

that he strongly believed in the possibility of the popularisation of science, and that he himself was eminently fitted to effect it. This same work is carried on in these memoirs over a wide extent of subjects. Each famous Academician, as he passes before us, is compelled to unfold his claim to the admiration of mankind in language which mankind at large can appreciate. Every memoir is a popular history of an art or science. The life of Herschel is the record of the improvement of the telescope, and the vast extension of sidereal astronomy. The name of Fourier is connected with an explanation of the theory of heat. The polarisation of light finds its place in the history of Malus: the theory of its undulation in that of Fresnel. An account, which most Englishmen must consider unfair, of the Egyptian hieroglyphics is given under the head of Thomas Young: and the biography of James Watt concludes the volume with an elaborate history of the steam-engine, deduced from the times of Pope Gerbert and the thundering idol of the ancient Teutones on the banks of the Weser.

The description of the powers of steam, and the successive improvements in its application, is an excellent specimen of Arago's power of exhibiting a difficult subject in clear, full, and popular language; but it is too long for extraction. The following statement of the two theories of light is a shorter illustration of the same qualities:—

"The senses of hearing and smell enable us to discover the existence of bodies at a distance by totally different means. Every odorous substance undergoes a species of evaporation; minute particles are sent off from it incessantly, they mix with the air, which becomes a vehicle for them, and diffuses them in every direction. A grain of musk, whose subtle emanations penetrate through all parts of a vast surrounding circuit, loses its power from day to day; it ends by being entirely dissipated and totally disappearing.

"It is not the same with a sounding body. Every one knows that a distant bell, whose sound strikes faintly on our ear, nevertheless does not send to us a single molecule of metal; that it can resound without interruption for successive centuries without losing any of its weight. When the clapper strikes it, its sides vibrate, they undergo an oscillatory motion, which communicates itself immediately to the neighbouring portions of the air, and thence by degrees to the whole atmosphere. These atmospheric vibrations constitute sound.

"Our organs, whatever be their nature, cannot be put in relation with distant bodies, except in one or the other of these two ways: thus either the sun emits incessantly, as odorous bodies do, material particles from all points of his surface with a velocity of 77,000 leagues in a second, and these are minute solar fragments which by penetrating into the eye produce vision; or else that luminary, in this respect like a bell, excites simply an undulatory movement in a medium extremely elastic, pervading all space, and these vibrations proceed to agitate our retina as the sonorous undulations affect the membrane of the tympanum.

"Of these two explanations of the phenomena of light, one is called the Theory of Emission, the other is known under the name of the System of Waves."

But the history of scientific men is not always exhausted in the history of science. Many of the distinguished names recorded in these pages have a place also in the more chequered scroll which records the destinies of nations. Not the least remarkable feature in the first outbreak of the French Revolution was the impulse which brought so many men of letters to the surface of action, now directing and now hurried away and absorbed by its eddying currents. Bailly, the famous Mayor of Paris, was among the earliest of these. Arago brings him before us in other guise from that in which Carlyle has familiarised us with his image. Yet the portrait is not substantially different. He was an honest, laborious, and patriotic man, sincerely anxious to fulfil his duty rightly, but quite unequal to the tremendous task of plucking safety out of the nettle danger by ruling or diverting the roused passions of an infuriated people. He perished, like many a stronger man, in the storm which he had once hoped to direct. Arago's account of his last moments is simple and touching, though somewhat different from the common version:—

"Bailly's last look was towards his wife. A gentleman of the escort feelingly listened to his last words, and faithfully repeated them to his widow. The procession reached the entrance to the Champ de Mars on the side towards the river, at a quarter past one o'clock. This was the place where, according to the words of the sentence, the scaffold had been raised. The blinded crowd collected there furiously exclaimed that the sacred ground of the Champ de la Federation should not be soiled by the presence and blood of him whom they called a great criminal. Upon their demand the scaffold was taken down again, and carried piecemeal into one of the fosses, where it was put up afresh. Bailly remained the stern witness of

these frightful preparations, and of these infernal clamors. Not one complaint escaped from his lips.—Rain had been falling all the morning; it was cold; it drenched the body, and especially the bare head, of the venerable man. A wretch saw that he was shivering, and cried out to him: 'Thou tremblest, Bailly.' 'I am cold, my friend,' mildly answered the victim.—These were his last words.

Fourier and Carnot swam more successfully in the troubled waters. The former sailed with Napoleon on his Eastern expedition, and became First Secretary of the Institute of Egypt. His services were, however, by no means confined to scientific matters, as the following anecdote will show:—

"The Emir Hadgey, or Prince of the Gharavan, who had been nominated by General Bonaparte upon his arrival in Cairo, escaped during the campaign of Syria. There existed strong grounds at the time for supposing that four *Cheiks Ulemas* had rendered themselves accomplices of the treason. Upon his return to Egypt, Bonaparte confided the investigation of this grave affair to Fourier. 'Do not,' said he, 'submit to high measures to me. You have to pronounce judgment upon high personages; we must either cut off their heads or invite them to dinner. On the day following that on which this conversation took place, the Cheiks dined with the General in Chief."

Ultimately he obtained the post of Prefect of Egypt, which brought him into an unpleasant contact with his former commander on his return from Elba. Arago gives us a graphic picture of the fall of Grenoble on this occasion:—

"It is eight o'clock in the evening. The inhabitants and the soldiers garrison the ramparts. Napoleon precedes his little troop by some steps; he advances even to the gate; he knocks (he not alarmed gentlemen, it is not a battle which I am about to describe), he knocks with his snuff box! 'Who is there?' cried the officer of the guard. 'It is the Emperor! Open!' 'Sire, my duty forbids me.' 'Open, I tell you; I have no time to lose.' 'But, Sire, even though I should open to you, I could not. The keys are in the possession of General Marchand.' 'Go, then, and fetch them.' 'I am certain that he will refuse them to me.' 'If the General refuses them, tell him that I will dismiss him.' These words petrified the soldiers. . . . The single word *dismissal*, effaced the faint line of demarcation which separated for an instant the old soldiers from the young recruit; one word established the whole garrison in the interest of the Emperor."

The life of Carnot was yet more prominent and more stormy. His personal character seems to have been singularly simple and upright; his public position carries with it almost an equal share of infamy and glory. As a simple member of the Committee of Public Safety he must be content to share in the execrations of Robespierre; as its War Minister he stands forth in almost solitary splendor, as the presiding spirit of that wonderful effort by which France, disorganized and exhausted, threw back the armies of invading Europe, and became itself the avenger and scourge. He was both used and dismissed by Napoleon, and only finally embraced with his full confidence during the Hundred Days; a confidence which compelled him to finish his days in exile. An improvement in the science of fortification is no inapt adjunct to such a life; but it does seem singular that the War Minister of the Committee of Public Safety should have found time or tranquility for working out "Reflections on the Metaphysics of the Infinitesimal Calculus." The deepest abstraction perhaps afforded the best refuge from the horrors of the concrete existence in which he acted.

Our notice would be imperfect without some allusion to the morsel of very wonderful autobiography which commences this volume, and which relates chiefly to Arago's adventures in the measurement of an arc of the meridian in Spain. But it is so difficult to know how to speak of it that we shall content ourselves with an extract from the translator's preface:—

"The reader will perhaps hardly suppress a smile at the indication of self-satisfaction with which several of the incidents are brought forward, while the air of romance which invests some of the adventures may possibly give rise to some suspicion of occasional embellishment; on these points, however, we leave the reader to judge for himself."

A DAY WITH NANA SAHIB.—Here sat the Maharajah on a Turkey carpet, and reclining slightly on a huge bolster. In front of him was his hookah, a sword, and several nosegays. His highness rose, came forward, took my hand, led me to the carpet, and begged of me to be seated on a cane-bottomed armchair, which had evidently been placed ready for my especial ease and occupation. "A hookah is called for by the Rajah, and then at least a dozen voices repeat the order—"Hookah-dao sahib ke waste" (bring a hookah for the sahib.) Presently the hookah is brought in. It is rather a

grand affair, but old, and has evidently belonged to some European of extravagant habits. . . . While I am pulling away at the hookah, the mullahs, or favorites of the Rajah, flatter me with very audible wh-pers. "How well he smokes!"—"What a fine forehead he has!"—"And his eyes, how they sparkle!"—"No wonder he is so clever?"—"He will be Governor-General some day." . . . Native Rajah (in a loud voice) "Monshie!"—"Monshie (who is close at hand.) "Maharaj, Protector of the Poor." Native Rajah—"Bring the petition that I have laid before the Governor-General." The Moonshie produces the petition, and at the instance of the Rajah reads, or rather sings it aloud. The Rajah listens with pleasure to the recital of his own wrongs, and I affect to be astounded that so much injustice can possibly exist. During my rambles in India I have been the guest of some scores of Rajahs, great and small; and I never knew one who had not a grievance. . . . I had either been wronged by the government, or by some judge whose decision had been against him. In the matter of the government it was a sheer love of oppression that led to the evil of which he complained, in the matter of the judge, that functionary had been bribed by the other party. It was with great difficulty that I kept my eyes open while the petition—a very long one—was read aloud. Shortly after it was finished I craved permission to retire, and was conducted by a bearer to the sleeping room.

The Maharajah invited me to accompany him to Cawnpore. I acquiesced, and the carriage was ordered. The carriage was English built—a very handsome landau—and the horses were English horses; but the harness! It was country made, of the very commonest kind, and worn out; for one of the traces was a piece of rope. The coachman was filthy in his dress, and the whip that he carried in his hand was an old broken buggy whip which some European gentleman must have thrown away. On the box, on either side of the coachman, sat a warlike retainer, armed with a sword and a dagger. In the rumble were two other retainers, armed in the same manner. Besides the Rajah and myself there were three others (natives and relatives of the Rajah) in the vehicle. On the road the Rajah talked incessantly, and among other things that he told me was this—in reference to the praises that I bestowed on his equipage:—"Not long ago I had a carriage and horses very superior to these. They cost me 25,000 rupees; but I had to burn the carriage and kill the horses."—"Why so?"—"The child of a certain sahib in Cawnpore was very sick, and the sahib and the memsahib were bringing the child to Bithpore for a change of air. I sent my big carriage for them. On the road the child died; and, of course, as a dead body had been in the carriage, and as the horses had drawn that dead body in that carriage, I could never use them again." The reader must understand that a native of any rank considers it a disgrace to sell property. "But could you not have given the horse to some friend—a Christian or a Mussulman?"—"No; had I done so, it might have come to the knowledge of the sahib, and his feelings would have been hurt at having occasioned me such a loss." Such was the Maharajah commonly known as Nana Sahib. He appeared to be not a man of ability, nor a fool. He was selfish, but what native is not? He seemed to be far from a bigot in matters of religion; and, although he was compelled to be so very particular about the destruction of his carriage and horses, I am quite satisfied that he drank brandy, and that he smoked hemp in the chillum of his hookah.—*Dickens's Household Words.*

THE MANUFACTURE OF WORDS.—No permission has been so much abused in our days as that of Horace for the manufacture of words. He allows me to mould one now and then, with a modest discretion and caution; but he is addressing poets, not vendors of patent leather or dealers in marine stores. Would he not have stood aghast at the term "antigropylus"? Would it not puzzle a Scaliger or Bentley? It is time, we protest, to put a stop to these vile coinages when every breeches-maker or blacking-manufacturer invents a compound word of six syllables as expressive of his wares. Ladies do not wear petticoats now-a-days, but crinolines. Men do not ride on horseback as aforetime—they take equestrian exercise; women are not married like their grandmothers—they are led to the hymeneal altar. A bookseller, forsooth, becomes a bibliopole; and a servant is converted into a mancipe. Barbers do not sell tooth powder and shaving soap as their fathers did, but odonto, and dentifrice, and rypopagon: hair wash has passed away—it is capillary fluid. Can any one tell what is the meaning of "diagnosis" as applicable to disease? If it has a signification at all, we will guarantee to half a dozen