious humility, so far did her accustomed self-control seem to accompany her even when alone. But a more attentive scrutiny would have detected, half hidden beneath the fringed eyelids, a sparkle of gratified triumph, and, in the slightly bent corners of the mouth, a shade of haughty disdain; and little by little, as the moments progressed, these indications of an inner, irrepressible nature gained in intensity, and, as though her fingers were stayed by a tumult of thought, her work slowly began to slip from her grasp.

At length, lifting her head, and, perhaps, for the first time realizing that she was alone and might indulge her impulses without restraint, she abruptly threw from her the folds of the embroidery, and stood erect. Why should she longer trifle with that weak affair of velvet and dyes? Who was the poor, inanimate, and tearful statue in the next room, to order her to complete those tasks? What to herself were the past deeds of the Vanni, that they should be perpetuated in ill-fashioned tapestry, to be hung around a gilded banquet hall? By the gods! she would from that day make a new history in the family life; and it should be recorded, not with silken threads upon embroidered velvet, but should be engraved deeply and ineffaceably upon human hearts!

Standing motionless in the centre of the room, with one foot upon the half-completed tapestry, she now for the first time, and in a flash of inspiration, gave shape and comeliness to her previously confusedly arranged ideas. Until the present moment she had had but little thought of accomplishing anything beyond skilfully availing herself of her natural attractions so as to climb from her menial position into something a little better and higher. If, in the struggle to raise herself from the degradation of slavery, she were obliged to engage in a rivalry with her mistress, and, by robbing her of the affection naturally belonging to her, were to crush her to the earth, it was a thing to be

deplored, but it must none the less be done. She might, perhaps, pity the victim, but the sacrifice must be accomplished all the same.

But now these vague dreams of a somewhat better lot, to be determined by future chance circumstances, rolled away like a shapeless cloud, and left in their place one bright image as the settled object of her ambition. So lofty, so dazzling seemed the prize, that another person would have shrunk in dismay from even the thought of striving for it, and even she, for the moment, recoiled. But she was of too determined a nature to falter long. The higher the object to be attained the fewer would be the competitors, and the greater the chance of success to unwearying determination. And if there were but one chance of success in a thousand, it were still worth the struggle.

This great thought which stimulated her ambition was nothing less than the resolution to become the wife of the imperator Sergius. At first it startled her with its apparent wild extravagance; but little by little, as she weighed the chances, it seemed to become more practicable. There was, indeed, nothing grossly impossible in the idea. Men of high rank had ere now married their slaves, and the corrupted society of Rome had winked at mesalliances which, in the days of the republic, would not have been tolerated. And she was merely a slave from accidental circumstances—being free born, and having, but a month before, been the pride and ornament of a respectable though lowly family. Once let her liberty be restored, and the scarcely perceptible taint of a few weeks' serfdom be removed from her, and she would be, in all social respects, fully the equal of the poor, trembling maid of Ostia, to whom, a few years before, the patrician had not been ashamed to stoop.

This bar of social inequality thus removed, the rest might be in her own hands. Sergius no longer felt for his wife the old affection, under the impulse of which he had wedded her; and the few poor remains of the love which he still cherished, more from habit than otherwise, were fast disappearing. This was already so evident as to have become the common gossip of even the lowliest slaves in the household. And he loved herself instead, for not only his actions, but his words had told her so. A little more craft and plotting, therefore—a little further display of innocent and lowly meekness and timid obedience—a few more well-considered efforts to widen the conjugal breach—a week or two more persistent exercise of those fascinations which men were so feeble to resist—jealousy, recrimination, quarrels, and a divorce—and the whole thing might be accomplished. In those days of laxity, divorce was an easy matter. In this case there was no family influence upon the part of the wife to be set up in opposition—but merely an old centurion, ignorant and powerless. A few writings, for form's sake—and the day that sent the weeping wife from the door might install the manumitted and triumphant slave in her place.

All aglow with the ravishing prospect—her eager hopes converting the possible into the probable, and again, by a rapid change, the probable into the certain, the Greek stood spurning the needle work at her feet. Then glancing around, the whim seized upon her to assume, for a moment in advance, her coming stately dignity. At the side of the room, upon a slightly elevated platform, was a crimson lounge—Ænone's especial and proper seat. Over one arm of this lounge hung, in loose folds, a robe of purple velvet, with an embroidered fringe of pearls—a kind of cloak of state, usually worn by her upon the reception of ceremonious visits. To this lounge Leta strode, threw herself upon it, drew the velvet garment over her shoulders, so that the long folds fell down gracefully and swept the marble pavement at her feet, and there, half sitting, half reclining, assumed an attitude of courtly dignity, as though mistress of the palace.

And it must be confessed that she well suited the place. With her lithe, graceful figure thrown into a position in which the gentle languor of unembarrassed leisure was mingled with the dignity of queenly state—with her burning eyes so tempered in their brilliancy that they seemed ready at the same instant to bid defiance to impertinent intrusion, and to bestow gracious condescension upon suppliant timidity—with every feature glowing with that proper pride which is not arrogance, and that proper kindliness which is not humility—there was probably in all Rome no noble matron who could as well adorn her chair of ceremony. Beside her, the true mistress of the place would have appeared

as a timid child dismayed with unaccustomed honors; and in comparison, the empress herself might not fill her throne in the palace of the Cæsars with half the grace and dignity.

Then, as she there sat, momentarily altering her attitude to correspond the better with her ideas of proper bearing, and gathering into newer and more pleasing folds the sweeping breadths of the velvet mantle, the door was slowly swung open, and there glided noiselessly in, clad in its neat and coarse tunic, the timid figure of her old lover Cleotos.

For an instant they remained gazing at each other as though paralyzed. Cleotos—who had looked to see her in her simple white vestment as of old, and had expected at her first glance to rush to her arms, and there be allowed to pour forth his joy at again meeting her, never more to part—beheld with dismay this gorgeously arrayed and queenly figure. This could not be the Leta whom he had known, or, if so, how changed! Was this the customary attire of slaves in high-placed families? Or could it be the token of a guilty favoritism? His heart sank within him; and he stood nervously clinging against the door behind him, fearing to advance, lest, at the first step, some terrible truth, of which he had already seemed to feel the premonitions, might burst upon him.

And she, for the moment, sat aghast, not knowing but that the gods, to punish her pride and ambition, had sent a spectre to confront her. But being of strong mind and but little given to superstitious terrors, she instantly reasoned out the facts of his simultaneous captivity with herself and coincidence of ownership; and her sole remaining doubt was in what manner she should treat him. They had parted in sorrow and tears, and she knew that he now expected her to fall into his arms and there repeat her former vows of constancy and love. But that could not be. Had he come to her but an hour before, while her dreams of the future were of a vague and unsatisfactory character, she might have acted upon such an impulse. But now, a glorious vision of what might possibly happen had kindled her ambition with brighter fires than ever before; and could she surrender all that, and think again only upon starving freedom in a cottage home?

'Is it thou, Cleotos? Welcome to Rome!' she said at length, throwing from her shoulder the purple cloak, and approaching him. As she spoke, she held out her hand. He took it in his own, in a lifeless and mechanical sort of way, and gazed into her face with a strange look of inquiring doubt, which momentarily settled into an expression of deeper apprehension. The blackness of despair began to enter into his soul. Now that she was divested of her borrowed richness, she looked more like herself, and that was surely her voice uttering tones of greeting; but somehow her heart did not seem to be in them, and, for a certainty, this had not been her wonted style of welcome.

'I thought,' she continued, 'that thou wert slain. Certainly when I parted from you ere you fled into the mountains—'

'You know that I fled not at all,' he interrupted, the color mounting into his temples. 'Why do you speak so, Leta? I retired to the mountains to meet my friends there and with them carry on the defence; and, previous thereto, I conducted you to what I believed to be a place of safety. And I fought my best against the foe, and was brought nigh unto death. This I did, though I can boast of but a weak and slender frame. And it is hard that the first greeting of one so well loved as you should be a taunt.'

'Nay, forgive me,' she said. 'I doubt not your valor. It was but in forgetfulness that I spoke. I meant it not for a taunt.' And in truth she had not so meant it. It was but the inadvertent expression of a feeling which the sight of his feeble and boyish figure unwittingly made upon her—an incapacity to connect deeds of valor with apparent physical weakness. But this very inability to judge of his true nature by the soul that strove to look into her own rather than by material impressions was perhaps no slight proof of the little unison between her nature and his.

'Sit down here,' she continued, 'and tell me all that has happened to you.' And they sat together, and he briefly told her of his warlike adventures, his wound, his captivity, his recognition of herself, and his successful attempt to be once more under the same roof with her. And somehow it still seemed to him that their talk was not as of old, and that her sympathy with his misfortunes was but weak and cheerless; and though he tried to interweave the customary words of endearment with his story,

there was a kind of inner check upon him, so that they came not readily to his lips as of old. And she sat, trying to listen, and indeed keeping the thread of his adventures in her mind; but all the while finding her attention fail as she speculated how she could best give that explanation of her feelings which she knew would soon be demanded of her.

'And here I am at last, Leta—as yourself, a slave!' he concluded.

'Courage, my friend!' was her answer. 'There are very many degrees and fates reserved for all in this old Rome, and much for every man to learn. And many a one who has begun as a slave has, in the end, attained not only to freedom, but to high honor and station.'

'If the gods were to give me honor and station, far be it from me to refuse the gift,' he said. 'But that, of itself alone, would not content me, unless you were there to share the good with me. And with yourself I would crave no other blessing. We are slaves here, Leta, but even that fate may have its mitigations and happiness for us.'

She was silent. How could she tell it to him? But his suspicions, at first vague, were now aroused by her very silence into more certainty.

'Tell me,' he cried, again taking her hand, 'tell me my fate; and if sorrow is to come upon me, let it come now. It seems as though there were indeed evil tidings in store for me. The blight of anticipated evil even weighed upon me ere I passed yonder hall, and when I knew no reason why I should not find you loving of heart and humble of desire as in other days. Is it all gone? Are you no longer the same? This tawdry velvet in which I found you arrayed—is it the type of a something equally foreign to your nature, and which imperial Rome has thrown about you to aid in crushing out the better feelings of your heart?'

'My friend, my brother,' she said at length, with some real pity and some false sorrow, 'why have we again met? Why is it now forced upon me to tell you that the past must always be the past with us?'

He dropped her hand, and the tears started into his eyes. Much as the words and gestures of the last few minutes had prepared him for the announcement, yet when it came, it smote him as though there had been no premonition of it; so lovingly had his heart persisted in clinging to the faint hope that he might have been mistaken. A low wail of anguish burst from his lips.

'And this is the end of all?' he sobbed.

'Think only,' she said, 'think only that I am not worthy of you.'

'The old story—the old story which has been repeated from the beginning of the world,' he cried, stung into life by something of heartlessness which he detected in her affected sympathy. 'The woman weaves her toils about the man—gilds his life until there is no brightness which can compare with it—fills his heart with high hopes of a blissful future—so changes his soul that he can cherish no thought but of her—so alters the whole tenor and purpose of his existence that he even welcomes slavery as a precious boon because it brings him under the same roof with her. And then—some other fancy having crossed her mind—or an absence of a week or two having produced forgetfulness—she insults him with a cruel mockery of self-unworthiness as her sole apology for perfidy.'

'Nay,' she exclaimed, half glad of an excuse to quarrel with him. 'If you would rather have it otherwise, think, then, that I have never loved you as I should, even though I may have imagined that I did.'

'Go on,' he said, seeing that she hesitated.

'I know,' she continued, 'that in other days you have had my words for it, uttered, indeed, in sympathy and truth, as I then felt them. But I was a simple girl, then, Cleotos. The sea before me and the mountains behind bounded all my knowledge of the world. The people whom I saw were but few. The tastes I had were simple. Is it wonderful that I should have listened to the first one who spoke to me of love, and should have imagined that my heart made response to him? But now, now, Cleotos—'

'Now, what?' he exclaimed. 'Would you say that now you have seen the world better and think differently? What is there in all that you have since known that should change you? Is it that the sight of war and tumult—of burning towns and bleeding captives—of insolent soldiers and cruel taskmasters

can have made you less in favor with our own native, vine-covered retreat, with its neighborhood of simple peasantry? Or would you say that since then you have met others whom you can love better than me? Whom, indeed, have you seen but weary prisoners like myself, or else unpitying conquerors whose love would be your shame? You blush, Leta! Pray the gods that it be not the latter! Struggle sternly with yourself to realize that you are merely for the moment fascinated by the unaccustomed splendors of this swarming city; and that after its first brightness has worn off from your dazzled eyes, your soul may return to its native, pure simplicity and innocence, and—and to me.'

'Speak not so, Cleotos,' she responded. 'My eyes are not dazzled with any splendors; but for all that, our ways now and forever lie in different directions. We are slaves, and can give little heed to our affections. Our only course must be for each to strive to rise above this serfdom; and if, in doing so, either can help the other, it must be done—but in friendship, not in love. To you, through good conduct, there may open, even in slavery, many posts of influence and profit; and, in so much, of better worth than our own boasted liberty with poverty. And as for me—I see my destiny already beckoning me to a position such as many a free Roman woman might envy.'

Speaking thus obscurely of her anticipated grandeur—to be gained, perhaps, by abasement, but none the less in her mind certain to end in such legitimate position as might sanctify the previous steps thereto—her face again lit up with a glow of pride, as though she were already the powerful patrician's wife. And revelling in such dreams, she saw not the agony which overspread her listener's face as he read her thoughts partly awrong, and believed her content to throw herself away forever, in order to gain some temporary exaltation as a wealthy Roman's plaything.

'And when that day does come,' she continued, 'if, for the memory of our old friendship, I can help to elevate you to some better sphere—'

'Enough! No more!' he cried bitterly; and starting from her, he fled out of the room. It were hard enough that he should lose her, harder yet that he should hear her marking out for herself a life of ruin for some temporary gain, but harder than all, that she should dare to mistake his nature so far as to insult him with the promise of aiding his prosperity through such an influence.

'Let me go hence!' he cried, in his agony, to Ænone, who, still radiant with her newly discovered hope, met him at the door. 'Send me to the captain Polidorus—anywhere—only let me leave this house!'

AMERICAN SLAVERY AND FINANCES

By Hon. Robert J. Walker

[The following article, from the pen of Hon. R. J. Walker, forms the Appendix to the volume just published in England, and now exciting great attention there, containing the various pamphlets issued by him during the last six months. The subjects discussed embrace Jefferson Davis and Repudiation, Recognition, Slavery, Finances and Resources of the United States. It would be difficult to overestimate the effect of these Letters abroad. As our readers already possess them in the pages of The Continental, we enable them to complete the series by furnishing the ensuing Appendix. It closes with an extract from an 'Introductory Address' delivered by Mr. Walker before the National Institute, at Washington, D. C., giving a short account of the various improvements and discoveries made by our countrymen in the Inductive Sciences. As showing to England what a high rank we had even then taken in the world of science, and pointing out to her the number and fame of our savants, it will be read with just pride and interest. As the Address was delivered in 1844, it of course contains no details of our marvellous progress since that date in science and discovery.—Ed. Continental.]

We have seen by the Census Tables, if the product *per capita* of the Slave States in 1859 had been equal to that of the Free States for that year, that the ADDITIONAL value produced in 1859 in the Slave States would have been $1,531,631,000. Now as our population augmented during that decade 35.59 per cent., this *increased* value, at that ratio, in 1869 would have been $2,052,332,272. If multiplying the amount *each year* by three only, instead of 3-559/1000 the result, during that decade, would have been as follows:

Product of	1860,	$1,559,039,962
"	1861,	1,605,811,060
"	1862,	1,654,085,391
"	1863,	1,703,707,952
"	1864,	1,754,819,198
"	1865,	1,807,464,773
"	1866,	1,861,688,716
"	1867,	1,917,539,377
"	1868,	1,975,065,558
"	1869,	2,034,317,524
Total augmented product of the decade		$17,873,539,511

That is, the total *increased* product of the Slave States, during the decade from 1859 to 1869, would have been $17,873,539,511, if the production in the Slave States had been equal, *per capita*, to that of the Free States. This, it will be remembered, is gross product. This, it will be perceived, is far below the actual result, as we can see by comparing the real product of 1869, $2,052,332,272, as before given, with the $2,034,317,524, as the result of a multiplication by three each year.

The ratio of the increase of our *wealth*, from 1850 to 1860, as shown by the census, was much greater than that of our population—namely, 126.45 per cent. Multiplying by this ratio (126.45), the result would be an *additional* product in 1860, in the Slave States, of $3,427,619,475. But our wealth increases in an augmented ratio during each decade.

Thus, the ratio of the increase of our wealth, as shown by the census, was as follows:

From	1820 to 1830,	41 per cent.
From	1830 to 1840,	42 per cent.
From	1840 to 1850,	64 per cent.
From	1850 to 1860,	126.45 per cent.

Thus, the increase of our wealth from 1840 to 1850, was more than 50 per cent. greater than from 1830 to 1840; and from 1850 to 1860, nearly double that from 1840 to 1850. At the same duplicate ratio, from 1850 to 1870, the result would be over 250 per cent. That such would have been a close approximation to the true result, is rendered still more probable by the fact, that the product of 1859, as shown by the census, was 250 per cent. greater than that of 1849.

If, then, instead of 126.45 per cent., we were to assume 250 per cent. as the ratio, the result would be in 1869, $5,297,708,612, as the *increased* product of the Slave States that year, if the ratio *per capita* were equal to that of the Free States. If we carry out these ratios from 1859 to 1869, either of 126.45, or of 250, into the aggregate of the decade, the results are startling. Assuming, however, that of the population only, we have seen that the aggregate result in the decade from 1859 to 1869 was over seventeen billions of dollars, or largely more than ten times our debt incurred by this rebellion.

When, then, I reassert the opinion, heretofore expressed by me, that as the result of the superiority of free over slave labor, our wealth in 1870, and especially in each succeeding decade, as a consequence of the entire abolition of Slavery in the United States, will be far greater, notwithstanding the debt, than if the rebellion had never occurred, there is here presented conclusive official proof of the truth of this statement. We have seen that our wealth increased from 1850 to 1860, 126.45 per cent., whilst that of England, from 1851 to 1861, augmented only at the rate of 37 per cent.

Applying these several ratios to the progress of the wealth of the United Kingdom and the United States, respectively, in 1870, 1880, 1890, and 1900, the result is given below.

We have seen by the census, that our national wealth was, in

1850,	$7,135,780,228
1860,	16,159,616,068

Increase from 1850 to 1860, 126.45 per cent.

England, from 1851 to 1861, 37 per cent.

Assuming these ratios, the result would be as follows:

UNITED KINGDOM.

1861,	wealth,	$31,500,000,000
1871,	"	48,155,000,000
1881,	"	59,122,350,000
1891,	"	80,997,619,500
1901,	"	110,966,837,715

UNITED STATES.

1860,	wealth,	$16,159,616,068
1870,	"	36,593,450,585
1880,	"	82,865,868,849
1890,	"	187,314,353,225
1900,	"	423,330,438,288

Thus, it appears by the census of each nation, that, each increasing in the same ratio respectively as for the last decade, the wealth of the United States in 1880 would exceed that of the United Kingdom $23,743,518,849; that in 1890 it would be much more than double, and in 1900, approaching quadruple that of the United Kingdom.

When we reflect that England increases in wealth much more rapidly than any other country of Europe, the value of these statistics may be estimated, as proving how readily our national debt can be extinguished without oppressive taxation.

These are the results, founded on the actual statistics, without estimating the enormous increase of our national wealth, arising from the abolition of Slavery. We have seen that, by the official tables of the census of 1860, the value of the *products* of the United States, so far as given, for the year 1859, was $5,290,000,000. But this is very short of the actual result. The official report (pages 59, 190, 198 to 210) shows that this included *only* the products of 'agriculture, manufactures, mines, and fisheries.' In referring to the result as to '*manufactures*,' at page 59 of his official report before given, the Superintendent says: 'If to this amount were added the very large aggregate of mechanical productions below the annual value of $500, of which no official cognizance is taken, the result would be one of *startling magnitude*.'

1. This omission alone, for gross product, is estimated at $500,000,000.

2. Milk and eggs, fodder, wood, poultry, and feathers, omitted, gross products, estimated at $350,000,000.

3. Gross earnings of trade and commerce, including freights, &c., by land and water, $1,000,000,000.

4. Gross earnings of all other pursuits and business, including all other omissions, $1,000,000,000.

Total gross products of 1860, as thus estimated, $8,140,000,000, of which the amount for the Free States, as estimated, is $6,558,334,000, and for the Slave States, $1,581,666,000.

I have heretofore referred to the vast influence of *education* as one of the principal causes of the greater product *per capita* in the Free than in the Slave States, of the much larger number of patents, of inventions, and discoveries, in the former than in the latter.

At the April meeting of 1844, upon the request of the Society, I delivered at Washington (D. C.) the Introductory Address for the National Institute, in which, up to that date, an account was given by me of 'the various improvements and discoveries made by our countrymen in the inductive sciences.' On reference to that address, which was published at its date (April, 1844), with their *bulletin*, it will be seen that, from the great Franklin down to Kinnersley, Fitch, Rumsey, Fulton, Evans, Rush, the Stevenses of New Jersey, Whitney, Godfrey, Rittenhouse, Silliman, J. Q. Adams, Cleveland, Adrain, Bowditch, Hare, Bache, Henry, Pierce, Espy, Patterson, Nulty, Morse, Walker, Loomis, Rogers, Saxton, and many others; these men, with scarcely an exception, were from the Free States.

EXTRACT

And, first, of electricity. This has been cultivated with the greatest success in our country, from the time when Franklin with his kite drew down electricity from the thunder cloud, to that when Henry showed the electrical currents produced by the distant lightning discharge. In Franklin's day the idea prevailed that there were two kinds of electricity, one produced by rubbing vitreous substances, the other by the friction of resinous bodies. Franklin's theory of one electric fluid in all bodies, disturbed in its equilibrium by friction, and thus accumulating in one and deserting the other, maintains its ground, still capable of explaining the facts elicited in the progress of modern discovery. Franklin believed that electricity and lightning were the same, and proceeded to the proof. He made the perilous experiment, by exploring the air with a kite, and drawing down from the thunder cloud the lightning's discharge upon his own person. The bold philosopher received unharmed the shock of the electric fluid, more fortunate than others who have fallen victims to less daring experiments. The world was delighted with the discoveries of the great American, and for a time electricity was called Franklinism on the continent of Europe; but Franklin was born here, and the name was not adopted in England. While Franklin made experiments, Kinnersley exhibited and illustrated them, and also rediscovered the seemingly opposite electricities of glass and resin. Franklin's lightning rod is gradually surmounting the many difficulties with which it contended, as experience attests the greater safety of houses protected by the rod, properly mounted, whilst the British attempt to substitute balls for points has failed. This question, as to powder magazines, has lately excited much controversy. Should a rod be attached to the magazine, or should it be placed upon a post at some distance? This question has been solved by Henry. When an electrical discharge passes from one body to another, the electricity in all the bodies in the neighborhood is affected. Henry magnetized a needle in a long conductor, by the discharge from a cloud, more than a mile from the conductor. If a discharge passes down a rod, attached to a powder house, may it not cause a spark to pass from one receptacle for powder to another, and thus inflame the whole? The electrical plenum, which Henry supposed, is no doubt disturbed, and to great distances; but the effect diminishes with the distance. If all the principal conductors about a building can be connected with a lightning rod, there is no danger of a discharge; for it is only in leaving or entering a conductor that electricity produces heating effects; but if not, the rod is safer at a moderate distance from the building. The rate at which electricity moved was another of the experiments of Franklin. A wire was led over a great extent of ground, and a discharge passed through it. No interval could be perceived between the time of the spark passing to and from the wire at the two ends. Not long since, Wheatston of England, aided by our own great mechanic, Saxton, solved the problem. This has induced Arago, of France, to propose to test the rival theories of light, by similar means—to measure thus a velocity, to detect which has heretofore required a motion over the line of the diameter of the earth's orbit.

In galvanism, our countrymen have made many important discoveries. Dr. Hare invented instruments of such great power as well to deserve the names of calorimeter and deflagrator. The most refractory substances yielded to the action of the deflagrator, melting like wax before a common fire. Even charcoal was supposed to be fused in the experiments of Hare and Silliman, and the visionary speculated on the possibility of black as well as white diamonds. Draper, by his most ingenious galvanic battery, of two metals and two liquids, with one set of elements, in a glass tube not the size of the little finger, was able to decompose water. Faraday, of England, discovered the principle, that when a current of electricity is set in motion, or stopped in a conductor, a neighboring conductor has a current produced in the opposite direction. Henry proved that this principle might be made available to produce an action of a current upon itself, by forming a conductor in the whirls of a spiral, so that sparks and shocks might be obtained by the use of such spirals, when connected with a pair of galvanic plates, a current from which could give no sparks and no shocks. Henry's discoveries

of the effects of a current in producing several alternations in currents in neighboring conductors—the change of the quality of electricity which gives shocks to the muscles into that producing heat, and *vice versa*—his mode of graduating these shocks—his theoretical investigations into the causes of these alternations—are abstruse, but admirable; and his papers have been republished throughout Europe. The heating effects of a galvanic current have been applied by Dr. Hare to blasting. The accidents which so often happen in quarries may be avoided by firing the charge from a distance, as the current which heats the wire, passing through the charge, may be conveyed, without perceptible diminution, through long distances. A feeble attempt to attribute this important invention of Dr. Hare to Colonel Pasley, an English engineer, has been abandoned. This is the marvellous agent by which our eminent countryman, Morse, encouraged by an appropriation made by Congress, will, by means of his electric telegraph, soon communicate information forty miles, from Washington to Baltimore, more rapidly than by whispering in the ear of a friend sitting near us. A telegraph on a new plan at that time, invented by Mr. Grout, of Massachusetts, in 1799, asked a question and received an answer in less than ten minutes through a distance of ninety miles. The telegraph of Mr. Morse will prove, I think, superior to all others; and the day is not distant when, by its aid, we may perhaps ask questions and receive replies across our continent, from *ocean to ocean*, thus uniting with steam in enlarging the limits over which our Republic may be safely extended.[2]

Many of our countrymen have contributed to the branch which regards the action of electrified and magnetic bodies. Lukens's application of magnetism to steel (called *touching*), the compass of Bissel for detecting local attraction, of Burt for determining the variation of the compass, and the observations on the variations of the needle made by Winthrop and Dewitt, deserve notice and commendation. Not long since, Gauss, of Germany, invented instruments by which the changes of magnetic variation and force could be accurately determined. Magnetic action is ever varying. The needle does not point in the same direction for even a few minutes together. The force of magnetism, also, perpetually varies. 'True as the needle to the pole' is not a correct simile for the same place, and, if we pass from one spot to another, is falsified at each change of our position; for the needle changes its direction, and the force varies. Enlarged and united observations, embracing the various portions of the world, must produce important results. The observations at Philadelphia, conducted by Dr. A. D. Bache, and now continued by him under the direction of the Topographical Bureau, are of great value, and will, it is hoped, be published by Congress. Part of them have already first seen the light in Europe—a result much to be regretted, for we are not strong enough in science to spare from the national records the contributions of our countrymen.

These combined observations, progressing throughout the world, are of the highest importance. The University of Cambridge, the American Philosophical Society, and Girard College have erected observatories; and one connected with the Depot of Charts and Instruments has been built in this city last year by the Government, and thoroughly furnished with instruments for complete observations. The names of Bache, Gillis, Pierce, Lovering, and Bond are well known in connection with these establishments.

A magnetic survey of Pennsylvania has been made by private enterprise, and the beginning of a survey in New York. Loomis has observed in Ohio, Locke in Ohio and Iowa, and to him belongs the discovery of the position of the point of greatest magnetic intensity in the Western World. Most interesting magnetic observations (now in progress of publication by Congress) are the result of the toilsome, perilous, and successful expedition, under Commander Wilkes, of our navy, by whom was discovered the Antarctic continent, and a portion of its soil and rock brought home to our country.

The analogy of the auroral displays with those of electricity in motion, was first pointed out by Dr. A. D. Bache, whose researches, in conjunction with Lloyd of Dublin, to determine whether

[2] This address was made and published several months before any electric telegraph line was in operation, and is believed to be the first prediction of the success of this principle, as Continental or Oceanic.

differences of longitude could be measured by the observations of small simultaneous changes in the position of the magnetic needle, led to the knowledge of the curious fact, that these changes, which had been traced as simultaneous, or nearly so, in the continent of Europe, did not so extend across the Atlantic.

Kindred to these two branches are electro-magnetism and magneto-electricity, connected with which, as discoverers, are our countrymen Dana, Green, Hare, Henry, Page, Rogers, and Saxton. The reciprocal machine for producing shocks, invented by Page, and the powerful galvanic magnet of Henry, are entitled to respectful notice. This force, it was thought, might be substituted for steam; but no experiments have as yet established its use, on any important scale, as a motive power. The fact that an electrical spark could be produced by a peculiar arrangement of a coil of wire, connected with a magnet, is a recent discovery; and the first magneto-electric machine capable of keeping up a continuous current was invented by Saxton.

Electricity and magnetism touch in some points upon heat. Heat produces electrical currents; electrical currents produce heat. Heat destroys magnetism. Melted iron is incapable of magnetic influence. Reduction of temperature in iron so far decreases the force, that a celebrated philosopher made an elaborate series of experiments to ascertain whether a great reduction of temperature might not develop magnetic properties in metals other than iron. This branch of thermo-electricity has received from us but little attention. Franklin's experiments, by placing differently colored cloths in the snow, and showing the depth to which they sank, are still quoted, and great praise has been bestowed abroad on a more elaborate series of experiments, by a descendant of his, Dr. A. D. Bache, proving that this law does not hold good as to heat, unaccompanied by light. The experiments of Saxon and Goddard demonstrate that solid bodies do slowly evaporate. It is proper here to mention our countryman, Count Rumford, whose discoveries as to the nature and properties of heat, improvement in stoves and gunnery, and in the structure of chimneys and economy of fuel, have been so great and useful.

Light accompanies heat of a certain temperature. That it acts directly to increase or decrease magnetic force, is not yet proved; and the interesting experiments made by Dr. Draper, in Virginia, go to show that it is without magnetic influence. The discussion of this subject forms, the branch of optics, touching physical science on the one side, the most refined, and the highest range of mathematics on the other. Rittenhouse first suggested the true explanation of the experiment, of the apparent conversion of a cameo into an intaglio, when viewed through a compound microscope, and anticipated many years Brewster's theory. Hopkinson wrote well on the experiment made by looking at a street lamp through a slight texture of silk. Joscelyn, of New York, investigated the causes of the irradiation manifested by luminous bodies, as for instance the stars. Of late, photographic experiments have occupied much attention, and Draper has advanced the bold idea, supported by experiment, that the agent in the so-called photography, is not light, nor heat, but an agent differing from any other known principle. Henry has investigated the luminous emanation from lime, calcined with sulphur, and certain other substances, and finds that it differs much from light in some of its qualities.

Astronomy is the most ancient and highest branch of physics. One of our earliest and greatest efforts in this branch was the invention of the mariner's quadrant, by Godfrey, a glazier of Philadelphia. The transit of Venus, in the last century, called forth the researches of Rittenhouse, Owen, Biddle, and President Smith, near Philadelphia, and of Winthrop, at Boston. Two orreries were made by Rittenhouse, as also a machine for predicting eclipses. Most useful observations, connected with the solar eclipses, from 1832 to 1840, have been made by Paine, of Boston. We have now well-supplied observatories at West Point, Washington, Cambridge, Philadelphia, Hudson, Ohio, and Tuskaloosa, Alabama; and the valuable labors of Loomis, Bartlett, Gillis, Bond, Pierce, Walker, and Kendall are well known. Mr. Adams, so distinguished in this branch and that of weights and measures, laid last year the corner stone of an observatory at Cincinnati, where will soon be one of the largest and most powerful telescopes in the world. Most interesting observations as to the great comet of

1843 were made by Alexander, Anderson, Bartlett, Kendall, Pierce, Walker, Downes, and Loomis, and valuable astronomical instruments have been constructed by Amasa Holcomb, of Massachusetts, and Wm. J. Young, of Philadelphia.

It is difficult to class the brilliant meteors of November the 13th, 1833. If such meteors are periodic, the discovery was made by Professor Olmsted; and Mr. Herrick, of New Haven, has added valuable suggestions. The idea that observers, differently placed at the time of appearance and disappearance of the same meteor, would give the means of determining differences of longitude, was first applied in our own country, where the difference of longitude of Princeton and Philadelphia was determined by observations of Henry and Alexander, Espy and Bache. In meteorology our countrymen have succeeded well. Dr. Wells, of South Carolina, elaborated his beautiful and original theory of the formation of dew, and supported it by many well-devised and conclusive experiments. The series of hourly observations, by Professor Snell and Captain Mordecai, are well known; and the efforts of New York and Pennsylvania, of the medical department of the army, and its present enlightened head, Dr. Lawson, have much advanced this branch of science. The interesting question, Does our climate change? seems to be answered thus far in the negative, by registers kept in Massachusetts and New York. There are two rival theories of storms. That of Redfield, of a rotary motion of a wide column of air, combined with a progressive motion in a curved line. Espy builds on the law of physics, examines the action of an upmoving column of air, shows the causes of its motion and the results, and then deduces his most beautiful theory of rain and of land and water spouts. This he puts to the test of observation; and in the inward motion of wind toward the centre of storms, finds a striking verification of his theory. This theory is also sustained by the overthrow or injury, in the recent tornado at Natchez, of the houses whose doors and windows were closed, while those which were open mostly escaped unhurt. Mr. Espy must be considered, not only here, but throughout the world, as at the head of this branch of science. This subject has been greatly advanced by Professor Loomis, whose paper has been pronounced, by the highest authority, to be the best specimen of inductive reasoning which meteorology has produced. The most recent and highly valuable meteorological works of Dr. Samuel Forry are much esteemed. Many important discoveries in pneumatics were made by Dr. Franklin and Count Rumford, and the air pump was also greatly improved by Dr. Prince, of Salem.

Chemistry, in all its departments, has been successfully pursued among us. Dana, Draper, Ellet, Emmet, Hare, the Mitchells, Silliman, and Torrey, are well known as chemical philosophers; and Booth, Boyé, Chilton, Keating, Mather, R. Rogers, Seybert, Shepherd, and Vanuxen, as *analysts*; and F. Bache, Webster, Greene, Mitchell, Silliman, and Hare, as authors. In my native town of Northumberland, Pennsylvania, resided two adopted citizens, most eminent as chemists and philosophers, Priestley and Cooper. The latter, who was one of my own preceptors, was greatly distinguished as a writer, scholar, jurist, and physician, as well as a chemist. Priestley, although I do not concur in his peculiar views of theology, was certainly one of the most able and learned of ecclesiastical writers, and possessed also a mind most vigorous and original. His discoveries in pneumatic chemistry have exceeded those of any other philosopher. He discovered vital air, many new acids, chemical substances, paints, and dyes. He separated nitrous and oxygenous airs, and first exhibited acids and alkalies in a gaseous form. He ascertained that air could be purified by the process of vegetation, and that light evolved pure air from vegetables. He detected the powerful action of oxygenous air upon the blood, and first pointed out the true theory of respiration. The eudiometer, a most curious instrument for fixing the purity of air, by measuring the proportion of oxygen, was discovered by Dr. Priestley. He lived and died in my native town, universally beloved as a man, and greatly admired as a philosopher. Chemistry has actively advanced among us during the present century. Hare's compound blowpipe came from his hand so perfect, in 1802, that all succeeding attempts of Dr. Clark, of England, and of all others, in Europe and America, to improve upon it or go beyond the effects produced, have wholly failed. His mode of mixing oxygen and hydrogen

gases, the instant before burning them, was at once simple, effective, and safe. The most refractory metallic and mineral substances yielded to the intense heat produced by the flame of the blowpipe. In chemical analysis, the useful labors of Keating, Vanuxen, Seybert, Booth, Clemson, Litton, and Moss, would fill many volumes. In organic chemistry, the researches of Clark, Hare, and Boyé were rewarded by the discovery of a new ether, the most explosive compound known to man. Mitchell's experiments on the penetration of membranes by gases, and the ingenious extension of them by Dr. Rogers, are worthy of all praise. The softening of indiarubber, by Dr. Mitchell, renders it a most useful article. Dyer's discovery of soda ash yielded him a competence. Our countrymen have also made most valuable improvements in refining sugar, in the manufacture of lard oil and stearin candles, and the preservation of timber by Earle's process. Sugar and molasses have been extracted in our country from the cornstalk, but with what, if any profit, as to either, is not yet determined. No part of mechanics has produced such surprising results as the steam engine, and our countrymen have been among the foremost and most distinguished in this great and progressive branch. When Rumsey, of Pennsylvania, made a steamboat, which moved against the current of the James River four miles an hour, his achievement was so much in advance of the age, as to acquire no public confidence. When John Fitch's boat stemmed the current of the Delaware, contending successfully with sail boats, it was called, in derision, the *scheme boat*

Конец ознакомительного фрагмента.