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Title: Invention and Discovery: Curious Facts and Characteristic Sketches

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Release date: August 21, 2014 [EBook #46644]

Language: English

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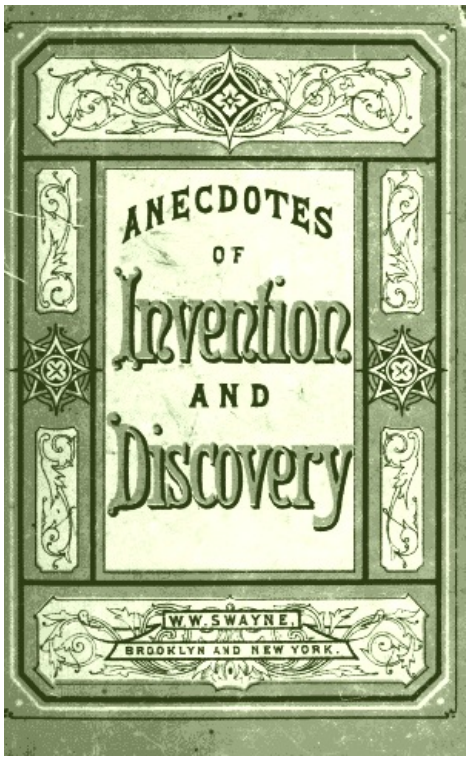
Transcribers Note: An effort has been made to keep the project as authentic as possible. Two printers errors have been corrected: "toothach" has been changed to "toothache", and "recals" has been changed to "recalls". Hyphenated words have been standardized as well.



INVENTION AND DISCOVERY:

WM. W. SWAYNE,
Brooklyn and New York.

INVENTION AND DISCOVERY:

Curious Facts and Characteristic Sketches.

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MURRAY AND GIBB, EDINBURGH,
PRINTERS TO HER MAJESTY'S STATIONERY OFFICE.

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NOTE.

In the annals of Invention and Discovery, it may be said without undue boasting, no nation of modern times can lay claim to such an eminent position as Great Britain; and her many ingenious and intrepid adventurers into what they found unknown regions of the arts, the sciences, and the earth's surface, have so largely contributed to raise her to her great place and power, that it is mere justice and self-interest to bestow on them grateful rewards in life, and renown after death. In this little volume are brought together a number of sketches and memoranda, illustrating the history of discovery, and the lives and labours of inventors and explorers, not of our own country alone, but of others—for knowledge is of no country, but of all. The object of the collector has been rather to present the popular than the strictly scientific side of his subject—to furnish materials of interest and amusement, as well as instruction; and if now and then he has been tempted to stray into bye-paths of anecdote and gossip, excuse may readily be found in the fact that the private life of our men of science, often singularly noble and full of character, is apt to be altogether obscured by the brilliancy of the results of their secret and silent toil. This volume will have served its purpose, if it excites an appetite for fuller and deeper inquisition into the sources of British greatness and of modern civilisation.

INVENTION AND DISCOVERY.

CURIOUS FACTS AND ILLUSTRATIVE SKETCHES.

POETIC PROPHECIES.

In Dr. Darwin's *Botanic Garden*, first published in 1789, but written, it is well known, at least twenty years before the date of its publication, occurs the following prediction respecting Steam:—

"Soon shall thy arm, unconquer'd Steam, afar
Drag the slow barge, or drive the rapid car;
Or, on wide-waving wings expanded bear
The flying chariot through the fields of air,[1]
Fair crews triumphant leaning from above,
Shall wave their fluttering 'kerchiefs as they move;
Or warrior bands alarm the gaping crowd,
And armies shrink beneath the shadowy cloud:
So mighty Hercules o'er many a clime
Waved his huge mace in virtue's cause sublime;
Unmeasured strength with early art combined,
Awed, served, protected, and amazed mankind."

A distinguished photographer imagines that he has traced the foreshadowing of his delightful science in the following passage from our great epic poet:

"With one touch virtuous
Th' arch-chemic sun, so far from us remote,
Produces."

Paradise Lost, b. iii. v. 608.

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[1] Darwin projected an "aërial steam-carriage," in which he proposed to use wings similar to those of a bird, to which motion was to be given by a gigantic power worked by high-pressure steam, though the details of his plan were not bodied forth.

CONSTRUCTION OF THE THAMES TUNNEL.

When the ingenious Miss Pardoe visited Constantinople in 1836, she was not less surprised than gratified by the inquiry of an Albanian chief, as to the probable completion of the Thames tunnel. This, however, is but one of the many instances of the anxiety with which the great work was watched throughout continental Europe. In Egypt, too, where a new country is rising, phœnix-like, upon the ashes of the old world, the progress of the tunnel was regarded with like curiosity; participated, indeed, throughout the civilised world. This interest is fully attested by the visitors' book at the Tunnel, wherein are inscribed the names of scientific men belonging to nearly every city of importance. The engineer of this great work, Mr. (afterwards Sir) Mark Isambard Brunel, completed his design in 1823; and amongst those who then regarded it as practicable were the Duke of Wellington and the late Dr. Wollaston. The works were commenced in 1825, and the Tunnel itself in 1826; and by March, 1827, it had advanced about one-third of the whole length. All proceeded well till May 18, when the river burst into the Tunnel with such velocity and volume, as to fill it in fifteen minutes; but, although the men were at work, no lives were lost. The hole, thirty-eight feet deep, was closed with bags of clay and hazel-rods, the water pumped out, and the works resumed in September. On Jan. 12, 1828, the river broke in a second time, and filled the Tunnel in less than ten minutes;
[pg 11] when the rush of water brought with it a strong current of air that put out the lights; six of the workmen were lost. For some distance, Mr. Brunel, junior, struggled in total darkness, and the rush of the water carried him up the shaft. The Tunnel was again cleared, and the part completed found to be sound. Hundreds of plans were proposed for its completion; the funds of the company were too low to proceed, and above 5000*l.* was raised by public subscription.

For seven years the work was suspended; but, by advances from Government, it was resumed in 1835. On April 23, 1837, there was a third irruption of the river; a fourth on Nov. 2, 1837, with the loss of one life; and, on March 6, 1838, the fifth and last irruption took place. Thus, of the tunnel there were completed—

In 1836	117 feet.
— 1837	28 "
— 1838	80 "
— 1839	194 "
— 1840	76 "

Leaving only 60 feet to complete.

Meanwhile, the tunnel works proved a very attractive exhibition. In 1838, they were visited by 23,000 persons, and, in 1839, by 34,000. By Jan. 1841, the tunnel was completed from shore to shore—1140 feet, and Sir I. Brunel, on Aug. 13, was the first to pass through. On March 25, 1843, the tunnel was opened to the public, with a demonstration of triumph.

The cost of the work has been nearly four times the sum at first contemplated; the actual expense being upwards of 600,000*l.* These, of course, are but a few data of the great work, the progress of
[pg 12] which, for twenty years, interested every admirer of scientific enterprize. The engineering details present marvels of ingenuity. The building of the vast brick shaft, 50 feet in diameter, 42 feet in height, and 3 feet thick, with, set over it, the steam-engine for pumping out the water and raising the earth—and the sinking of the whole, *en masse*, into the Rotherhithe bank, were master-works of genius. Thus far the vertical shaft: the tunnel itself commenced with an excavation larger than the interior of the old House of Commons. But the great invention was the *shield* apparatus—the series of cells, in which, as the miners worked at one end, the bricklayers formed at the other the top, sides, and bottom of the tunnel. The dangers, too, were many: sometimes, portions of the frame would break, with the noise of a cannon-shot; then alarming cries were heard, as some irruption of earth or water poured in; the excavators were, however, much more inconvenienced by fire than water—gas explosions frequently wrapping the place with a sheet of flame, and strangely mingling with the water, and rendering the workmen insensible. Yet, with all these perils, but seven lives were lost in making the tunnel under the Thames; whereas, nearly forty men were killed in building the new London Bridge.—*Note-book of 1848.*

VAST SPOT ON THE SUN.

Sir John Herschel, when at the Cape of Good Hope, observed, on May 25, 1837, a spot upon the sun, the black centre of which would have allowed the globe of our earth to drop through it, leaving a thousand miles clear of contact on all sides of that tremendous gulf.

DEATH OF SIR HUMPHRY DAVY.

It was at Rome, on the 20th day of February, 1829, when he was finishing his eloquent work, *The Last Days of a Philosopher*, that Sir Humphry Davy received the final warning to prepare. By dictation, he wrote to his brother, who was at Malta with the British troops—"I am dying from a severe attack of palsy, which has seized the whole of the body, with the exception of the intellectual organ. I shall leave my bones in the Eternal City." But he was to die neither then nor there. Within three weeks, his brother was by his bedside, and found him as much interested in the anatomy and electricity of the torpedo as ever, though he bade Dr. Davy "not to be grieved" by his approaching dissolution. Yet, after a day of 150 pulse-beats, and only five breathings in a minute, and of the most distressing particular symptoms, he again revived. Shortly after this, Lady Davy arrived at Rome from England, with a copy of the second edition of *Salmonia*, which Sir Humphry received with peculiar pleasure. After some weeks of melancholy dalliance with the balmy spring air of the Campagna, the Albula Lake, the hills of Tivoli, and the banks of the Tiber, they travelled quietly round by Florence, Genoa, Turin, slowly threading the flowery, sweet-scented Alpine valleys, to Geneva, where *he suddenly expired*. It was three hours beyond midnight; his servant called his brother; his brother was in time to close his eyes. It was the 29th of May, in 1829.

[pg 14] They buried him at Geneva. In truth, Geneva buried him herself, with serious and respectful ceremonial. A simple monument stands at the head of the hospitable grave. There is a tablet to his memory on the walls of Westminster Abbey. There is a monument also, at Penzance, his birth-place.

HOMAGE TO CUVIER.

When the Count de Seze replied to an eloquent discourse of Cuvier, he stated that, "since the Restoration, Cuvier was the second example of fortunate combination of literature and science, and that he had been preceded only by that illustrious geometer, (the Marquis de Laplace), whom we may call the *Newton* of France." In referring to the European reputation of Cuvier, and to the vast extent and variety of his knowledge, he applied to him the happy observation which Fontenelle made respecting Leibnitz—that while the ancients made one Hercules out of several, we might, out of one Cuvier, make several philosophers.

FALSE ESTIMATE OF RAILWAY SPEED.

The ordinary speed of George Stephenson's Killingworth engine, in 1814, was four miles an hour. In 1825, Mr. Wood, in his work on Railways, took the standard at six miles an hour, drawing 40 tons on a level; and so confident was he that he gauged the power of the locomotive, that he asserted—"nothing could do more harm towards the adoption of railways than the promulgation of such nonsense as that [pg 15] we shall see locomotive engines travelling at the rate of 12, 16, 18, and 20 miles an hour." The promulgator of such nonsense was George Stephenson. In 1829, it was estimated that, at 15 miles an hour, the gross load was 9-1/2 tons, and the net load very little; and that, therefore, high speed, if attainable, was perfectly useless. Before the end of that year, George Stephenson got with "the Rocket" a speed of 29-1/2 miles an hour, carrying a net load of 9-1/2 tons. In 1831, his engines were to draw 90 tons on a level, at 20 miles an hour.

When the speed of the locomotive was set beyond question, prejudice then took the alarm about safety, and a very strong stand was from time to time made for a limitation of speed. Even after the year 1849, the London and Birmingham Directors considered that 20 miles an hour was enough; but the vigour of the broad gauge advocates has tripled the working power of the locomotive, and given us 60 miles an hour where we might have been lingering at 20.

THE CRAWSHAYS OF MERTHYR TYDVIL.

Mr. Crawshay, of the Cyfarthfa Works, at a dinner given to him in 1847, by the people of Merthyr, related the following account of the rise of his family of "Iron Kings," as they are called.

"My grandfather was the son of a most respectable farmer in Normanton, Yorkshire. At the age of 15, father and son differed. My grandfather, an enterprising boy, rode his own pony to London, then an arduous task of some fifteen or twenty days' travelling. On getting there, he found himself perfectly
[pg 16] destitute of friends. He sold his pony for 15*l.*; and during the time that the proceeds of the pony kept him, he found employment in an iron warehouse of London, kept by Mr. Bicklewith. He hired himself for three years for 15*l.*, the price of his pony. His occupation was to clean the counting-house, to put the desks in order, and to do anything else that he was told. By industry, integrity, and perseverance, he gained his master's favour, and was termed 'the Yorkshire Boy.' He had a very amiable and good master; and, before he had been two years in his place, he stood high in this just man's confidence. The trade in which he was engaged was only a cast-iron warehouse, and his master assigned to him, 'the Yorkshire Boy,' the privilege of selling flat irons—the things with which our shirts and clothes are flattened. The washerwomen of London were sharp folks; and when they bought one flat iron, they stole two. Mr. Bicklewith thought that the best person to cope with them would be a man working for his own interest—and a Yorkshireman at the same time. That was the first matter of trading that ever my grandfather embarked in. By honesty and perseverance, he continued to grow in favour. His master retired in a few years, and left my grandfather in possession of his cast-iron business in London, which was carried on on the very site where I now spend my days—in York Yard. My grandfather left his business in London, and came down here; and my father, who carried it on, supplied him with money almost as fast as he spent it here; but not quite so fast. What occurred
[pg 17] subsequently, this company knows perfectly well. Who started with humbler prospects in life than my grandfather? No man in this room is so poor but that he can command 15*l.* Depend upon it, any man who is industrious, honest, and persevering, will be respected in any class of life he may move in. Do you, think, gentlemen, there is a man in England prouder than I am at this moment? What is all the world to me, unless they know me?"

WEIGHING MACHINE AT THE BANK OF ENGLAND.

The most interesting place connected with the machinery of the Bank of England is the Weighing-Office, which was established about 1840. In consequence of a proclamation concerning the gold circulation, it became very desirable to obtain the most minute accuracy, as coins of different weight were plentifully offered. Many complaints were made, that sovereigns which had been issued from one office were refused at another; and though these assertions were not, perhaps, always founded on truth, yet it is indisputable that the evil occasionally occurred. Every effort was made by the Directors to remedy this, some millions of sovereigns being weighed separately, and the light coins divided from those which were full weight. Fortunately, the Governor for the time being, (Mr. W. Cotton), before whom the complaints principally came, was attached to scientific pursuits; and he at once turned his attention to discover the causes which operated to prevent the attainment of a just weight. In this he [pg 18] was successful, and the result of his inquiry was, a machine, remarkable for an almost elegant simplicity. About 80 or 100 light and heavy sovereigns are placed indiscriminately in a round tube; as they descend on the machinery beneath, those which are light receive a slight touch, which moves them into their proper receptacle; while those which are the legitimate weight, pass into their appointed place. The light coins are then defaced by a sovereign-cutting machine, remarkable alike for its accuracy and rapidity. By this, 200 may be defaced in one minute; and, by the weighing machinery, 35,000 may be weighed in one day.

An eminent member of the Royal Society mentioned to the writer, that, amongst scientific men, it is a question whether the Weighing-Machine of Mr. Cotton is not the finest thing in Mechanics; and that there is only one other invention—the envelope-machine of De la Rue—to be named with it.—*Francis's History of the Bank of England.*

CHILDHOOD OF PASCAL.

Pascal, the celebrated French philosopher and divine, (whose life, Bayle affirms, is worth a hundred sermons), evinced such early ardour for knowledge, that, at the age of eleven, he was ambitious of teaching as well as learning; and he then composed a little treatise on the refractions of the sounds of vibrating bodies when touched by the finger. One day he was found alone in his chamber, tracing, in lines of coal, geometrical figures on the wall; and, on another occasion, he was surprised by his father,
[pg 19] just when he had succeeded in obtaining a demonstration of the 32nd proposition of the first book of Euclid—that the three angles of a triangle are equal to two right angles. Astonished and overjoyed, his father rushed to his friend, M. Pailleur, to announce the extraordinary fact; and the young geometer was instantly permitted to study, unrestrained, the Elements of Euclid, of which he soon made himself master, without any extrinsic aid. From the geometry of planes and solids he passed to the higher branches of the science; and, before he was sixteen years of age, he composed a treatise on the Conic Sections, which evinced the most extraordinary sagacity. When scarcely 19 years of age, too, Pascal contrived a machine to assist his father in making the numerical calculations which his official duties in Upper Normandy required.

In later life, Pascal found researches in geometry an occupation well fitted to give serenity to a heart bleeding from the wounds of his beloved associates. He had long before renounced the study of the sciences; but during a violent attack of toothache, which deprived him of sleep, the subject of the cycloid forced itself upon his thoughts. Fermat, Roberval, and others, had trodden the same ground before him; but, in less than eight days, and under severe suffering, he discovered a general method of solving this class of problems, by the summation of certain series; and as there was only one step from this discovery to that of Fluxions, Pascal might, with more leisure and better health, have won from Newton and from Leibnitz the glory of that great invention.

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THE DISCOVERER OF GUTTA PERCHA.

The Gutta Percha Tree, or Gutta Tuban, as it ought more properly to be called—the Percha being a spurious article—abounds in the indigenous forests of Singapore, although it was only about the year 1840 that it was discovered by Europeans. The first notice taken of it appears to have been by Dr. W. Montgomerie, in a letter to the Bengal Medical Board, in the beginning of 1843, wherein he commends the substance as likely to prove useful for some surgical purposes; and supposes it to belong to the Fig tribe. In April, 1843, the substance was taken to Europe by Dr. D. Almeida, who presented it to the Royal Society of Arts of London; but it did not at first attract much attention, as the Society simply acknowledged the receipt of the gift. Its uses would rather appear to have been found out by the Malays, who first manufactured some of the Gutta Percha into whips, and brought them into the town at Singapore for sale, where they were seen by Europeans.

SIR ISAAC NEWTON'S MAGNET.

The smallest natural Magnets generally possess the greatest proportion of attractive power. Sir Isaac Newton wore in his ring a magnet which weighed only three grains; yet it was able to take up 746 grains, or nearly 250 times its own weight—whereas magnets weighing above two pounds seldom lift more than five or six times their own weight.

COAL GAS in BALLOONS.

Mr. Green has the merit of being the first person who made experiments on the buoyant properties of Coal Gas. In some of his preliminary trials, he ascertained that the ascensive force of a small balloon, three feet in diameter, was equal to eleven ounces; but, when filled in the old way, with hydrogen gas, not more than fifteen ounces.

CUVIER AND NAPOLEON.

After Cuvier had presented to Buonaparte, in a Council of State, his Report of the Progress of the Mathematical and Natural Sciences since the year 1789, the Emperor expressed, in a very happy manner, the satisfaction which he had received from the document. "He has praised me," said Napoleon, "as I like to be praised." Cuvier, however, as he himself said, had only invited the Emperor to imitate Alexander, and to employ his power in promoting the advancement of the natural sciences.

LAST MOMENTS OF LEIBNITZ.

The passing of the mighty spirit of Leibnitz from this scene of existence was a deeply impressive scene. He had suffered from occasional illness during several preceding years. These attacks, however, passed away, and the philosopher resumed his speculations with renewed energy. In November, 1716, his complaint returned with great violence.

[pg 22] "The closing scene suggests gloomy reflections, as the lurid glare, which, during his extraordinary life, had attracted the eyes of the world, disappears; while we have not the record we could desire, indicating that the moral sensibilities of the Philosopher were rightly alive to the decisive nature of the awful change. His seventy years are ended, and the lightning seems lost among dark clouds. During the last day of his life, we are told, he was buried in conversation with his physician on the nature of his disease, and on the doctrines of alchymy. Towards evening, his servant asked him if he would receive the Eucharist. 'Let me alone,' said he, 'I have done ill to no one. I have nothing to confess. All must die.' He raised himself on his bed, and tried to write. The darkness of death was gathering around him. He found himself unable to read what he had written. He tore the paper, and, lying down, covered his face, and a few minutes after 9 o'clock, on the evening of the 14th of November, 1716, he ceased to breathe! It is most solemn to contemplate a human spirit, whose course of thought throughout life was unsurpassed for power of speculation, and daring range of mind among the higher objects of knowledge, and which, at the period of its departure, was in the depths of a controversy about the mysteries of a supersensible world—thus summoned into that world, to become conversant in its final relations with that Being who had entrusted it with such mental power, and whose nature and attributes had so often tasked its speculative energies."—*North British Review.*

FRANKLIN'S DISCOVERIES.

Of all this great man's scientific excellencies, the most remarkable is the smallness, the simplicity, the apparent inadequacy of the means which he employed in his experimental researches. His discoveries were all made with hardly any apparatus at all; and if, at any time, he had been led to employ instruments of a somewhat less ordinary description, he never rested satisfied until he had, as it were, afterwards translated the process, resolving the problem with such simple machinery, that you might
[pg 23] say he had done it wholly unaided by apparatus. The experiments by which the identity of lightning and electricity was demonstrated, were made with a sheet of brown paper, a bit of twine or silk thread, and an iron key!—*Lord Brougham.*

CARNÔT, WHEN A CHILD.

The aptitude and taste for military affairs of Carnôt, destined afterwards to perform so important a part in the history of Europe, displayed itself in a singular manner while he was yet a child. Being taken for the first time to a theatre, where some siege or other warlike operation was represented, he astonished the audience by interrupting the piece to complain of the manner in which the general had disposed his men and his guns, crying out to him that his men were in fire, and loudly calling upon him to change his position. In fact, the men were so placed as to be commanded by a battery.

SMEATON'S INDEPENDENCE.

Smeaton, the engineer, often evinced a high feeling of independence in respect to pecuniary matters, and would never allow motives of emolument to interfere with plans laid on other considerations. The Empress Catherine of Russia was exceedingly anxious to have his services in the formation of great engineering works in her dominions, and she commissioned the Princess Dackshaw to offer him his
[pg 24] own terms, if he would accede to her proposal. But his plans and his heart were bent upon the exercise of his skill in his own country, and he steadily refused all the offers made to him. It is reported that when the Princess found her attempts unavailing, she said to him, "Sir, you are a great man, and I honour you. You may have an equal in abilities, perhaps, but in character you stand single. The English minister, Sir Robert Walpole, was mistaken; and my sovereign, to her loss, finds one who has not his price."

After Smeaton had retired from his profession, he was often pressed to superintend certain works; when these entreaties were backed by personal offers of emolument, he used to send for an old woman who took care of his chambers in Gray's Inn, and say, "Her attendance suffices for all my wants!" a reply which conveyed the intimation that a man whose personal wants were so simple, was not likely to break through a pre-arranged line of conduct for mere pecuniary considerations.

Smeaton's *magnum opus* is the Eddystone lighthouse, which has withstood the storms of more than a century. One of its severest perils was in a terrific hurricane in November, 1824, when the men in the lighthouse appear to have been in a most critical situation; alive to their danger, and conscious of being beyond the hope of human aid. The report made by one of the light-keepers states, that on the morning of the 23rd, "the sea was tremendous, and broke with such violence on the top and round the building, as to demolish in an instant five panes of the lantern glass, and sixteen cylinder glasses, the
[pg 25] former of unusual thickness. The house shook with so much violence as to occasion considerable motion of the cylinder glasses fixed in the lamps; and at times the whole building appeared to sway as if resting on an elastic body. The water came from the top of the edifice in such quantities that we were overwhelmed, and the sea made a breach from the top of the house to the bottom."

CHILDHOOD OF CUVIER.

Cuvier, like Sir Isaac Newton, was born with such a feeble and sickly constitution, that he was scarcely expected to reach the years of manhood. His affectionate mother watched over his varying health, instilled into his mind the first lessons of religion, and had taught him to read fluently before he had completed his fourth year. She made him repeat to her his Latin lessons, though ignorant herself of the language; she conducted him every morning to school; made him practise drawing under her own superintendence, and supplied him with the best works on history and literature. His father had destined him for the army. In the library of the Gymnasium, where he stood at the head of the classes of history, geography, and mathematics, he lighted upon a copy of Gesner's History of Animals and Serpents, with coloured plates; and, about the same time, he had discovered a complete copy of Buffon among the books of one of his relatives. His taste for Natural History now became a [pg 26] passion. He copied the figures which these works contained, and coloured them in conformity with the descriptions; whilst he did not overlook the intellectual beauties of his author.

In the fourteenth year of his age he was appointed president of a society of his schoolfellows, which he was the means of organising, and of which he drew up the rules; and seated on the foot of his bed, which was the president's chair, he first showed his oratorical powers in the discussion of various questions, suggested by the reading of books of natural history and travels, which was the principal object of the society.

When at the age of nineteen, the casual dissection of a colmar, a species of cuttle-fish, induced Cuvier to study the anatomy of the mollusca; and the examination of some fossil terebratulæ, which had been dug up near Fécamp, in June, 1791, suggested to him the idea of comparing fossil with living animals; and thus, as he himself said, "the germ of his two most important labours—the comparison of fossil with living species, and the reform of the classification of the animal kingdom—had their origin at this epoch."

WATT'S DISCOVERY OF THE COMPOSITION OF WATER.

A controversy a good many years ago agitated the philosophical world, as to the discovery of the Composition of Water—whether the merit was due to Watt or Cavendish. One of Watt's letters, dated May 15th, 1784, seems to compress the matter into a nutshell. Writing to his friend, Mr. Fry of Bristol,
[pg 27] Mr. Watt says, that "he has had the honour of having had his ideas pirated;" that Dr. Blagden explained his theory to Lavoisier, at Paris; that M. Lavoisier soon after invented it himself; and that "since that, Mr. Cavendish has read a paper to the Royal Society on the same idea, without making the least mention of me." "The one," he continues, "is a French financier, and the other a member of the illustrious house of Cavendish, worth above 100,000*l.* (1,000,000*l.*) and does not spend 1000*l.* a year. Rich men may do mean actions; may you and I always persevere in our integrity, and despise such doings."

Another important point is, that Watt and Cavendish's papers on the discovery were printed under the sole superintendence of Dr. Blagden, secretary to the Royal Society; that Mr. Watt's paper is printed with the *erroneous date of 1784, in place of 1783*, and that the separate copies of Mr. Cavendish's papers have the *erroneous date of 1783, in place of 1784*. The obvious effect of these two errors was to give Cavendish the priority over Watt; whereas, by written testimony, Watt's theory is proved to have been known to Priestley in 1782.

It is Dr. Blagden's conduct in the matter that has disturbed the current of scientific history. "It is his testimony," says an able writer in the *North British Review*, "not appealed to by Cavendish, but gratuitously offered by himself, that contains the allegation that Cavendish mentioned to him and others his conclusions. It is his testimony, gratuitously sent to Crell, that deprives the French
[pg 28] chemists, Lavoisier, Laplace, and Monge, of their due share of honour; and it was by his acts that erroneous dates and claims were propagated throughout Europe. Let us impanel, then, a British jury—not of chemists, for their verdict is given—not of the improvers or manufacturers of steam-engines, for they might be partial—but of the highest functionaries of the law, the members of the peerage—let us lay before them these facts, and then tell them that Blagden received an annuity of 500*l.* from Cavendish; that, at his death, he left him a legacy of 15,000*l.*; and we will answer for it, that the testimony of Blagden will be rejected, and the priority of Watt affirmed."

HOW PASCAL WEIGHED THE ATMOSPHERE.

Pascal's Treatise on the weight of the whole mass of air forms the basis of the modern science of Pneumatics. In order to prove that the mass of air presses by its weight on all the bodies which it surrounds, and also that it is elastic and compressible, he carried a balloon, half filled with air, to the top of the Puy de Dome, a mountain about 500 toises above Clermont, in Auvergne. It gradually inflated itself as it ascended, and when it reached the summit, it was quite full, and swollen as if fresh air had been blown into it; or, what is the same thing, it swelled in proportion as the weight of the column of air which pressed upon it was diminished. When again brought down, it became more and more flaccid, and when it reached the bottom, it resumed its original condition. In the nine chapters of [pg 29] which the Treatise consists, Pascal shows that all the phenomena and effects hitherto ascribed to the horror of a vacuum arise from the weight of the mass of air; and after explaining the variable pressure of the atmosphere in different localities, and in its different states, and the rise of water in pumps, he calculates that the whole mass of air round our globe weighs 8,983,889,440,000,000,000 French pounds.

THE LEANING TOWER OF PISA.[2]

Sir John Leslie used to attribute the stability of this tower to the cohesion of the mortar it is built with being sufficient to maintain it erect, in spite of its being out of the condition required by physics—to
[pg 30] wit, that "in order that a column shall stand, a perpendicular let fall from the centre of gravity must fall within the base." Sir John describes the column of Pisa to be in violation of this principle; but, according to designs shown to Dr. Cumming, at Pisa, in 1836, the perpendicular does fall within the base.

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[2] When at Pisa, many years since, Captain Basil Hall investigated the origin and divergence of the tower from the perpendicular, and established completely to his own satisfaction that it had been built from top to bottom, originally, just as it now stands. His reasons for thinking so are, that the line of the tower, on that side towards which it leans, has not the same curvature as the line on the opposite, or what may be called the upper side. If the tower had been built upright, and then been made to incline over, the line of the wall on that side towards which the inclination was given, would be more or less concave in that direction, owing to the nodding or "swagging over" of the top, by the simple action of gravity acting on a very tall mass of masonry, which is more or less elastic when placed in a sloping position. But the contrary is the fact; for the line of wall on the side towards which the tower leans, is decidedly more convex than the opposite side. Captain Hall has, therefore, no doubt whatever that the architect, in rearing his successive courses of stones, gained or stole a little at each layer, so as to render his work less and less overhanging as he went up; and thus, without betraying what he was about, really gained stability.

HOLDING A "CRAWS' COURT."

Dr. Edmonston in his interesting "*View of the Zetland Islands*," relates that the hooded Crow sometimes engages in merry meetings, but, savage-like, concludes by a sanguinary sacrifice. The crows generally appear in pairs, even during winter, except when attracted to a spot in search of food, or when they assemble for the purpose of holding what is called a *Craws' Court*. This latter institution exhibits a curious fact in their history. Numbers are seen to assemble on a particular hill or field, from many different parts. On some occasions, the meeting does not appear complete before the expiration of a day or two. As soon as all the deputies have arrived, a very general noise and croaking ensue; and shortly after, the whole fall upon one or two individuals, whom they persecute and beat until they kill them. When this has been accomplished, they quietly disperse.

ALPINE PERILS.

Strange incidents befel Professor Forbes, and his companions, in their travels through the Alps of Savoy. On one occasion, they got so near a thundercloud, as to be highly electrified by induction, with
[pg 31] all the angular stones round them hissing like points near a powerful electrical machine; on another, whilst crossing one of the loftiest passes, the Col de Collon, they discovered a dark object lying on the snow, which proved to be the body of a man, with the clothes hard-frozen and uninjured. "The effect on us all," says the Professor, "was electric; and had not the sun shone forth in its full glory, and the very wilderness of eternal snow seemed gladdened under the serenity of such a summer's day, as is rare at these heights, we should certainly have felt a deeper thrill, arising from the sense of personal danger. As it was, when we had recovered our first surprise, and interchanged our expression of sympathy for the poor traveller, and gazed with awe on the disfigured relics of one who had so lately been in the same plight with ourselves, we turned and surveyed, with a stronger sense of sublimity than before, the desolation by which we were surrounded; and became still more sensible of our isolation from human dwellings, human help, and human sympathy, our loneliness with nature, and as it were, the more immediate presence of God."

PHILOSOPHICAL ENTHUSIASM.

"Never shall I forget," says Agassiz, "the impression which the sight of the *Pterichthys*, provided with appendages resembling wings, produced upon me, when I assured myself that it belonged to the class of fishes. It was an entirely new type, which was about to figure, for the first time since it had ceased [pg 32] to exist, in the series of beings—again to form a link which nothing of all that had been revealed up to the time with regard to extinct creations, would have led us ever to suspect the existence of—showing forcibly that observation alone can lead us to the recognition of the laws of development of organized beings; and how much we should guard against all those systems of transformation of species, which the imagination invents with as much facility as reason refutes them."

"SHEPHERD TO THE KING OF ENGLAND FOR SCOTLAND."

Lalande, the celebrated astronomer, committed a ludicrous mistake in styling James Ferguson, *Berger du Roi d'Angleterre en Ecosse*, the King of England's Shepherd for Scotland. The matter has, however, been thus explained:—Daubenton, as a naturalist, had the charge of the royal flocks of sheep in France. In order to retain his situation under the republic, he required a *certificate of civism* from the Section of the Sans Culottes. In this curious document, he is called *the Shepherd Daubenton*. Lalande, whose great work on astronomy was published at this period, had seen James Ferguson (the astronomer) designated *the Shepherd*, probably to distinguish him from Adam Ferguson the Philosopher, and hence he placed *Ferguson the Shepherd* in the same category with *the Shepherd Daubenton*, and made him "Shepherd to the King of England for Scotland!"

TRAVELS OF VOLCANIC DUST.

On the 2nd of September, 1845, a quantity of volcanic dust fell in the Orkney Islands, which was supposed to have originated in an eruption of Hecla in Iceland. It was subsequently ascertained that an eruption of Hecla took place on the morning of the above-named day, so as to leave no doubt of the justness of the conclusion. The dust had thus travelled about 600 miles!

EARLY LIFE OF ALEXANDER BRONGNIART.

This celebrated chemist and mineralogist, upwards of forty years director of the porcelain manufactory of Sèvres, was born at Paris in 1770. His father was justly celebrated for his attainments in the fine arts. His mind developed itself in the midst of that brilliant society belonging to the end of the eighteenth century, which his father was accustomed to draw around him. He there derived, from conversations with Franklin, the germ of that mild and practical philosophy which he never abandoned; and from those of Lavoisier his earliest notions of chemistry, which formed one of the foundations of his scientific career. He gave early indications of that clearness of elocution which formed one of his merits as a professor; and it is related that Lavoisier himself took pleasure in listening to a lecture on chemistry delivered by Brongniart even when he was scarcely fifteen years of
[pg 34] age. He studied in the Ecole de Medécine, where he was thrice enrolled; and when every Frenchman was called to the frontier, he was connected to the army of the Pyrenees in the capacity of an apothecary. A stay of fifteen months among these mountains gave him the opportunity of studying a rich and varied field of nature, as a zoologist and botanist. He likewise made geological observations, which, at a later period, took their place in the science, and which he often took pleasure in recalling; but there he encountered dangers which his youth did not suspect, and he was imprisoned under suspicion of having favoured the escape of the skilful naturalist, Broussonnet, who avoided certain death by fleeing by the breach of Rolland. Restored to liberty after the 9th Thermidor, Brongniart returned to Paris, and, in 1800, was nominated director of the porcelain manufactory of Sèvres, on the recommendation of Berthollet. At nineteen years of age, Brongniart was one of the founders of the Societé Philomatique, which, at the period of proscription for all of a higher class, kept alive the sacred fame of science. He died in 1847, and at his funeral, on October 9th, M. Elie de Beaumont delivered an *éloge*, whence these details have been derived.

SMEATON'S REPROOF OF GAMING.

[pg 35]

Smeaton, the engineer, was on intimate terms of acquaintance with the Duke and Duchess of Queensbury, and often spent a leisure hour in the evening at their house. On a few occasions, he played at cards with them, and on one such evening, he effected the abolition of that inconsiderate, indiscriminate play amongst people of superior rank or fortune, which compels every one to join, and at their own stake too. Smeaton detested cards, and his attention never following the game he played like a boy. The game was Pope Joan; and the general run of it was high; and the stake in Pope had accumulated to a serious sum. It was Smeaton's turn by the deal to *double* it; when, regardless of his cards, he busily made minutes on a slip of paper, and put it on the board. The Duchess eagerly inquired what it was; and he as coolly replied, "Your grace will recollect the field in which my house stands may be about five acres, three roods, and seven perches; which, at thirty years' purchase, will be just my stake; and if your grace will make a duke of me, I presume the winner will not dislike my mortgage." The joke and the lesson had alike their weight; and the party never after played but for the merest trifle.

INVENTION OF GUN-COTTON.

Cotton, having largely contributed to our national prosperity in times of peace, promised, not long since, to play a very important part in the strategies of war; and this by its use in place of gunpowder; wherefore the new substance was termed "Gun-cotton."

The merit of the invention is believed to be due to Professor Schonbein, of Basle. In 1840, the novelty was first announced as an explosive compound, possessing many apparent advantages over
[pg 36] gunpowder. It was described as a cotton prepared by a secret process; which, on the application of a spark, became at once converted into a gaseous state. In an experiment performed in the laboratory of Professor Schonbein, a certain weight of gunpowder, when fired, filled the apartment with smoke; whilst an equal weight of gun-cotton exploded without producing any smoke, leaving only a few atoms of carbonaceous matter behind. Cannon-balls and shells were then experimentally projected by this prepared cotton, with nearly double the projectile force of gunpowder.

Professor Schonbein made an interesting experiment upon the wall of an old castle: it had been calculated that from three to four pounds of gunpowder would be requisite to destroy this wall, and a hole capable of containing that quantity was prepared. In this aperture were put four ounces of the prepared cotton, which, when fired, blew the massive wall to pieces.

Again, the sixteenth part of an ounce of the prepared cotton, placed in a gun, carried a ball with such force, that it perforated two planks at the distance of twenty-eight paces; and, at another time, with the same charge, drove a bullet into a wall, to the depth of three inches and three-quarters.

Professor Schonbein attended the meeting of the British Association for the Advancement of Science, held at Southampton, in 1846, when the operation of this new power was explained and experimented with. Subsequently, the professor attended at Osborne House, to exhibit the properties of his gun-
[pg 37] cotton to Prince Albert, when Schonbein offered to explode a portion on the hand of Colonel B——: who would, however, have nothing to do with the novel power. Prince Albert himself submitted to the test, and off went the cotton, without smoke, stain, or burning of the skin. Thus encouraged, the colonel took his turn; but whether the material was changed or not for the coarser preparation, it gave him such a singeing that he leaped up with a cry of pain. A hearty laugh was all the commiseration he received. After this, Professor Schonbein loaded a fowling-piece with cotton in the place of powder, and the prince fired both ball and shot from it with the usual effect, and perfect impunity.

SIR JOSEPH BANKS'S "BALANCE."

At the death of Sir Joseph Banks, there was left at the apartments of the Royal Society, at Somerset House, a very delicate balance, constructed by Ramsden, the property of Sir Joseph. The secretaries accordingly wrote to his widow, requesting to know her wishes respecting the instrument. "Pay it into Coutts's," was her ladyship's reply.

BUCKINGHAM PALACE GATES.

[pg 38]

The central gates of the marble arch, facing Buckingham Palace, were put up in the summer of 1837: they were designed and cast by Samuel Parker, then of Argyll-place—they are the largest and most superb in Europe, not excepting the gates of the Ducal Palace at Venice, or of the Louvre at Paris. Their material is a beautiful alloy, the base of which is refined copper. Although cast, their enriched foliage and scroll-work bear the elaborate finish of the finest chasing: the height of each gate is twenty-five feet; width, seventeen feet, six inches; extreme thickness, three inches; weight of each, two tons, thirteen cwt.; yet, they are so beautifully hung, that a child might open and shut them. They now terminate at the springing of the arch; but Mr. Parker had cast for the heading a chaste frieze, and a design of the royal arms in the central circle, flanked by state crowns: this portion was, however, irretrievably mutilated by the Government removing the gates from the foundry in a common stage-waggon, without due care to prevent their breakage; yet the work cost, altogether, 3000 guineas!

EARTHQUAKES IN CHILE.

Mr. Darwin, in his very interesting *Journal of a Voyage round the World*, relates that he was one day dining with a gentleman at Coquimbo, when a sharp earthquake happened. He heard the forthcoming rumble, but from the screams of the ladies, the running of servants, and the rush of several of the gentlemen to the doorway, he could not distinguish the motion. Some of the women afterwards were crying with terror, and one gentleman said he should not be able to sleep all night, or if he did, it would only be to dream of falling houses. The father of this person had lately lost all his property at
[pg 39] Talcahuano, and he himself had only just escaped a falling roof at Valparaiso, in 1822. He mentioned a curious coincidence which then happened: he was playing at cards, when a German, one of the party, got up, and said he would never sit in a room in these countries with the door shut, as, owing to his having done so, he had nearly lost his life at Copiapo. Accordingly, he opened the door; and no sooner had he done this, than he cried out, "Here it comes again!" and the famous shock commenced. The whole party escaped. The danger in an earthquake is not from the time lost in opening a door, but from the chance of its becoming jammed by the movement of the walls.

CUVIER IN LONDON.

When Cuvier visited England, in 1818, in conversing with the Prince Regent on the subject of our Natural History Collections, he suggested the union of all the private collections in one great national museum, which, from the extent of our colonial possessions, he conceived would surpass every other collection in Europe.

During the great naturalist's stay in London, he was gratified with the sight of a Westminster election, in which he saw the practical working of one of our most important political institutions. "At this period," says his biographer, Mrs. Lee, "the election for Westminster was going forward, and he frequently dwelt upon the amusement he had received from being on the hustings every day. These [pg 40] orgies of liberty were then unknown in France; and it was a curious spectacle for a man who reflected so deeply on everything which passed before him, to see and hear our orators crying out at the top of their voices to the mob, who pelted them with mud, cabbages, eggs, &c. &c.; and Sir Murray Maxwell, in his splendid uniform, and decorated with orders, flattering the crowd who resisted him, and sent at his head all the varieties of the vegetable kingdom. Nothing ever effaced this impression from Cuvier's memory, who frequently described the scene with great animation."

THE FIRST CUP OF TEA DRUNK IN ENGLAND.

In all probability, the first cup of Tea made in England was drunk upon the site of Buckingham Palace, St. James's Park; for the Earl of Arlington took the first pound of tea to England, having bought it in Holland for sixty shillings; and at this time the Earl resided at Arlington House, which was taken down to make room for Buckingham House, since altered to the Queen's Palace.

BENEFIT OF A WIFE TO AN AUTHOR.

The wife of Nathaniel Bowditch was a woman of singular sweetness of disposition and cheerful piety, who, by her entire sympathy with her husband in all his studies and pursuits, lightened and cheered his labours; and by relieving him from all domestic cares, enabled him to go on with undivided mind and undistracted attention, in the execution of his great work—the translation of Laplace's *Mécanique*
[pg 41] *Celeste*, on which his fame as a man of science rests. He had been heard to say that he never should have accomplished the task, and published the book in its present extended form, had he not been stimulated and encouraged by her. When the serious question was under consideration as to the expediency of Bowditch's publishing it at his own expense, at the estimated cost of 10,000 dollars, (which it actually exceeded,) with the noble spirit of her sex, his wife conjured and urged him to go on and do it, saying that she would find the means, and gladly make any sacrifice, and submit to any self-denial that might be involved in it. In grateful acknowledgment of her sympathy and aid, he proposed, in the concluding volume, to dedicate the work to her memory, (she died in 1834)—a design than which nothing could be more beautiful or touching.[3]

In the course of his labour, Dr. Bowditch used to say, "I never come across one of Laplace's *Thus it plainly appears*, without feeling sure that I have got hours of hard study before me to fill up the chasm, and find out and show *how* it plainly appears."

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[3] It is highly honourable to the sex, that the only exposition of Laplace's work that has (1848) appeared in England, is from the pen of a female—the accomplished Mary Somerville, wife of Dr. Somerville, of Chelsea Hospital. This was published under the title of the *Mechanism of the Heavens*, of which, it is observed, in the *Edinburgh Review*, "this, unquestionably, is one of the most remarkable works that female intellect ever produced in any age or country; and with respect to the present day, we hazard little in saying that Mrs. Somerville is the only individual of her sex in the world who could have written it." For this signal service to science, there was conferred upon the lady a pension of 300*l.* per annum, at the recommendation of Sir Robert Peel.

[pg 42]

THE WORLD IN A DROP OF WATER.

The microscope has shown that a drop of water though it may appear to the naked eye to be perfectly clear, is swarming with living beings. According to Ehrenberg, a cubic inch of water may contain more than 800,000 millions of these beings, estimating them only to occupy one fourth of its space; and a single drop, placed under the microscope, will be seen to hold 500 millions; an amount, perhaps, not so very far from equal to the whole number of human beings on the surface of our globe!

ORIGIN OF POST-PAID ENVELOPES.

M. Piron tells us, that the idea of a Post-paid Envelope originated, early in the reign of Louis XIV., with M. de Velayer, who, in 1653, established, with royal approbation, a private penny post, placing boxes at the corners of the streets for the reception of letters, wrapped up in envelopes, which were to be bought at offices established for that purpose.

M. de Velayer also caused to be printed certain forms of *billets*, or notes applicable to the ordinary business among the inhabitants of great towns, with blanks, which were to be filled up by the pen with such special matter as might complete the writer's object. One of these *billets* has been preserved to our times by a pleasant misapplication of it. Pelisson, Mde. de Sevigné's friend, and the object of the [pg 43] *bon mot*, that "he abused the privilege which men have of being ugly," was amused at this kind of skeleton correspondence; and under the affected name of *Pisandre*, (according to the pedantic fashion of the day,) he filled up and addressed one of these forms to the celebrated Mademoiselle de Scuderi, in her *pseudonyme of Sappho*. This strange *billet-doux* has happened, from the celebrity of the parties, to be preserved, and is still extant: one of the oldest, we presume, of penny-post letters, and a curious example of a pre-paying envelope—as well as a new proof of the adage, that "there is nothing new under the sun."

CHARACTER IN WORKS.

Telford, the engineer, relates that he came to London in 1782, and got employed at the quadrangle of Somerset house-buildings; he soon became known to Sir William Chambers and Mr. R. Adam, the two most distinguished architects of that day; the former haughty and reserved, the latter affable and communicative; and a similar distinction of character pervades their works, Sir William's being stiff and formal, and those of Mr. Adam, playful and gay.

BRINDLEY, THE ENGINEER.

Though one of the most successful engineers of his age, Brindley was so illiterate as to be scarcely able to read or to write. By his unrivalled powers of abstraction and memory, he often executed his plans without committing them to paper; and when he was engaged in any difficult or complex [pg 44] undertaking, he was in the habit of retiring to bed, where he often remained for two or three days, till he had thoroughly completed his design. So singular, indeed, was the structure of his mind, that the spectacle of a play in London, disturbed to such a degree the balance of its mechanism, that he could not, for some time, resume his usual pursuits.

REASON FOR SILENCE.

Some one asked Fontaine, the celebrated geometrician, what he did in society where he remained almost perfectly silent. "I study," replied he, "the vanity of men, in order to mortify it occasionally."

ASCENT OF THE JUNGFRAU ALP.

In 1841, Professor Forbes, along with M. Agassiz, and others, made a successful ascent of the great Swiss mountain, the Jungfrau, whose summit is 13,720 feet above the level of the sea.

Of six travellers and seven guides who formed the party, four of each reached the top—viz., of the former, MM. Forbes, Agassiz, Desor, and Duchatelies; of the latter, Jacob Leutvold (who ascended the Finster Aarhorn,) Johan Jannon, Melchior, Baucholzer, and Andreas Aplanalp. They left the Grimsel on the morning of the 27th of August, 1841, ascended the whole height of the Ober-Aar Glacier, and descended the greater part of that of Viesch. Crossing a col to the right, they slept at the chalet of
[pg 45] Aletsch, near the lake of that name. This was twelve hours' hard walking, the descent of the glaciers being difficult and fatiguing. Next day, the party started at six a.m., having been unable sooner to procure a ladder, to cross the crevices; they then traversed the upper part of the glacier of Aletsch in its whole extent for four hours and a half, until the ascent of the Jungfrau began.

The party crossed with great caution extensive and steep fields of fresh snow, concealing crevices, till they came to one which opened vertically, and behind which rose an excessively steep wall of hardened snow. Having crossed the crevices with the ladder, they ascended the snow without much danger, owing to its consistency. After some similar walking they gained the col, which separates the Aletsch Glacier from the Rothal, on the side of Lauterbrunnen, by which the ascent has usually been attempted. Thus, the travellers, although now at a height of between 12,000 and 13,000 feet, had by far the hardest and most perilous part of the ascent to accomplish. The whole upper part of the mountain presented a steep, inclined surface of what at first seemed snow, but which soon appeared to be hard ice. This slope was not less than 800 or 900 feet in perpendicular height, and its surface (which Professor Forbes measured several times with a clinometer,) in many places rose at 45 degrees, and in few much less; and all Alpine travellers know well what an inclined surface of 45 degrees is to walk up. Of course, every step taken was cut with the hatchet, whilst the slope terminated below, on both sides in precipices some thousand feet high. After very severe exertion,
[pg 46] they reached the top of this great mountain, at four p.m. The summit was so small that but one person could stand upon it at once, and that not until the snow had been flattened. The party returned as they came up, step by step, and backwards, and arrived at the chalets of Aletsch, and by beautiful moonlight, at half-past eleven at night.

THE STEAM-GUN IN THE FIFTEENTH CENTURY.

In 1841, M. Delectuze discovered, among the manuscripts of Leonardo da Vinci, an entry carrying a knowledge of the steam-engine, applied to warfare, to at least as far back as the fifteenth century. He has published in the *Artiste*, a notice of the life of Leonardo, to which he adds a fac-simile of a page of one of his manuscripts, containing five pen-and-ink sketches of details of the apparatus of a Steam Gun, with an explanatory note on what he designates the "Architonnere." The entry is as follows:—

Invention of Archimedes. The architonnere is a machine of fine copper, which throws balls with a loud report and great force. It is used in the following manner:—One-third of the instrument contains a large quantity of charcoal fire. When the water is well heated, a screw at the top of the vessel which contains the water must be made quite tight. On closing the screw above, all the water will escape below, will descend into the heated portion of the instrument, and be immediately converted into a vapour so abundant and powerful, that it is wonderful to see its force, and hear the noise it produces. This machine will carry a ball a talent in weight."

It is worthy of remark that Leonardo da Vinci, far from claiming the merit of this invention for himself or the men of his time, attributes it to Archimedes.

[pg 47] The Steam Gun of our time has been an exhibition-room wonder; and the prediction of the Duke of Wellington that it would fail in warfare, has never been, and is never likely to be, tested.

ANCIENT OBSERVATORY IN PERSIA.

When Sir John Malcolm visited Maraga, he traced distinctly the foundations of the Observatory, constructed in the 13th century, for Naser-ood-Deen, the favourite philosopher of the Tartar prince, Hoolakoo, the grandson of Ghenghiz, who, in this locality relaxed from his warlike toils, and assembled round him men of the first genius of the age, who have commemorated his love of science, and given him more fame as its munificent patron, than he acquired by all his conquests.

In this observatory there was, according to one of the best Mahomedan works, a species of apparatus to represent the celestial sphere, with the signs of the zodiac, the conjunctions, transits, and revolutions of the heavenly bodies. Through a perforation in the dome, the rays of the sun were admitted, so as to strike upon certain lines on the pavement in a way to indicate, in degrees and minutes, the altitude and declination of that luminary during every season, and to mark the time and hour of the day throughout the year. The Observatory was further supplied with a map of the terrestrial globe, in all its climates or zones, exhibiting the several regions of the habitable world, as [pg 48] well as a general outline of the ocean, with the numerous islands contained in its bosom; and, according to the Mahomedan author, all these were so perspicuously arranged and delineated, as at once to remove, by the clearest demonstration, every doubt from the mind of the student.

LONDON AS A PORT.

Sir John Herschel, who possesses in an eminent degree, the peculiar talent of felicitously illustrating every subject that he approaches, in his valuable *Treatise on Astronomy*, thus refers to the situation of London as a Port:—"It is a fact, not a little interesting to Englishmen, and combined with our insular station in that highway of nations, the Atlantic, not a little explanatory of our commercial eminence, that London *occupies nearly the centre of the terrestrial hemisphere*."

FOURDRINIER'S PAPER-MAKING MACHINERY.

On April 25, 1839, some very interesting details of Fourdrinier's Machinery for making Paper of endless length, were elicited during a debate in the House of Commons, upon the presentation of a petition from these ingenious manufacturers. It appears that 1000 yards, or any given quantity of yards, of paper could be continuously made by it. Many years since, the invention was patented; but, owing to a mistake in the patent—the word "machine" being written instead of "machines"—the
[pg 49] property was pirated, and that led to litigations, in which the patentees' funds were exhausted before they could establish their rights. They then became bankrupts, and thus all the fruits of their invention, on which they had spent 40,000*l.*, were entirely lost to them.

The evidence of Mr. Brunel, and of Mr. Lawson, the printer of *The Times*, proved the invention of the Fourdriniers to be one of the most splendid discoveries of the age. Mr. Lawson stated that the conductors of the metropolitan newspapers could never have presented to the world such an immense mass of news and advertisements as was now contained in them, had not this invention enabled them to make use of any size required. By the revolution of the great cylinder employed in the process, an extraordinary degree both of rapidity and convenience in the production is secured. One of its chief advantages is the prevention of all risk of combination among the workmen, the machine being so easily managed that the least skilful person can attend to it. It was added that the invention had caused a remarkable increase in the revenue: in the year 1800, when this machine was not in existence, the amount of the paper duty was 195,641*l.*; in 1821, when the machinery was in full operation, the amount of duty was 579,867*l.*; in 1835, it was 833,822*l.* No doubt, part of this increase must be set down to other causes; still, it was impossible but for this discovery, that such a quantity of paper could have been made and consumed. The positive saving to the country effected by it, had not been less than 8,000,000*l.*; the increase in the revenue not less than 500,000*l.* a-year. At length, in
[pg 50] May, 1840, the sum of 7,000*l.* was voted by Parliament to Messrs. Fourdrinier, as some compensation for their loss by the defective state of the patent law.

There has been made by this machinery at Colinton mills, a single sheet of paper weighing 533 lbs., and measuring upwards of a mile and a half in length, the breadth being only 50 inches. Were a ream of paper of similar sheets made, it would weigh 266,500lbs. or upwards of 123 tons.

THE COCOA-NUT CRAB.

M. Darwin in his *Voyage round the World*, thus describes a Crab which lives upon Cocoa-nuts, and which he found on Keeling Island, in the South Seas: "It is very common on all parts of the dry land, and grows to a monstrous size; it has a front pair of legs, terminated by very strong and heavy pincers, and the least pair by others which are narrow and weak. It would at first be thought quite impossible for a crab to open a strong cocoa-nut covered with the husk; but M. Liesk assures me he has repeatedly seen the operation effected. The crab begins by tearing the husk, fibre by fibre, and always from that end under which the three eye-holes are situated; when this is completed, the crab commences hammering with its heavy claws on one of these eye-holes till an opening is made. Then, turning round its body, by the aid of its posterior and narrow pair of pincers, it extracts the white
[pg 51] albuminous substance. I think this is as curious a case of instinct as ever I heard of, and likewise of adaptation in structure between two objects apparently so remote from each other in the scheme of nature, as a crab and a cocoa-nut."

DESCARTES' WOODEN DAUGHTER.

When Descartes resided in Holland, he made with great labour and industry a female automaton, which gave some wicked wits occasion to report that he had an illegitimate daughter, named Franchine. The object of Descartes was, to demonstrate that beasts have no souls, and are but machines nicely composed, that move whenever another body strikes them and communicates to them a portion of its motions. Having carried this singular machine on board of a Dutch vessel, the captain, who sometimes heard it move, had the curiosity to open the box. Astonished to see a little human form uncommonly animated, yet when touched appearing to be nothing but wood—and being little versed in science, but very superstitious—he took the ingenious labour of the philosopher for a little devil, and terminated the experiment of Descartes, by throwing his "wooden daughter" into the sea.

ASTRONOMICAL SHOEMAKER.

When Halley's comet was expected in 1835, a shoemaker of Leicester, named Joseph Mills, set about tracing the path of the heavenly visitor through the heavens. This he did by drawing its orbit upon his
[pg 52] house floor, from which he made a diagram that more accurately represented the course of the comet than any that had been previously published. On being questioned how he had calculated the disturbing forces, so as to come so near the truth; he replied that he could not tell, further than he had performed it by the common rules of arithmetic.

DECLINE OF SCIENCE.

In January, 1842, a poor fellow was taken before the authorities of Paris for begging in the streets. He had studied the *science* of cookery under the celebrated Carême, and was the inventor of the delicious *Saumon truffé à la broche*. He was in the last garb of want, and attributed his poverty to the decline of cookery from a science to a low art! It has been observed that cooks, in nine cases out of ten, after ministering to the luxury of the opulent, creep into holes and corners, and pass neglected out of the world.

VARIABLE CLIMATE OF TEBREEZ.

Tebreez is celebrated as one of the most healthy cities in Persia, and it is on this ground alone that we can account for its being so often rebuilt after its repeated demolition by earthquakes. It is seldom free even for a twelvemonth from slight shocks; and it is not yet so much as a century since it was levelled to the ground by one of those terrible convulsions of nature.

[pg 53] Sir John Malcolm, when he visited this place, was more surprised at its salubrity, from knowing the great extremes of heat and cold to which it is subject; having obtained from a friend who had resided there during the whole of the preceding year, a most accurate diary of the various changes of its climate.

"From this, it appeared that on the 20th of October there was a heavy fall of snow, which did not, however, remain long upon the ground: the weather again became mild, and there was no excessive cold until the middle of December, from which period, until the end of January, Fahrenheit's thermometer, when exposed to the air at night, never rose above zero; and in the house at mid-day it was seldom above 18°.

"January was by far the coldest month. During it, the water is described as becoming almost instantaneously solid in the tumblers upon the dining-table, and the ink often freezing in the ink-stand, although the table was close to the fire. For at least a fortnight, not an egg was to be had, all being split by the cold. Some bottles of wine froze, although covered with straw, and many of the copper ewers were split by the expansion of the water when frozen in them.

"According to this diary, the weather became comparatively mild towards the end of February; but it appears that here, as in England,

'A lingering winter chills the lap of May;'

for, on the first of that month, there was a heavy fall of snow, with such cold that all promise of the spring was destroyed. Of the heat that ensued, and the sudden and great changes to which Tebreez is subject, we had abundant proof; in the month of June, the range of the thermometer being usually, within the twenty-four hours, from 56° to 94°,—a difference of 38°.

"The extreme heat of the summer causes most of the houses in Tebreez to be built so as to admit the air during that season; but the architects of Persia fall short of their brethren in Europe, in forming places by which the cool air can be admitted in summer, and excluded in winter. This partly accounts for the above effects of cold; but the city of Tebreez, and many more parts of Aderbejan, and still more of the neighbouring province of Kûrdistan, though nowhere beyond the 40th degree of latitude, are, from their great elevation, subject to extreme cold. In the latter country (says Sir John Malcolm) I found, on the morning of the 17th of August, ice half an inch thick on a basin of water standing in my tent."[4]

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[4] Sketches of Persia.

STRYCHNINE A REMEDY FOR PARALYSIS.

Strychnine (obtained in the greatest purity from the Upas Tiente) has been used successfully for this purpose. One of Dr. Bardesley's patients in Lincolnshire, who was experiencing the return of sensation in his paralyzed limbs, under the use of strychnine, asked if there was not something *quick* in the pills; *quick* for *alive* being still in use in that part of England.

RAPID MANUFACTURE.

Many years ago, the late Sir John Throckmorton sat down to dinner, dressed in a coat which, the same morning, had been wool on the back of the sheep. The animals were sheared; the wool washed, carded, spun, and woven; the cloth was scoured, fulled, sheared, dyed, and dressed; and then, by the tailor's aid, made into a coat, between sunrise and the hour of seven, when a party sat down to dinner, with Sir John, as their chairman, wearing the product of the active day!

DISCOVERIES ANTICIPATED.

From time immemorial, the inhabitants of some distant regions have carried on their nocturnal or underground manufactures by natural gas, obtained through a hollow reed thrust into the earth. Arriving at modern times, navigation by the Archimedes screw, as a propeller, through the means of
[pg 55] steam, attracted the notice of the Scottish Society of Arts in 1840; but, above twenty years previously, an experiment with similar screws, adapted to a boat, on the lake Lochend, by Mr. Whytock, a member of the Society, proved the efficiency of the invention, though on a small scale. In Scotland, an Agricultural Society was established in 1723; a thrashing-machine appeared in 1735; and a reaping-machine in 1765.

THE FIRST USE OF JESUIT'S BARK.

A casual circumstance, it is said, discovered that excellent febrifuge, the Jesuit's Bark. An Indian in a delirious fever was left by his companions, as incurable, by the side of a river, to quench his burning thirst while dying. He naturally drank copious draughts of the water, which, having long imbibed the virtues of the bark, that floated abundantly on the stream, quickly dispersed the fever of the Indian. He returned to his friends, and explained the nature of his remedy; and the sick crowded about the margin of the holy stream (as they imagined it) till they had quite exhausted its virtues. The sages of the tribe found out at length, however, whence the efficacy of the stream arose. The Indians discovered it first, in 1640, to the lady of a Viceroy of Peru, who by its use recovered of a dangerous fever; and in 1643 it was known at Rome.

NICE ROBBERY.

[pg 56] M. Bachalier, a French florist, kept some beautiful species of the anemone to himself, which he had procured from the East Indies; and he succeeded in withholding them, for ten years, from all who wished to possess them likewise. A counsellor of the parliament, however, one day paid him a visit, while the anemones were in seed, and in walking with him round the garden contrived to let his gown fall upon them. By this means he swept off a good number of the seeds; and his servant, who had been apprised of the scheme, dexterously wrapt up the gown and secured them. Any one must have been a sour moralist who should have considered this to be a breach of the eighth commandment.

FEMALE MATHEMATICIAN.

In the year 1736, the French Academy of Sciences proposed, as a subject for a prize, "the Propagation of Heat," when the Marchioness of Châtelet entered the list of competitors. Her work was not only an elegant account of all the properties of heat at that time known to natural philosophers, but it was also remarkable for various proposals for experiments; one, among others, which was afterwards followed up by Herschel, and from which he derived one of the chief gems in his brilliant scientific crown.

FOURIER'S INDEPENDENCE.

[pg 57]

It was only occasionally that the real character of Fourier, the French philosopher, showed itself. "It is strange," said, one day, a certain very influential person belonging to the court of Charles X., whom the servant, Joseph, would not allow to get further than Fourier's ante-chamber—"it is really strange that your master should be more difficult of access than a minister." Fourier, overhearing this remark, jumped out of bed, to which he had been confined by indisposition, opened the room door, and facing the courtier, exclaimed, "Joseph, tell the gentleman, that if I were a minister, I should receive everybody, because such would be my duty: as a private individual, I receive whom I think fit, and when I think fit." The grandee, disconcerted by the liveliness of the sally, did not answer a word. We must even suppose that from that instant he determined to visit nobody but ministers, for the simple *savant* heard no more of him.

MECHANICAL TRIUMPHS.

The direct and almost instant benefits of Mechanical Inventions to their originators have been thus eloquently illustrated in the *Edinburgh Review*:—"Contributing, as they do, to our most immediate and pressing wants—appealing to the eye by their magnitude, and often by their grandeur, and associated, in many cases, with the warmer impulses of humanity and personal safety—the labours of the mechanist and engineer acquire a contemporary celebrity, which is not vouchsafed to the results of scientific research, or to the productions of literature and the fine arts. The gigantic steam-vessel, [pg 58] which expedites and facilitates the intercourse of nations—the canal, which unites two distant seas—the bridge and the aqueduct, which span an impassable valley—the harbour and the break-water, which shelter our vessels of peace and of war—the railway, which hurries us along on the wings of mechanism, and the light beacon which throws its directing beams over the deep—address themselves to the secular interests of every individual, and obtain for the engineer who invented or who planned them, a high and a well-merited popular reputation."

THE ELGIN MARBLES.

These beautiful relics of Grecian antiquity cost the Earl of Elgin 74,000*l.*, of which sum he barely received one-half from Government; so that Lord Byron's imputation to the Earl of a mercantile spirit in the transaction is notoriously unjust.

RALEIGH A CHEMIST.

During his confinement in the Tower of London, Sir Walter Raleigh devoted a considerable portion of his time to chemical and pharmaceutical investigations; and interesting it is to see how his unsubdued spirit enabled him to make the most of his misfortunes, to surmount difficulties, and to turn ordinary things to extraordinary purposes,—greatly, no doubt, to the amazement of those about him, who marvelled much to behold the splendid courtier, and the captain of a happier day, earnestly employing
[pg 59] himself with chemical stills and crucibles in a vacant hen-house! "He has converted," says Sir W. Wade, the lieutenant of the Tower, in a letter to Cecil, "a little hen-house in the garden into a still-house, and here he doth spend his time all day in distillations."

MR. BABBAGE'S CALCULATING MACHINE.

A calculating machine is a fair subject for a joke. In May, 1839, when an additional grant was applied for in the House of Commons, in order to complete Mr. Babbage's machine, Mr. Wakley inquired whether it was likely to be of any use to the public? Upon this, Sir Robert Peel felicitously replied, that "the machine should be put to calculate the time at which it would be of any use." The calculating machine has certainly not yet been put to any more practical purpose.

HERSCHEL'S LOVE OF MUSIC.

Sir William Herschel was a good musician, yet such was his ardour for astronomical discovery, that at some benefit concert which he gave, he had his telescope fixed in a window, and made his observations between the acts.

POWER OF THE LEVER.

[pg 60]

Archimedes said, "Give me a lever long enough, and a prop strong enough, and with my own weight I will move the world." "But," says Dr. Arnott, "he would have required to move with the velocity of a cannon-ball for millions of years, to alter the position of the earth a small part of an inch. This feat of Archimedes is, in mathematical truth, performed by every man who leaps from the ground; for he kicks the world away from him whenever he rises, and attracts it again when he falls."

AN ELECTRIFYING MACHINE IN PERSIA.

When Sir James Malcolm was in Persia, on his first expedition, an electrifying machine which he took with him was one of the chief means of astonishing his Persian friends; and with its effects he surprised and alarmed all, from majesty itself to the lowest peasant.

At Isfahan, all were delighted with the electric machine, except one renowned doctor and lecturer of the college, who, envious of the popularity gained by this display of superior science, contended publicly that the effects produced were moral, not physical; that it was the mummery the Europeans practised, and the state of the nervous agitation they excited, which produced an ideal shock; but he expressed his conviction that a man of true firmness of mind would stand unmoved by all that could be produced out of the *glass bottle*, as he scoffingly termed the machine. He was invited to the next experiment, the day arrived, and he came accordingly.

This doctor was called "Red-stockings," from his usually wearing scarlet hose. He was, notwithstanding his learning and reputed science, often made an object of mirth in the circles of the
[pg 61] great and wealthy at Isfahan, to whom he furnished constant amusement, from the pertinacity with which he maintained his dogmas.

Hence, "Red-stockings," with all his philosophy, was not overwise. Nevertheless, he maintained his ground in the first society, by means common in Persia, as in other countries: he was, in fact, a little of the fool,[5] and not too much of the honest. This impression of his character, combined with his presumption, made Sir John Malcolm and his party less scrupulous in their preparations to render him an example for all who might hereafter doubt the effects of their boasted electricity; indeed, their Persian visitors seemed anxious that the effect should be such as to satisfy the man that had dared them to the trial—that it was physical, not moral.

The philosopher, notwithstanding various warnings, came boldly up, and took hold of the chain with both hands, planted his feet firmly, shut his teeth, and evidently called forth all his resolution to resist the shock. It was given; and poor "Red-stockings" dropped on the floor, as if he had been shot. There was a momentary alarm; but, on his almost instant recovery, and it being explained that the effect had been increased by the determination to resist it, all gave way to one burst of laughter. The good-natured philosopher took no offence. He muttered something about the reaction of the feelings after being overstrained, but admitted there was more in the glass bottle than he had anticipated.

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[5] "*Poco di matto*" is deemed by the Italians an essential quality in a great man's companion.

HOW TO MEASURE THE SHOCK OF AN EARTHQUAKE.

Dr. Buckland relates that in certain places liable to earthquakes, their extent has been measured by *bowls of treacle*, the inclination of the treacle in the bowl showing the quantum of shock; and elsewhere (by a watchmaker) in Scotland, by placing a clock against each of the four walls of an apartment, and marking the centre of the disk of the pendulum with chalk: when the shock took place, the derangement caused the pendulum to strike against the back and front of the clock-case, when, of course, a mark would be left indicative of the phenomenon, though not of its amount.

THE DRUMMOND LIGHT.

The importance of simplicity in inventions for popular use, has been shown in the late Lieutenant Drummond's apparatus for illuminating lighthouses with his oxyhydrogen light; that is, a stream of oxygen and another of hydrogen, directed upon a ball of lime. Experimentally, the light has succeeded beyond the expectation of the inventor; but the machinery or apparatus remains to be simplified before it can be worked by the keepers of lighthouses.

ST. PIERRE'S "PAUL AND VIRGINIA."

[pg 63] Baron Humboldt, in his *Cosmos*, vol. ii., pays the following eloquent tribute to that small production of the creative imagination to which Bernardin de St. Pierre owes the fairest portion of his literary fame —Paul and Virginia—a work such as scarcely any other literature can show.

"It is," says Humboldt, "a simple, but living picture of an island in the midst of the tropic seas, in which, sometimes smiled on by serene and favouring skies, sometimes threatened by the violent conflict of the elements, two young and graceful forms stand out picturesquely from the wild luxuriance of the vegetation of the forest, as from a flowery tapestry. Here the aspect of the sea, the grouping of the clouds, the rustling of the breeze in the bushes of the bamboo, and the waving of the lofty palmo, are painted with inimitable truth.

"Bernardin de St. Pierre's master-work, Paul and Virginia, accompanied me into the zone to which it owes its origin. It was there read for many years by my dear companion and friend, Bonpland, and myself; and there (let this appeal to personal feelings be forgiven) under the silent brightness of the tropical sky, or when, in the rainy season, on the shores of the Orinoco, the thunder crashed, and the flashing lightnings illuminated the forest, we were deeply impressed and penetrated with the wonderful truth with which this little work paints the power of nature in the tropical zone in all its peculiarity of character.

[pg 64] "A similar firm grasp of special features, without impairing the general impression, or depriving the external materials of the free and animating breath of poetic imagination, characterises in an even higher degree the ingenious and tender author of "Atala," "René," "the Martyr," and the "Journey to Greece and Palestine." The contrasted landscapes of the most varied portions of the earth's surface are brought together, and made to pass before the mind's eye with wonderful distinctness of vision: the serious grandeur of historic remembrances could alone have given so much depth and repose to the impressions of a rapid journey."

MYTHOLOGY OF SCIENCE.

M. Arago, in his brilliant *eloge* on Fourier, observes:—"The ancients had a taste, or rather a passion, for the marvellous, which made them forget the sacred ties of gratitude. Look at them, for instance, collecting into one single group the high deeds of a great number of heroes, whose names they have not even deigned to preserve, and attributing them all to Hercules. The lapse of centuries has not made us wiser. The public in our time also delight in mingling fiction with history. In all careers, particularly in that of the sciences, there is a design to create Herculeses. According to the vulgar opinion, every astronomical discovery is attributable to Herschel. The theory of the motions of the planets is identified with the name of Laplace, and scarcely any credit is allowed to the important labours of D'Alembert, Clairaut, Euler, and Lagrange. Watt is the sole inventor of the steam-engine, whilst Chaptal has enriched the chemical arts with all those ingenious and productive processes which
[pg 65] secure their prosperity." To countervail this error, Arago continues: "Let us hold up to legitimate admiration those chosen men whom nature has endowed with the valuable faculty of grouping together isolated facts, and deducing beautiful theories from them; but do not let us forget that the sickle of the reaper must cut down the stalks of corn, before any one can think of collecting them into sheaves."

EL DORADO OF SIR WALTER RALEIGH.

The term *El Dorado* is commonly considered to have reference to the sovereignty teeming with precious metals, which had long been sought for in vain by Spanish adventurers. Their expeditions in quest of it were directed to the interior of the vast region lying between the Orinoco and the Amazon, or Guiana. The rocks were represented as impregnated with gold, the veins of which lay so near the surface as to make it shine with a dazzling resplendency. The capital, Manoa, was said to consist of houses covered with plates of gold, and to be built upon a vast lake, named Parima, the sands of which were auriferous.

We abridge the following new version of this "romance of history," from a brilliant paper on the life and works of Raleigh, in the *Edinburgh Review*.

The term *El Dorado* was not originally used to designate any particular place; it signified generally 'the gilded,' or 'golden,' and was variously applied. According to some, it was first used to denote a religious ceremony of the natives, in covering the anointed body with gold-dust. The whole of Guiana was, on account of the above usages, sometimes designated *El Dorado*; but the locality of the fable varied.

[pg 66] The question, however, to be solved is, whence arose the belief that a district so marvellously abundant with the precious metals existed in the interior of Guiana; and the solution appears to have been left to Humboldt. While exploring the countries upon the Upper Orinoco, he was informed that the portion of Eastern Guiana, lying between the rivers Essequibo and Branca is 'the classical soil of the Dorado of Parima.' In the islets and rocks of mica, slate, and talc, which rise up within and around a lake adjoining the Parima river, reflecting from their shining surfaces the rays of an ardent sun, we have materials out of which to form that gorgeous capital, the temples and houses of which were overlaid with plates of beaten gold.

With such elements to work upon, heated fancies, aided by the imperfect vision of distant and dubious objects, might easily create that fabulous superstructure. We may judge of the brilliancy of these deceptive appearances, from learning that the natives ascribed the lustre of the Magellanic clouds, or nebula of the southern hemisphere, to the bright reflections produced by them. There could not well be a more poetical exaggeration of the lustrous effects produced by the metallic hues of rocks of talc. These details, in which M. de Pons, a somewhat later traveller, who long resided in an official capacity in the neighbouring countries, fully concurs, in all probability point to the true origin of this remarkable fable. The well-known failure of Raleigh did not discourage other adventurers, who were found in quick succession; the last always flattering themselves with the hope that the discovery of *El Dorado* would ultimately be realized.

AMBER, A SOURCE OF INTERNATIONAL TRADE.

The amber trade, which was probably first directed to the west Cimbrian coasts, and only subsequently to the Baltic and the country of the Esthonians, owes its first origin to the boldness and perseverance of Phœnician coast navigators. In its subsequent extension, it offers a remarkable instance of the influence which may be exerted by a predilection for even a single foreign production, [pg 67] in opening an inland trade between nations, and in making known large tracts of country. In the same way that the Phocæan Massilians brought the British tin across France to the Rhone, the amber was conveyed from people to people through Germany, and by the Celts on either declivity of the Alps to the Padus, and through Pannonia to the Borysthenes. It was this inland traffic which first brought the coasts of the Northern ocean into connexion with the Euxine and the Adriatic.—*Humboldt's Cosmos.*

ANTIQUITY OF LIGHTNING CONDUCTORS.

A story was formerly repeated in Germany, after Father Angelo Cortenoria, that the tomb of the hero of Clusium, Lars Porsena, described by Varro, ornamented with a bronze head and bronze pendent chains, was an apparatus for atmospheric electricity, or for conducting lightning, (as were, according to Michaelis, the metal points on Solomon's temple); but the tale obtained currency at a time when men were much inclined to attribute to ancient nations the remains of a supernaturally revealed primitive knowledge, which was soon after obscured.

The most important notice of the relation between lightning and conducting metals (a fact not difficult of discovery) still appears to be that of Ctesias: he possessed two iron swords, presents from the King Artaxerxes Mnemon, and from his mother Parysatis, which, when planted in the earth, averted clouds, hail, and strokes of lightning. He had himself seen the operation, for the king had twice made the experiment before his eyes.

[pg 68] The exact attention paid by the Etruscans to the meteorological processes of the atmosphere in all that deviated from the ordinary course of phenomena, makes it to be lamented that nothing has come down to us from their Fulgur red books. The epochs of the appearance of great comets, of the fall of meteoric stones, and of showers of falling stars, would no doubt have been found recorded in them, as in the more ancient Chinese annals, of which Edward Biot has made use. Creuzer has attempted to show, that the natural features of Etruria may have influenced the peculiar turn of mind of its inhabitants. A "calling forth" of the lightning, which is ascribed to Prometheus, reminds us of the pretended "drawing down" of lightning by the Fulguratores. This operation consisted in a mere conjuration, and may well have been of no more efficacy than the skinned ass' head, which, in the Etruscan rites, was considered a preservative from danger in their thunder-storms.—(*See Notes to Humboldt's Cosmos*, vol. ii.)

HOW THE DEAF MAY HEAR.

About 1738, a merchant of Cleves, named Jorissen, who had become almost totally deaf, sitting one day near a harpsichord, while some one was playing—and having a tobacco-pipe in his mouth, the bowl of which rested accidentally against the body of the instrument—was surprised to hear all the notes most distinctly. By a little reflection and practice, he again attained the use of this valuable
[pg 69] sense; for he soon learned—by means of a piece of hard wood, one end of which he placed against his teeth, while another person placed the other end on *his* teeth—to keep up a conversation, and to be able to understand the least whisper. The effect thus described is the same, if the person who speaks rests his stick against his throat or his breast; or when one rests the stick which he holds in his teeth against some vessel into which the other speaks.

DRYING WOOD FOR VIOLINS.

Some amusing instances are related of the efficiency of "the Application of Heated Currents to Manufacturing and other Purposes," once patented by Davison and Symington. Thus, a violin had been in the owner's possession for upwards of sixteen years, how old it was when he first had it is not known. Upon being exposed to this process, it lost in eight hours no less than five-sixths (nearly five and two-thirds) per cent. of its weight. This there is every reason to believe was owing to the blocks glued inside, for the purpose of holding the more slender parts together. Instrument makers would do well to see that all parts, however mean their position in the instrument, are properly seasoned, or divested of moisture; for surely water cannot improve sound.

A violin-maker of high reputation, having an order to make an instrument for one of the first violinists of the day, was requested to have the wood seasoned by the new process; only three days were
[pg 70] allowed for the experiment, in which the wood was seasoned and sent home. The two heaviest pieces were reduced in weight 2-1/2lbs., which is equal to two pints of water.

It is ascertained that, by this means of drying, the effect of age has been given to the instrument made from the above wood; and it became *first fiddle* in the orchestra of Her Majesty's Theatre. The wood had been in the possession of its owners for eight years; and it was sent from Switzerland, in the first instance, as dry wood.[6]

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[6] In proof of the economy of Messrs. Davison and Symington's invention applied to the manufacture and cleansing of brewers' casks, it is stated that through its adoption at Truman's brewery, Spitalfields, a saving of 300 tons of coals was effected annually.

COLUMBUS'S OWN SHIP JOURNAL.

Columbus has left us some charming descriptions of his own discoveries; though it is only recently that we have obtained the knowledge of his own ship's journal, of his letters to the treasurer Sanchez, to Donna Juana de la Torre, governess of the infant Don Juan, and to Queen Isabella. Humboldt has sought to show with how deep a feeling and perception of the forms and the beauty of nature the great discoverer was endowed, and how he described the face of the earth, and the "new heaven" which opened to his view, with a beauty and simplicity of expression which can only be fully appreciated by those who are familiar with the ancient force of the language as it existed at the period.

[pg 71] The aspect and the physiognomy of the vegetation, the impenetrable thickets of the forest, "in which one can hardly distinguish which are the flowers and leaves belonging to each stem;" the wild luxuriance which clothed the humid shores; the rose-coloured flamingoes fishing at the mouth of the rivers in the early morning, and giving animation to the landscape, attract the attention of the old navigator while sailing along the coast of Cuba, between the small Lucayan islands and the Jardinillos. Each newly-discovered land appears to him still more beautiful than those he had before described; he complains that he cannot find words in which to record the sweet impressions which he has received.

"The loveliness of this new land," says the discoverer, "far surpasses that of the Campina de Cordoba. The trees are all bright with ever-verdant foliage, and perpetually laden with fruits. The plants on the ground are tall and full of blossoms. The breezes are mild like those in April in Castille; the nightingales sing more sweetly than I can describe. At night, other small birds sing sweetly, and I also hear our grasshoppers and frogs. Once I came into a deeply-enclosed harbour, and saw high mountains which no human eye had seen before, from which lovely waters streamed down. The mountain was covered with firs, pines, and other trees of very various form, and adorned with beautiful flowers. Ascending the river, which poured itself into the bay, I was astonished at the cool shade, the crystal clear water, and the number of singing birds. It seemed as if I could never quit a
[pg 72] spot so delightful—as if a thousand tongues would fail to describe it, as if the spell-bound hand would refuse to write."

We have here, from the journal of an unlettered seaman, the power which the beauty of nature, manifested in her individual forms, may exert on a susceptible mind. Feelings ennoble language; for the prose of the admiral, especially when, on his fourth voyage, at the age of 67, he relates his wonderful dream on the coast of Veragua, is, if not more eloquent, yet far more moving, than the allegorical pastoral romance of Boccacio and the two Arcadias of Sannazaro and Sydney; than Garcilasso's Salicio y Nemoroso; or than the Diana of Jorge de Montemayor.

EARLY INCITEMENTS TO A SCIENTIFIC STUDY OF NATURE.

Baron Humboldt, in the opening of his *Cosmos*, vol. ii., recalls the lessons of experience, which tell us how often impressions received by the senses from circumstances, seemingly accidental, have so acted on the youthful mind as to determine the whole direction of the man's course through life. Childish pleasure, in the form of countries and of seas, as delineated in maps; the desire to behold those southern constellations which have never risen in our horizon; the sight of palms and of the cedars of Lebanon, figured in a pictorial Bible, may have implanted in the spirit the first impulse to travel in distant lands.

[pg 73] "If I might (says Humboldt) have recourse to my own experience, and say what awakened in me the first beginnings of an inextinguishable longing to visit the tropics, I should name George Forster's descriptions of the islands of the Pacific—paintings, by Hodge, in the house of Warren Hastings, in London, representing the banks of the Ganges—and a colossal dragon-tree in an old tower of the Botanic Gardens at Berlin."

THE RIGHTS OF WHITEBAIT.

Formerly, whitebait were considered to be the young of the shad; and only of late years has the misnamed fish taken its proper position. It appears that Mr. Yarrell, the able naturalist, was one morning in March struck with the early appearance of whitebait in a fishmonger's shop in St. James's; and knowing that shads, which they were supposed to be, did not make their appearance till much later (May), he took up the matter, and persevered in a course of investigation, which lasted from March to August, 1828. The specific distinction between the two fishes, on which Mr. Yarrell relies as of the greatest value, is the difference of their anatomical character; and especially in the number of vertebræ, or small bones, extending from the back-bone. "The number of vertebræ in the shad," he states, "of whatever size the specimen may be, is invariably fifty-five, while the number in the whitebait is uniformly fifty-six; even in a fish of two inches, with the assistance of a lens, their exact number may be distinctly made out."

CATCHING ELECTRIC EELS.

Humboldt gives a very interesting narrative of the mode of the capture of the gymnoti employed by the Indians of South America. This is done by rousing the eels by driving horses and mules into the ponds which those fish inhabit, and harpooning them when they have exhausted their electricity upon the unhappy quadrupeds.

"I wished," says Humboldt, "that a clever artist could have depicted the most animated period of the attack; the groups of Indians surrounding the pond, the horses, with their manes erect, and eye-balls wild with pain and fright, striving to escape from the electric storm which they had roused, and driven back by the shouts and long whips of the excited Indians, the livid yellow eels, like great water-snakes, swimming near the surface, and pursuing their enemy: all these objects presented a most picturesque and exciting *ensemble*. In less than five minutes, two horses were killed: the eel, being more than five feet in length, glides beneath the body of the horse, and discharges the whole strength of its electric organ; it attacks at the same time the heart, the digestive viscera, and above all, the gastric plexus of nerves. I thought the scene would have had a tragic termination, and expected to see most of the quadrupeds killed; but the Indians assured me that the fishing would soon be finished, and that only the first attack of the gymnoti was really formidable. In fact, after the conflict had lasted a quarter of an hour, the mules and horses appeared less alarmed; they no longer erected their manes, and their eyes expressed less pain and terror. One no longer saw them struck down in the water; the eels, instead of swimming to the attack, retreated from their assailants, and approached the shore."

The Indians now began to use their missiles; and by means of the long cord attached to the harpoon, jerked the fish out of the water without receiving any shock so long as the cord was dry. All the
[pg 75] circumstances narrated by Humboldt establish the close analogy between the gymnotus and torpedo in the vital phenomenon attending the exercise of their extraordinary means of offence. The exercise is voluntary and exhaustive of the nervous energy; and, like voluntary muscular effort, it needs repose and nourishment to produce a fresh accumulation.

SIR WILLIAM HERSCHEL'S FIRST TELESCOPE.

Sir William Herschel arrived in England from Hanover, his birth-place, about the end of the year 1759, when he was in his 21st year. He was bred a professor of music, and went to live at Halifax, where he acquired, by his own application, a considerable knowledge of mathematics; and, having studied astronomy and optics in the popular writings of Ferguson, he was anxious to witness with his own eyes the wonders of the planetary system. He accordingly borrowed of a friend a telescope, two feet in focal length; and, having directed it to the heavens, he was so delighted with the actual sight of phenomena, which he had previously known only from books, that he commissioned a friend to purchase for him in London a telescope, with a high magnifying power. Fortunately for science, the price of such an instrument greatly exceeded his means, and he immediately resolved to construct a telescope with his own hands. After encountering the difficulties which every amateur at first experiences, in the casting, grinding, and polishing, of metallic specula for reflecting telescopes, he [pg 76] completed, in 1776, a reflecting instrument, *five feet* in focal length, with which he was able to observe the ring of Saturn, and the satellites and belts of Jupiter. This telescope was completed when he resided at Bath, where he acquired by degrees, and in his leisure hours, that practical knowledge of optics and mechanics which was necessary for such a task.

His experience in this scientific art was of the most remarkable kind; and, by 1781, he had constructed so many telescopes, as to be better furnished with the means of surveying the heavens than were possessed by any other astronomer, in either of the fixed observatories in Europe.

WONDERS OF AUSTRALIA.

Sydney Smith has thus sketched a few of the natural wonders of this new world:—"In this remote part of the earth, Nature (having made horses, oxen, ducks, geese, oaks, elms, and all regular and useful productions, for the rest of the world) seems determined to have a bit of play, and to amuse herself as she pleases. Accordingly, she makes cherries with the stone outside; and a monstrous animal, as tall as a grenadier, with the head of a rabbit, a tail as big as a bedpost, hopping along at the rate of five hops to a mile, with three or four young kangaroos looking out of its false uterus, to see what is passing. Then comes a quadruped, as big as a large cat, with the eyes, colour, and skin of a mole, and the bill and web-feet of a duck, puzzling Dr. Shaw, and rendering the latter half of his life miserable, [pg 77] from his utter inability to determine whether it was a bird or a beast. Add to this, a parrot with the legs of a sea-gull; a skate with the head of a shark; and a bird of such monstrous dimensions, that a side-bone of it will dine three real carnivorous Englishmen;—together with many other productions that, on the discovery of the country, agitated Sir Joseph Banks, and filled him with emotions of distress and delight."

VICISSITUDES OF MINING.

Humboldt relates of a Frenchman, Joseph Laborde, that he went to Mexico very poor in 1743, and acquired a large fortune in a very short time by the mine of La Canada. After building a church at Tasco, which cost him 84,000*l.*, he was reduced to the lowest poverty by the rapid decline of those very mines, from which he had annually drawn from 130,000 to 190,000 pounds' weight of silver. With a sum of 20,000l., raised by selling a *sun* of solid gold, which, in his prosperity, he had presented to the church, and which he was allowed by the archbishop to withdraw, he undertook to clear out an old mine, in doing which he lost the greatest part of the produce of this golden sun, and then abandoned the work. With the small sum remaining, he once more ventured on another undertaking, which was, for a short time, highly productive; and he left behind him, at his death, a fortune of 120,000*l.*

TROPICAL DELIGHTS.

[pg 78]

What a ludicrous picture has Sydney Smith drawn of the animal annoyance of tropical climates. "Insects," he says, "are their curse. The bete rouge lays the foundation of a tremendous ulcer. In a moment, you are covered with ticks. Chigoes bury themselves in your flesh, and hatch a large colony of young chigoes in a few hours. They will not live together, but every chigoe sets up a separate ulcer, and has his own private portion of pus. Flies get into your mouth, into your eyes, into your nose; you eat flies, drink flies, and breathe flies. Lizards, cockroaches, and snakes get into your bed; ants eat up the books; scorpions sting you on the foot. Everything bites, stings, or bruises. Every second of your existence, you are wounded by some piece of animal life, that nobody has ever seen before, except Swammerdam and Merian. An insect with eleven legs is swimming in your tea-cup; a nondescript, with nine wings, is struggling in the small-beer; or a caterpillar, with several dozen of eyes in his belly, is hastening over the bread and butter. All nature is alive, and seems to be gathering all her entomological hosts to eat you up, as you are standing, out of your coat, waistcoat, and breeches. Such are the tropics. All this reconciles us to our dews, fogs, vapours, and drizzle; to our apothecaries rushing about with gargles and tinctures; to our old British constitutional coughs, sore throats, and swelled faces."

INVENTION OF THE DIVING-BELL.

[pg 79]

In the United States of America, generally, and to some extent in England, the invention of the diving-bell has been attributed to Sir William Phipps; who was, however, one of the first persons who used the bell advantageously, in recovering nearly 300,000l. treasure from a Spanish wreck, near the Bahamas. The *invention*, or the earliest use of the diving-bell, dates from upwards of a century before the birth of Phipps; the first instance of its use being at Cadiz, in the presence of Charles V., in 1538; whereas Phipps was born at Pemaguid, in America, in 1650. There is, likewise, another popular error, that the Mulgrave family, of which the present head is the Marquess of Normanby, descended from Sir William Phipps; the founder of the Mulgrave family being Phipps, one of the earliest explorers of the Arctic regions.

EXPERIMENTS WITH AN ELECTRIC EEL.

In 1838 there was brought to London, and exhibited at the Adelaide Gallery, in the Strand, a living specimen of the electric eel, or gymnotus, being the first received in this country alive within the present century. It was fed upon fish, and occasionally with bullock's blood, and was kept warm by water, artificially heated. With this eel several interesting experiments were made, allowing periods of rest from a week to a month between each set. One of these is thus described:—

"I was so fortunate (says Professor Owen) as to witness the experiments performed by Professor Faraday on the large gymnotus which was so long preserved at the Adelaide Gallery, in London. That the most powerful shocks were received when the one hand grasped the head, and the other hand the
[pg 80] tail of the gymnotus, I had painful experience, especially at the wrists, the elbow, and across the back. But our distinguished experimenter showed us that the nearer the hands were together, within certain limits, the less powerful was the shock. He demonstrated by the galvanometer that the direction of the electric current was always from the anterior parts of the animal to the posterior parts, and that the person touching the fish with both hands received only the discharge of the parts of the organs included between the points of contact. Needles were converted into magnets; iodine was obtained by polar decomposition of iodide of potassium; and availing himself of this test, Professor Faraday showed that any given part of the organ is negative to other parts before it, and positive to such as are behind it. Finally, heat was evolved, and the electric spark obtained."

TALENT AND OPPORTUNITY.

Previous to the year 1706, the brass ordnance for the British Government was cast at the foundry in Moorfields; but an accident which occurred there at the above date, led to the removal of the foundry to Woolwich. The circumstances connected with this change are interesting, as well as instructive.

It appears that a great number of persons had assembled to witness the re-casting of the cannon taken by the Duke of Marlborough from the French; and there happened to be among them, a young German artisan in metal, named Schalch. Observing some moisture in the moulds, he pointed out to
[pg 81] the spectators around him the danger likely to ensue from an explosion of steam, when the moulds were filled with the heated metal; and at the instigation of his friends, this apprehension was conveyed through Colonel Armstrong, major-general of the Ordnance, to the Duke of Richmond, then in attendance, as the head of the department. This warning was, however, disregarded; but Schalch retired from the spot with as many of the bystanders as he could persuade to accompany him. They had not proceeded far before the furnaces were opened, and, as Schalch had foretold, a dreadful explosion ensued. The water in the moulds was converted into steam, which from its expansive force caused a fiery stream of liquid metal to dart out in every direction. Part of the roof of the building was blown off, and the galleries that had been erected for the company were swept to the ground. Most of the foundrymen were terribly burnt; some were killed; and many of the spectators were severely injured.

A few days afterwards, in answer to an advertisement in the newspapers, Schalch waited upon Colonel Armstrong, and was informed by him that the Board of Ordnance contemplated building a new foundry, and had determined, from the representations made to them of Schalch's ability, to offer him the superintendence of its erection, and the management of the entire establishment, when completed. Schalch readily accepted the appointment: he fixed upon the Warren at Woolwich, as the most eligible site for the new building; and the ordnance which were cast here under his direction
[pg 82] were highly approved of. Thus, almost by mere chance, was the young German appointed to a situation of great trust and emolument, which he filled so ably, that during the many years he was superintendent of the Royal Arsenal, not a single accident occurred, amidst all the dangerous operations of gun-casting. He retired, after sixty years service, to Charlton, where he died; and his tomb may be seen in Woolwich church-yard.

TRAVELLING IN THE HIMALEH MOUNTAINS.

The perils of the heights and passes of the Himâleh are truly frightful. At Boorendo, 15,171 feet in height, one of the safest and most frequented of the passes, the guides point out a spot where upwards of twenty persons, returning from Koonacour with salt, a few years since, perished at once: they were overtaken by a fall of snow when on the other side, but they preferred trying the pass to making a circuit of six or seven days' journey; the wind got up, and they were so benumbed with cold by the time they reached the trees, that they were unable to strike a light, and slept to wake no more.

The road to Ludak is passable in the middle of winter, and is never shut by snow; but there are frightful accounts of frosts on this route. As protection against these perils, travellers clothe themselves in their journeys with a winter-dress, which is so heavy that it scarcely seems possible for them to walk. Putee Ram, a traveller, is described as wearing a garment of lambskin, called Lapka, [pg 83] with sleeves; the fleecy side was inward, and the exterior covered with sooklat, a kind of warm blanket, dyed blue. There were trousers of the same, long woollen stockings, and over them the usual kind of boots, the foot part stuffed with two inches of wool; and gloves of thick flannel reaching above the elbows; in addition to this, he had a blanket round his waist, another thrown on his shoulders, and a shawl wrapt over his cap and part of his face; such, he said, was the usual garb of a traveller in the winter season; adding, that he was always accompanied by a mule-load of blankets and another Lapka, all of which were required at night, when he was obliged to sleep under the snow.

GOLD IN SIBERIA.

The reign of the Emperor Nicholas has been distinguished by the important discovery, that portions of the great *eastern* regions of Siberia are highly auriferous; viz., the government of Tomsk and Teniseik, where low ridges, similarly constructed to those on the eastern flank of the Ural, and like them, trending from north to south, appear as offsets from the great east and west chain of the Altai, which separates Siberia from China. And here, it is curious to remark, that a very few years ago, this distant region did not afford a third part of the gold which the Ural produced; but by recent researches, an augmentation so rapid and extraordinary has taken place, that in 1843 the eastern Siberian tract yielded considerably upwards of two-and-a-quarter millions sterling, raising the total gold produce of the Russian empire to nearly *three millions sterling*!—*Sir R. I. Murchison*.

COMBINATIONS OF THE KALEIDOSCOPE.

The system of endless changes is one of the most astonishing properties of the Kaleidoscope. With a number of loose objects—pieces of glass, for example,—it is possible to reproduce any figure we have admired, when it is once lost. Centuries may elapse before the same combination returns; if the objects, however, are placed in the cell so as to have very little motion, the same figure may be recalled, and if actually fixed, the same pattern will return in every evolution of the object-plate. A calculation of the number of forms is given upon the ordinary principles of combination; namely, that twenty-four pieces of glass may be combined 13,917,242,888,872,552,999,425,128,493,402,200 times —an operation the performance of which would take hundreds of thousands of millions of years, even upon the supposition that twenty combinations were effected every minute!

"THE MEANS TO THE END."

From the abundance of clay upon its site, London is, as might be expected, a brick-built city; although the ingenuity of our age has cased miles of streets with cement, to imitate stone. This prevalence of clay is, in great measure, explanatory of the vastness of the metropolis. It is nowhere better illustrated than in the fact of "the Five Fields," (between Pimlico and Chelsea,) formerly a clayey swamp, being now the site of some of the finest mansions in London. A few years ago, the clay retained so much
[pg 85] water that no one would build there, and "the Fields" were the terror of foot-passengers proceeding from Westminster to Chelsea after nightfall. At length, Mr. Cubitt, on examining the strata, found them to consist of clay and gravel, of inconsiderable depth. *The clay he removed, and burned into bricks; and by building upon the substratum of gravel, he converted this spot from the most unhealthy to one of the most healthy*, to the immense advantage of the ground landlord and the whole metropolis. This is one of the most perfect adaptations of the means to the end, to be found in the records of the building art.

INDIA RUBBER, A CENTURY AND A HALF SINCE.

Every generation is wisest in its own conceit, and the present is continually overrated at the expense of the past. Who would have thought that India rubber cloaks were worn in South America upwards of a century since? yet such, forsooth, is the plain fact of history; and disinclined as we are to rob Mr. Macintosh of the merit of his adaptation, the invention must be awarded to another age; indeed, it is almost one of the antiquities of the New World. In a work entitled *La Monarchia Indiana*, printed at Madrid in 1723, we find a chapter devoted to "Very profitable trees in New Spain, from which there distil various liquors and resins." Among them is described a tree called *ulquahuill*, which the natives cut with a hatchet, to obtain the white, thick, and adhesive milk. This when coagulated, they made
[pg 86] into balls, called *ulli*, which rebounded very high, when struck to the ground, and were used in various games. It was also made into shoes and sandals. The author continues:—"Our people (the Spaniards) make use of their *ulli* to varnish their *cloaks*, made of hempen cloth, *for wet weather*, which are good to resist water, but not against the sun, by whose heat and rays the *ulli* is dissolved."

India rubber is not known in Mexico at the present day by any other name than that of *ulli*. And the oiled silk covering of hats very generally worn throughout the country by travellers is always called *ulli*.

BALLOON VOYAGE FROM LONDON TO NASSAU.

On Monday, November 7, 1836, Mr. Monck Mason and Mr. Robert Holland accompanied Mr. Green in his large balloon from London to Weilburg, in the grand duchy of Nassau, in Germany, an extent of 500 British miles, achieved in the short space of eighteen hours. The route lay through a considerable portion of the five kingdoms of England, France, Belgium, Prussia, Germany, and the Archduchy of Nassau; whilst a long succession of cities, including London, Rochester, Canterbury, Dover, Calais, Cassel, Ypres, Courtray, Lille, Oudenarde, Ath, and Brussels, (with the renowned fields of Waterloo and Genappe,) Namur, Liege, Spa, Malmedy, Coblentz, and a whole host of intermediate villages, were all brought within the compass of the aeronauts' horizon; their superior elevation and various
[pg 87]
aberrations enabling them to extend far beyond what might be expected from a hasty consideration of the line connecting the two extremities of the route. The voyagers returned to London by steam, and Mr. Monck Mason afterwards published an interesting narrative of the æronautical voyage.

The appearance which the balloon exhibited previous to the ascent was very strange. Provisions calculated for a fortnight's consumption, in case of emergency; ballast to the amount of upwards of a ton in weight, disposed in bags of different sizes, duly registered and marked; together with an unusual supply of cordage, implements, and other accessories to an aërial excursion, occupied the bottom of the car: while, all around the hoop, and elsewhere appended, hung cloaks, carpet-bags, barrels of wood and copper, a coffee-warmer by means of slaked lime, barometers, telescopes, lamps, wine and spirit flasks, with many other articles designed to serve the purposes of a voyage to regions where, once forgotten, nothing could be supplied.

ANTIQUITY OF REFINED SUGAR.

It appears from the accounts of the Chamberlain of Scotland, published from the originals in the Exchequer, that in the year 1329, *loaves of sugar* were sold in Scotland at the price of 1s. 9-1/2d. (more than an ounce of standard silver) per lb. Stow's *Survey of London* states sugar refining to have been commenced in England about 1544; and upwards of four centuries since we find Margaret Paston writing to her husband from Norwich thus:—"I pray, that ye will vouchsafe to send me another sugar-loaf, for my old one is done."

CLEARNESS OF THE SKY AT THE CAPE OF GOOD HOPE.

An observer states that in forty-two successive days at the Cape, there were only three in which he could not see Venus in broad daylight. Sir John Herschel assures us that he has written a letter by the light of an eclipse of the moon. Under these circumstances, the starry heavens presented a brilliance, of which the inhabitants of the northern hemisphere can have no conception; the line from Orion to Antinous being remarkably rich and brilliant, and appearing as a continuous blaze of light; with, however, a few patches of the sky destitute of stars.

INTRODUCTION OF THE POTATO.

The history of the potato affords a strong illustration of the influence of authority. For more than two centuries, the use of this invaluable plant was vehemently opposed: at last, Louis XV. wore a bunch of its blossoms in the midst of his courtiers, and the consumption of the root became universal in France.

FARADAY, AS A LECTURER.

Von Raumer acutely observes:—"Mr. Faraday is not only a man of profound chemical and physical science, (which all Europe knows), but a very remarkable lecturer. He speaks with ease and freedom, but not with a gossiping unequal tone, alternately inaudible and bawling, as some very learned
[pg 89] professors do; he delivers himself with clearness, precision, and ability. Moreover, he speaks his language in a manner which confirmed me in a secret suspicion I had, that a great number of Englishmen speak it very badly. Why is it that French in the mouth of Mdlle. Mars, German in that of Tieck, and English in that of Faraday, seems a totally different language? Because they articulate what other people swallow or chew. It is a shame that the power and harmony of simple speech (I am not talking of eloquence, but of vowels and consonants), that the tones and inflexions which God has given to the human voice, should be so neglected and abused. And those who think they do them full justice—preachers—generally give us only the long straw of pretended connoisseurs, instead of the chopped straw of the dilettanti."

THE RAILWAY SYSTEM SUGGESTED.

A striking suggestion of the extension of railway communication into a "system," as connecting lines are now called, will be found in Sir Richard Phillips's *Morning's Walk from London to Kew*, published in 1813. On reaching the Surrey Iron Railway at Wandsworth, Sir Richard records: "I found renewed delight on witnessing, at this place, the economy of horse labour on the Iron Railway. Yet a heavy sigh escaped me, as I thought of the inconceivable millions which have been spent about Malta, four or five of which might have been the means of extending *double lines of iron railway* from London to Edinburgh, Glasgow, Holyhead, Milford, Falmouth, Yarmouth, Dover, and Portsmouth! A reward of a [pg 90] single thousand would have supplied coaches and other vehicles, of various degrees of speed, with the best tackle for readily turning out; and we might, ere this, have witnessed our mail coaches running at the rate of 10 miles an hour, drawn by a single horse, or *impelled 15 miles an hour by Blenkinsop's steam-engine*. Such would have been a legitimate motive for overstepping the income of a nation; and the completion of so great and useful a work would have afforded rational ground for public triumph in general jubilees!"

The writer of these penetrative remarks lived until 1840, so that he had the gratification of witnessing a triumph akin to his long-cherished hope.

LORD BROUGHAM'S BLUNDERS.

Dr. Young's theory of light was treated with the most sovereign contempt by Lord Brougham, in the earlier numbers of the *Edinburgh Review*; and Dr. Young died without reaping the honour of his discovery. The theory is now recognised as true; and M. Arago has formally vindicated Dr. Young from the noble critic's animadversions, in a discourse delivered at the French Institute.

In 1809, when the first application was made to Parliament on gas-lighting, the movers in the project were much opposed; a committee of the House of Commons was granted, but the application terminated unsuccessfully; and the testimony of Mr. Accum to the practicability of gas-lighting exposed him to the severe animadversions and ridicule of Mr. Brougham.

WHO FIRST DOUBLED THE CAPE OF GOOD HOPE?

"Why, Vasco de Gama, to be sure"—perhaps, the reader will reply. In Portugal, however, a much more ancient navigator has been mentioned. Vieyra, an old preacher of great renown at Lisbon, said in one of his sermons:—"One man only passed the Cape of Good Hope before the Portuguese. And who was he? and how? It was Jonah, in the whale's belly. The whale (or rather great fish) went out of the Mediterranean because he had no other course; he kept the coast of Africa on the left, scoured along Ethiopia, passed by Arabia, took post in the Euphrates, on the shores of Nineveh, and, making his tongue serve as a plank, landed the prophet there."

THE FIRST KALEIDOSCOPE.

When, by a happy accident, Sir David Brewster had discovered the leading principles of the kaleidoscope while repeating Biot's experiments on the action of fluids upon light, he constructed an instrument in which he fixed permanently, across the ends of the reflectors, pieces of coloured glass, and other irregular objects. But it was not till some time afterwards that the great step towards the completion of the instrument was made, in the idea of giving motion to these objects, which were placed loosely in a cell at the end of the instrument. When this idea was carried into execution, the [pg 92] kaleidoscope in its simple form was completed. The next and by far the most important step of the invention was, to employ a draw tube and lens, by means of which beautiful forms could be created from objects of all sizes, and at all distances from the observer. In this way, the power of the kaleidoscope was indefinitely extended, and every object in nature could be introduced into the picture, in the same manner as if these objects had been reduced in size, and actually placed at the end of the reflector.

FERGUSON AND HIS WIFE.

James Ferguson and his wife led a cat-and-dog life, and she is not once alluded to in the philosopher's autobiography. About the year 1750, one evening, while he was delivering to a London audience a lecture on astronomy, his wife entered the room in a passion, and maliciously overturned several pieces of the apparatus; when all the notice Ferguson took of the catastrophe was the observation to the audience—"Ladies and gentlemen, I have the misfortune to be married to this woman."

A DESCENT IN A DIVING-BELL.

Sir George Head, in his shrewdly humorous *Home Tour*, gives an amusing picture of a pair of operative divers whom he saw in the Hull docks. Sir George was passing as the workmen were raising the diving-bell, when he stepped into the lighter to observe the state of the labourers on their return
[pg 93] from below. He had a remarkably good view of their features, at a time when they had no reason to expect any one was looking at them; for, as the bell was raised very slowly, he had an opportunity of seeing within it, by stooping, the moment its side was above the gunwale of the lighter. But, Sir George shall relate what he saw:—

"A pair of easy-going, careless fellows, each with a red nightcap on his head, sat opposite one another, by no means over-heated or exhausted, and apparently with no other want in the world than that of 'summut to drink;' they had been under water exactly two hours. I asked them what were their sensations on going down? They said that, before a man was used to it, it produced a feeling as if the ears were bursting; that, on the bell first dipping, they were in the habit of holding their noses; at the same time of breathing as gently as possible, and that thus they prevented any disagreeable effect: they added, the air below was hot, and made a man thirsty;—the latter observation, though in duty bound I received as a hint, I believe to be true; nevertheless, the service cannot be formidable, as the extra pay is only one shilling per day. Had there been any thing extraordinary to see below, I should have asked permission to go down; but the water was by no means clear, and the muddy bottom of the docks was not a sufficient recompence for the disagreeable sensation. Two men descend at a time, and four pump the air into the bell through the leathern hose; the bell is nearly a square, or rather an oblong, vessel of cast-iron, with ten bull's-eye lights at the top, which lights are fortified within by a lattice of strong iron wire, sufficient to resist an accidental blow of a crowbar, or other casualty.—Notwithstanding the great improvements made in diving-bells since their invention, after all precautions, a man in a diving-bell is, certainly, in a state of awful dependence upon human aid: in case of the slightest accident to the air-pump, or even a single stitch of the leathern hose giving way, long before the ponderous vessel could be raised to the surface, life must be extinct."

SIR HUMPHRY DAVY AN ANGLER.

[pg 94] Laybach, in Styria, is interesting, for having been the retreat of Sir Humphry Davy not long before his death: he resided in an hotel here, and the pretty daughter of the hostess relates several anecdotes of him. He was a most indefatigable angler: his extraordinary success in transferring the trout to his basket procured for him the title of "the English wizard;" and the scared peasants, who could never understand by what artificial means he caught the fish, shunned him as if he had been his Satanic majesty. He spent the greater part of the day in angling, or in geologizing among the mountains; he generally passed his evenings in the company of his hostess' pretty daughter, who made his tea, and was his antagonist at écarté, or some other light game; and the maid of the inn played her cards so well, that she secured a handsome legacy from the philosopher in his will.

MISS CAROLINE LUCRETIA HERSCHEL.

This very interesting lady died at Hanover on the 9th of January, 1848, in the 98th year of her age. She was the sister of Sir William Herschel; and consequently, aunt to Sir John Herschel, the present representative of this truly scientific family.

Miss Herschel was the constant companion of her brother, and sole assistant of his astronomical labours, to the success of which her indefatigable zeal, diligence, and singular accuracy of calculation, not a little contributed. From the first commencement of his astronomical pursuits, her attendance on both his daily labours and nightly watches was put in requisition; and was found so useful, that on
[pg 95] Herschel's removal from Bath to Datchet, and subsequently to Slough, he being then occupied with the review of the heavens and other researches, she performed the whole of the arduous duties of his astronomical assistant; not only reading the clocks and noting down all the observations from dictation as an amanuensis, but subsequently executing the extensive and laborious numerical calculations necessary to render them available to science. For the performance of these duties, his majesty King George the Third was pleased to place her in the receipt of a salary sufficient for her singularly moderate wants and retired habits.

Arduous, however, as these occupations must appear, especially when it is considered that her brother's observations were always carried on (circumstances permitting) till daybreak, without regard to season, and indeed chiefly in winter, they proved insufficient to exhaust her activity. In the intervals, she found time both for astronomical observations of her own, and for the execution of more than one work of great extent and utility. The observations she made with a small Newtonian sweeper, constructed for her by her brother, with which she found no less than eight comets; and on five of these occasions her claim to the *first* discovery is admitted. These sweeps also proved productive of the detection of several remarkable nebulæ and clusters of stars, previously unobserved.

On her brother's death, in 1822, Miss Herschel returned to Hanover, which she never again quitted; passing the last twenty-six years of her life in repose—enjoying the society, and cherished by the
[pg 96] regard of, her remaining relatives and friends; gratified by the occasional visits of eminent astronomers, and honoured with many marks of favour and distinction on the part of the King of Hanover, the Crown Prince, and his amiable and illustrious consort. To within a very short period of her death, her health continued uninterrupted, her faculties perfect, and her memory (especially of the scenes and circumstances of former days) remarkably clear and distinct. Her end was tranquil and free from suffering—a simple cessation of life.

We append the following just and eloquent tribute to the merits of Miss Herschel, from Dr. Nichol's "Views of the Architecture of the Heavens:"—

"The astronomer (Sir William Herschel), during these engrossing nights, was constantly assisted in his labours by a devoted maiden sister, who braved with him the inclemency of the weather—who heroically shared his privations that she might participate in his delights—whose pen, we are told, committed to paper his notes of observations as they issued from his lips; 'she it was,' says the best of authorities, 'who, having passed the nights near the telescope, took the rough manuscripts to her cottage at the dawn of day, and produced a fair copy of the night's work on the ensuing morning; she it was who planned the labour of each succeeding night, who reduced every observation, made every calculation, and kept everything in systematic order;' she it was—Miss Caroline Herschel—who helped our astronomer to gather an imperishable name. This venerable lady has in one respect been more fortunate than her brother; she has lived to reap the full harvest of their joint glory. Some years ago, the gold medal of our Astronomical Society was transmitted to her at her native Hanover, whither she removed after Sir William's death; and the same learned Society has recently inscribed her name upon its roll: but she has been rewarded by yet more, by what she will value beyond all earthly pleasures; she has lived to see her favourite nephew, him who grew up under her eye unto an astronomer, gather around him the highest hopes of scientific Europe, and prove himself fully equal to tread in the footsteps of his father."

[pg 97]

TYCHO BRAHE'S CREDULITY.

This great astronomer strongly—and weakly—believed in the predictions of astrology. If, when he went abroad, he met an old woman, or a hare crossed his path, he would turn back, being persuaded that evil was threatened him.

INVENTION OF THE TELESCOPE, AND EARLY DISCOVERIES WITH IT.

It is singular that the epoch of the most extensive discoveries upon the surface of our planet was immediately succeeded by man's first taking possession of a considerable part of the celestial spaces by the telescope. The powers of this instrument have not yet reached their limit. The feeble commencement, however hardly magnifying as much as thirty-two times in linear dimension, enabled astronomers to penetrate into cosmical depths, before unknown. The accidental discovery of the space-penetrating power of the telescope was first made in Holland, probably as early as the close of 1608. According to the latest documentary investigations, this great invention may be claimed by Hans Lippershey, a native of Wesel and a spectacle-maker at Middelburg, who, on the 2nd of October, 1608, offered to the States-General certain instruments "with which one can see to a distance." Two other persons, Adrienz and Jansen, made a similar offer, nearly at the same time.

When the news of the Dutch invention reached Venice, Galileo was accidentally present; he at once
[pg 98] divined what were the essential conditions of the construction, and immediately completed a telescope at Padua for his own use. He directed it first to the mountains in the moon; then examined with small magnifying powers the group of the Pleiades, the cluster of stars in Cancer, the Milky Way, and the group of stars in the head of Orion. Then followed in quick succession the great discovery of the four satellites of Jupiter, the two "handles" of Saturn, or his surrounding ring imperfectly seen, so that its true character was not at once recognised; the solar spots, and the crescent form of Venus. The occultations of the satellites, or their entrance into the shadow of Jupiter, led to the knowledge of the velocity of light; and led Galileo to perceive their importance in the determination of the longitude of places on land.

Galileo carried his first telescope to Venice, where his time for more than a month was employed in showing and explaining its nature to the different inhabitants. A ludicrous instance is related of the insatiable telescope mania which had seized on the people. Galileo went one day to the tower of St. Mark, in order to make observations on its summit, but the people espied him, and compelled him to hand a telescope which he had made for himself, from one to another, until all had gratified their curiosity by having a peep; and, after he had been detained several hours, he was not a little glad to regain his telescope, and return home. But this was not all: he heard them inquiring at what inn he lodged; and foreseeing the inconvenience of the celebrity which was beginning to attach to him, he
[pg 99] left Venice early the next morning, to pursue his observations with greater privacy.

Melancholy is it to relate that these brilliant disclosures brought temporary disgrace and positive suffering upon their author. Galileo, at the age of seventy-seven, after having devoted his life to useful and valuable labours, was forced to abjure his philosophical opinions, and to declare, on his knees, that he believed his doctrines concerning the motion of the earth round the sun, the existence of solar spots, &c., to be false and pernicious. The moral firmness of the old man was not sufficient to make him brave the terrors of the Inquisition, and we must therefore look with a lenient eye at this abjuration of doctrines which at the very moment he firmly believed to be true: but what shall we say of those men, who, under the plea of religion, could subject so noble a mind to such humiliating degradation!

IDENTITY OF BLACK AND GREEN TEA.

Green and Black Tea are produced from the same plant, though the botanists were long at issue about this matter. The idea of green tea being dried upon copper is proved to be a popular fallacy, for the tea would be flavoured and spoiled in the process; besides, the bloom can be given by harmless means. Dr. Lettsom, by the way, thought it was given by a vegetable process.

[pg 100]

Mr. Ball, who has written a practical volume on "the Cultivation and Manufacture of Tea," describes an experiment made by him, proving that tea may be dried *black and green*, at once, in the same vessel and over the same fire: he divided the pan, and the leaves on one side he kept in motion, and the other quiet—when the latter became black, and the former green; thus proving the difference of colour to be not derived from any management of heat, but from manipulation, the heat being the same in both cases.

At the same time, certain Chinese rogues glaze our hysons most unscrupulously; and it has been proved by chemical analysis, that the Chinese green teas are artificially coloured, though not with indigo, as represented by the green tea merchants. We may add, that gunpowder tea is dried at the highest temperature, and pekoe at the lowest; and the chemical cause of black tea is its loss of tannin in its drying, previous to roasting, an opinion that is supported by the testimony of Liebig. Again, Mr. Ball thinks there may be one species of tea plant, but several varieties, and that all botanical difference is destroyed in the course of packing.

PROTECTION BY RUST.

Rust is usually associated with decay. Professor Faraday, however, observes that, in some cases, it is curious to see how tin, a metal having a slight attraction for oxygen, protects other metals from oxidation or rust. In Canada, tin-plate is used for the roofs of houses, and you are dazzled by the lustre of the setting sun upon the roofs; whilst there, although it is exposed to the atmosphere year after year, it does not decay, because the superficial coat of oxide protects the tin and iron beneath.

THE LION EATEN AS FOOD.

Captain C. Kennedy, in his "Journey through Algeria and Tunis," notes:—"We were anxious to know if there was any chance of another lion being found in the neighbourhood, and were informed that doubtless there were plenty; but such was the nature of the ground, that, unless their exact haunts were known (in which case they were generally killed), we might go out for a fortnight, and never encounter a single beast. The skins of all lions killed throughout the regency are sent to the Bey, who pays a handsome premium upon each. The flesh is eaten: contrary to our expectation, we found it excellent, and made a capital supper upon the ends of the ribs, stewed with a little salt and red pepper; it tasted like very young beef, and was neither tough nor strong flavoured."

THE MOON SEEN THROUGH LORD ROSSE'S TELESCOPE.

In 1846, the Rev. Dr. Scoresby had the gratification of observing the moon through the stupendous telescope constructed by Lord Rosse, at Parsonstown. It appeared like a globe of molten silver, and every object of the extent of one hundred yards was quite visible. Edifices, therefore, of the size of York Minster, or even of the ruins of Whitby Abbey, might be easily perceived, if they had existed. But there was no appearance of anything of that nature; neither was there any indication of the existence
[pg 102] of water, or of an atmosphere. There were a great number of extinct volcanoes, several miles in breadth; through one of them there was a line of continuance about 150 miles in length, which ran in a straight direction, like a railway. The general appearance, however, was like one vast ruin of nature; and many of the pieces of rock driven out of the volcanoes, appeared to lie at various distances.

LONGEVITY OF THE BEETLE.

Some facts recently stated to the British Association may, perhaps, shake faith in the "corporal sufferance" of the beetle, whose cause has been so eloquently pleaded by Shakspeare. Sir G. Richardson has exhibited a beetle found imbedded in some artificial concrete, where it must have been at least sixteen years; yet, when the animal was brought to him, it was alive, and lived for six weeks after—the ordinary duration of the life of this species of beetle being but two or three years. Mr. Darwin left one of the same kind of beetles in a covered vessel for a year, without its being killed; he also dropped upon one hydrocyanic acid, but it walked off, quite unaffected by the poison.

TOTAL ECLIPSE OF THE SUN.

[pg 103]

Sagua La Grande, on the island of Cuba, was the only place where total darkness was produced by the eclipse of the sun, on the 25th of July, 1846. The eclipse phenomenon commenced at 9h. 41m. 32s. a.m., sky clear. As the time of the total darkness approached, all animated nature gave signs of approaching night, man only excepted. Still, the mirth of the gay donnas and senoras soon ceased; the slaves abandoned their occupations, and many fell on their knees. The darkness came on gradually, and at 17 minutes past 11, the sun was totally obscured. There stood the moon, covering the whole face of the sun, and presenting the appearance of a great black ball in the heavens, with rays of light diverging from behind it. The rays gave out a pale, aurora-like reflection upon the earth, resembling that cast by the moon when half-full. This lasted only fifty seconds; and, at a little past 12, the eclipse ended.

THE DIVING-BELL.

Was first used in Europe at Toledo, in Spain, in 1538, before Charles V. and 10,000 spectators. The experiment was made by two Greeks, who, taking a very large kettle suspended by ropes with the mouth downward, fixed planks in it, on which they placed themselves, and with a lighted candle gradually descended to a considerable depth.

RATE OF BALLOON TRAVELLING.

Mr. Green relates some singular experiences of the variety of currents in our atmosphere, influencing the rate of his aërial travelling. He has found that at a great elevation, the north-west current generally prevails throughout the year, without reference to the direction of the wind near the earth; this constant current being at an elevation of from 13,000 to 14,000 feet. This upper current carries
[pg 104] his balloon at the rate of six miles an hour; whilst the lower current wafts it at the rate of thirty miles an hour. He states, that in one of his ascents from Liverpool, he entered the constant current at an elevation of 14,000 feet, and descended into a lower south-east current at the height of 12,000 feet; the former carrying his balloon at the rate of five miles, and the latter at the rate of eighty miles an hour. He has travelled ninety-seven miles in fifty-eight minutes, and his speed has often been from sixty to eighty miles an hour.

SAFE DESCENT IN A PARACHUTE.

This feat, of very rare occurrence, was accomplished in September, 1838, when Mr. Hampton ascended with a parachute attached to a gas balloon, from Cheltenham, to the height of 9000 feet. At this altitude, he cut the connecting-cord, when the balloon rose for some hundred feet, and burst; Mr. Hampton safely descending in the parachute, within thirteen minutes; the collapsed balloon having reached the earth before him.

"FOSSIL RAIN."

In 1838, there was discovered at Liverpool, the impression of a fossil shower of rain upon sandstone. Dr. Buckland observes of the phenomenon:—"It could not be mistaken for ripple of the water, that was common enough: it had all the small-pox character, the pitted appearance, which a heavy shower of rain would leave, and which would be covered up by the next tide, and so preserved to future generations."

MELTING OF A WATCH BY LIGHTNING.

During a violent thunder-storm in 1844, a fishing-boat, belonging to one of the Shetland Islands, was struck by lightning. The electric fluid came down the mast, which it tore into shivers; and melted a watch in the pocket of a man who was sitting close by the side of the mast, without injuring him. Not only was the man altogether unhurt, but his clothes also were uninjured; and he was not aware of what had taken place until, on taking out his watch, he found it was fused into a mass!

THE INDIAN JUGGLERS' SECRET.

Lieutenant Hutton states, that the snakes which the Indian jugglers handle with impunity are drugged with opium, which renders them quiet and harmless. The effects of the drug will not wear off for a fortnight or three weeks; but a drugged snake which Lieutenant Hutton purchased, after the lapse of three weeks, flew at him unexpectedly, and nearly strangled him.

THE ART OF STEREOTYPE.

The first person mentioned as practising the modern art of stereotype, was a Dutchman, Van der Mey, who resided at Leyden about the end of the sixteenth century. He printed four books from solid plates; but at his death the art of preparing solid blocks was lost, or wholly neglected. In 1725, however, Mr. [pg 106] Ged, a jeweller of Edinburgh, apparently without knowledge of Van der Mey's performances, devised the plan of printing from plates; and in 1729 he entered into partnership with three other persons, for the purpose of prosecuting the art. A privilege was obtained by the company, from the University of Cambridge, to print Bibles and Prayer-books; but one of Ged's partners was so averse to the success of the plan, that he engaged such people for the work as he thought most likely to spoil it. The compositors wilfully made errors in correcting, and the pressmen battered the plates when the masters were absent. In consequence, the books were suppressed by authority, and the plates melted. Mr. Ged, with the help of his son, whom he had apprenticed to the printing trade, actually produced, in 1736, an 18mo edition of Sallust; and in 1742 another book was printed in Newcastle. But after the death of Ged and his son, the art again fell into disuse, till in 1780 it was revived by Mr. Tulloch of Glasgow, who practised it in partnership with Mr. Foulis, the University printer.

"RAINING TREES."

During Sir John Herschel's residence at the Cape of Good Hope, he often observed that on the windward side of the Table Mountain the clouds were spread out and descended very low, but frequently without any rain falling; while, on the lee-side they poured over the precipitous face of the mountain, producing as they rolled out, the well-known phenomenon of the table-cloth. Sir John, [pg 107] however, found that as he walked under fir-trees in the neighbourhood, while the clouds were closely overhead, he was subjected to a copious shower; but on coming from beneath the trees it was fair. On inquiring into the cause of this, he ascertained that the cloud was condensed on the trees, and thus the umbrella-shaped tops of the firs acted a part quite the reverse of our umbrellas in this country, for they wetted the person beneath them, instead of keeping him dry.

THE INVISIBLE DISPATCH.

The plan of writing with rice-water, to be rendered visible by the application of iodine, was practised with great success in the correspondence during the war in Affghanistan. The first letter of this kind was received from Jellalabad, concealed in a quill. On opening it, a small paper was unfolded, on which appeared only a single word, "iodine." The magic liquid was applied, and an important dispatch from Sir Robert Sale stood forth.

TAME HYÆNA.

When the traveller, Ignatius Pallme, was at Kordofan, he saw in the court of a house at Lobeid, a hyæna running about quite domesticated. The children of the proprietor tamed it, took the meat thrown to it for food out of its jaws, and put their hands even to its throat without receiving the slightest injury. When the family sat down to dinner in the open air, the animal approached the table,
[pg 108] and snapped up the pieces that were thrown to it, like a dog. A full-grown hyæna and her two cubs, on another occasion, were brought to our traveller for sale; the latter were carried in arms, as you might carry a lamb, and were not even muzzled. The old one, it is true, had a rope round her snout, but she had been led a distance of twelve miles by one man without offering the least resistance. The Africans do not even reckon the hyæna among the wild beasts of their country, for they are not afraid of it.

NOVEL TRAVELLING CARRIAGE.

In 1838, a carriage was built for a gentleman at Kensington, which, for completeness, equalled Sir Samuel Morland's celebrated cooking-carriage, of the seventeenth century. It was divided into two apartments, an anti-room, and a drawing-room and bed-chamber with every comfort. The anti-room contained a table, drawers, and culinary utensils; and the drawing-room was furnished with sofas, sofa-bedstead, six chairs, table, cupboards, and a chandelier for nine lights; a stove and fuel. The length of the carriage was twenty-nine feet, and the breadth nine feet; and the length of the drawing-room twenty-feet. The whole weighed two tons and a half.

ENEMIES OF THE OSTRICH.

The ostrich would appear to be a bird of many enemies, from the following statement in Sir J. E. Alexander's narrative of his Expedition of Discovery in South Africa:

[pg 109] "According to native testimony, the male ostrich sits on the nest (which is merely a hollow place scooped out in the sand) during the night, the better to defend the eggs from jackals and other nocturnal plunderers. Towards morning, he *brummels*, or utters a grumbling sound, for the female to come and take his place; and she sits on the eggs during the cool of the morning and evening. In the middle of the day, the pair, leaving the eggs in charge of the sun, and 'forgetting that the foot may crush them, or the wild beast break them,' employ themselves in feeding off the tops of bushes in the plain near the nest. Looking aloft at this time of day, a white Egyptian vulture may be seen, soaring in mid-air, with a large stone between his talons. Having carefully surveyed the ground below him, he suddenly lets fall the stone, and then follows it in rapid descent. Let the hunter run to the spot, and he will find a nest of, probably, a score of eggs, (each equal in size to twenty-four hen's eggs,) some of them broken by the vulture. The jackal, too, is said to roll the eggs together to break them; and the hyæna pushes them off with his nose, to bury them at a distance."

FIRE-PROOF HOUSE ON PUTNEY HEATH.

Upon Putney Heath, by the road-side, stands an obelisk, to record the success of a discovery made in the last century, of the means of building a house which no ordinary application of ignited combustibles could be made to consume. The inventor was Mr. David Hartley, to whom the House of
[pg 110] Commons voted 2,500*l.*, to defray the expenses of the experimental building, which stood about one hundred yards from the obelisk. In 1774, King George the Third and Queen Charlotte took their breakfast in one of the rooms; while in the apartment beneath, fires were lighted on the floor, and various inflammable materials were ignited, to attest that the rooms above were fire-proof. Hartley's secret lay in the floors being double, and there being interposed between the two boards sheets of laminated iron and copper, not thicker than tinfoil or stout paper, which rendered the floor air-tight, and thereby intercepted the ascent of the heated air; so that, although the inferior boards were actually charred, the metal prevented the combustion taking place in the upper flooring.

Another experiment took place on the 110th anniversary of the great fire of London, when a patriotic lord mayor and the corporation of London witnessed the indestructible property of the structure. Yet, the invention was never carried into further practice. The house was, many years after, converted into a tasteful villa, although the obelisk records the success of the experiment.

THE LAST OF THE ALCHEMISTS.

The last true believer in alchemy was, according to Mr. Brande, one Peter Woulfe, who occupied chambers in Barnard's Inn, Holborn, while in London, and usually spent the summer in Paris. He died in 1805. About the year 1801, another solitary adept lived, or rather starved, in London, in the person
[pg 111] of an editor of an evening newspaper, who expected to compound the alkahest, if he could keep his materials digested in a lamp-furnace for the space of seven years. The lamp burnt brightly during six years eleven months, and some odd days besides; and then, unluckily, it went out. Why it went out, the adept could never guess; but he was certain that if the name could only have burnt to the end of the septenary cycle, his experiment must have succeeded.

In 1828, Sir Richard Phillips visited "an alchemist," named Kellerman, at the village of Lilley, midway between Luton and Hitchen; he was believed by some of his neighbours to have succeeded in discovering the Philosopher's Stone, and also the universal solvent. He had been a man of fashion, and an adventurer on the turf; but had for many years shut himself up at Lilley, and been inaccessible and invisible to the world; his house being barricaded, and the walls of his grounds protected by hurdles, with spring-guns, so planted as to resist intrusion in every direction. Sir Richard, however, obtained an interview with this strange being, and the account of his visit is very graphic:—

"The front-door was opened, and Mr. Kellerman presented himself. I lament that I have not the pencil of Hogarth, for a more original figure never was seen. He was about six feet high, and of athletic make. On his head was a white nightcap, and his dress consisted of a long great-coat, once green, and a sort of jockey waistcoat, with three tiers of pockets. His manner was extremely polite and graceful; but my attention was chiefly absorbed by his singular physiognomy. His complexion was deeply sallow, and his eyes large, black, and rolling. He conducted me into a very large parlour, with a window looking backward,
[pg 112] and having locked the door and put the key into his pocket, he desired me to be seated in one of two large armchairs, covered with sheepskins. The room was a realization of the well-known picture of Teniers's Alchemist. The floor was strewed with retorts, crucibles, alembics, jars, and bottles of various shapes, intermingled with old books, the whole covered with dust and cobwebs. Different shelves were filled in the same manner; and on one side stood the Alchemist's bed. In a corner, somewhat shaded from the light, I beheld two heads, white, with dark wigs on them; I entertained no doubt, therefore, that, among other fancies, he was engaged in re making the brazen speaking head of Roger Bacon and Albertus."

"He then gave me a history of his studies, mentioned some men in London whom I happened to know, and who, he alleged, had assured him that they had made gold. That having, in consequence, examined the works of the ancient alchemists, and discovered the key which they had studiously concealed from the multitude, he had pursued their system under the influence of new lights; and, after suffering numerous disappointments, owing to the ambiguity with which they describe their processes, he had at length happily succeeded; had made gold, and could make as much more as he pleased, even to the extent of paying off the national debt in the coin of the realm."

"I yielded to the declaration, expressed my satisfaction at so extraordinary a discovery, and asked him to show me some of the precious metal which he had made."

"'Not so,' said he, 'I will show it to no one. I made Lord Liverpool the offer that, if he would introduce me to the King, I would show it to his Majesty; but Lord Liverpool insolently declined, on the ground that there was no precedent; and I am therefore determined that the secret shall die with me. It is true that, in order to avenge myself of such contempt, I made a communication to the French ambassador, Prince Polignac, and offered to go to France, and transfer to the French government the entire advantages of the discovery; but, after deluding me, and shuffling for some time, I found it necessary to treat him with the same contempt as the others. Every court in Europe,' he added, 'knows that I have made the discovery, and they are all in a confederacy against me; lest, by giving it to any one, I should make that country master of all the rest—the world, Sir,' he exclaimed with great emotion, 'is in my hands, and my power.'"

"I now inquired whether he had been alarmed by the ignorance of the people in the country, so as to shut himself up in this unusual manner?"

[pg 113] "'No,' he replied, 'not on their account wholly. They are ignorant and insolent enough; but it was to protect myself against the governments of Europe, who are determined to get possession of my secret by force. I have been,' he exclaimed, 'twice fired at through that window, and three times attempted to be poisoned. They believed I had written a book containing my secrets, and to get possession of this book has been their object. To baffle them, I burnt all that I had ever written; and I have so guarded the windows with spring-guns, and have such a collection of combustibles in the range of bottles which stand at your elbow, that I could destroy a whole regiment of soldiers if sent against me.' He then related that, as a further protection, he lived entirely in that room, and permitted no one to come into the house; while he had locked up every room except that with patent padlocks, and sealed the keyholes."

In a conversation of two or three hours with the narrator, Kellerman enlarged upon the merits of the ancient alchemists, and on the blunders and impertinent assumptions of modern chemists. He quoted Roger and Lord Bacon, Paracelsus, Boyle, Boerhaave, Woolfe, and others, to justify his pursuits. As to the term philosopher's stone, he alleged that it was a mere figure to deceive the vulgar. He appeared to give full credit to the silly story of Dee's assistant, Kelly, finding some of the powder of projection in the tomb of Roger Bacon, at Glastonbury, by means of which, as he said, Kelly for a length of time supported himself in princely splendour. Kellerman added, that he had discovered the blacker than black of Appolonius Tyanus: it was itself "the powder of projection for producing gold."

It further appeared he had lived in the premises at Lilley for twenty-three years, during fourteen of which he had pursued his alchemical studies with unremitting ardour; keeping eight assistants for the
[pg 114] purpose of superintending his crucibles, two at a time, relieving each other every six hours: that he had exposed some preparations to intense heat for many months at a time, but that all except one crucible had burst—and that, Kellerman said, contained the true "blacker than black." One of his assistants, however, protested that no gold had ever been found, and that no mercury had ever been fixed, for he was quite sure Kellerman could not have concealed it from his assistants; while, on the contrary, they witnessed his severe disappointment at the result of his most elaborate experiments.

By the way, in the introduction to *Zanoni*, Sir E. Bulwer Lytton has given a clever sketch of an eccentric antiquarian bookseller, in the neighbourhood of Covent Garden, who is said to have

assembled "the most notable collection ever amassed by an enthusiast, of the works of alchemist, cabalist, and astrologer." The "vindictive glare and uneasy vigilance," and the frowning and groaning of the anti-bookseller (for it absolutely went to his heart when a customer entered his shop), are all very characteristic and life-like in this sketch. When free from such annoyance, he might be seen gloating over his musty, unsaleable treasures, on which he had, it was said, spent a fortune.

CELEBRATED DIAMONDS.

We read marvellous records, (in modern books, too,) of the high prices realized for diamonds; but according to Dr. Ure, "it does not appear that any sum exceeding one hundred and fifty thousand
[pg 115] pounds has ever been given for a diamond." This statement, made in the year 1820, has since received signal confirmation. On July 20, 1837, the Nassuck diamond was sold by auction in London, and realised only 7,200l., though it was estimated by the East India Company to be worth 30,000l. This diamond was among the spoils which were captured by the combined armies, under the command of the Marquis of Hastings, in the British conquest of India, and formed part of the "Deccan booty." This magnificent gem is as large as a good-sized walnut, weighs 357-1/2 grains, is of dazzling whiteness, and is as pure as a drop of dew. After the above sale, it was purchased by the Marquis of Westminster, who more than once wore it on the hilt of his court sword; it was presented by his lordship to the Marchioness of Westminster, on her birth-day, along with the Arcot diamond ear-rings, once belonging to Queen Charlotte, and disposed of at the above sale for 11,000l.

The Great Mogul's diamond, about the size of half a hen's egg, and the Pitt diamond, are well known. Among the crown jewels of Russia is a magnificent diamond, weighing 195 carats: it is the size of a small pigeon's egg, and was formerly the eye of a Brahminical idol, whence it was purloined by a French soldier; it passed through several hands, and was ultimately purchased by the Empress Catherine, for 90,000l. in ready money, and an annuity of 4,000l.

One of the largest diamonds in the world was found in the river Abaite, about 92 miles N. W. of the
[pg 116] diamond district of Serro do Frio, in Brazil: it is of nearly an ounce in weight, and has been *estimated* by Roma de l'Isle at the enormous sum of 300 millions. It is uncut; but the king of Portugal, to whom it belonged, had a hole bored through it, in order to wear it suspended about his neck on gala days. No sovereign possessed so fine a collection of diamonds as this prince.

In 1846, the Brazilian journals announced that a negro had found, in the diamond district of Bahia, a rough diamond weighing nearly an ounce. The approximative value was stated at 45,000l., but it was sold by the finder for 35l.

The most celebrated diamond of our times we, however, suspect to be that called "The Mountain of Light," (*Koh-i-noor*,) which belonged to Runjeet Sing, and now belongs to Queen Victoria. It was once valued at £3,000,000, is very brilliant, and without a flaw of any kind. Runjeet's string of pearls was, it is thought, if possible, even handsomer than the diamond; they were about three hundred in number, literally the size of small marbles, all picked pearls, and round, and perfect both in shape and colour. Two hours before he died, he sent for all his jewels, and gave the above diamond, said to be the largest in the world, to a Hindoo temple; his celebrated string of pearls to another; and his favourite fine horses, with all their jewelled trappings, worth 300,000l., to a third. "The Nizam's Diamond" is another wonderful gem: it was first seen in the hands of a native child in India, who was playing with
[pg 117] it, ignorant of its value; and a considerable sum being offered for it, led to the discovery of its being a real diamond. In its rough state, it weighs 277 carats; and as the rough stones are usually taken to give but half of their weight when cut or polished, it would allow 138 carats.

DR. DEE, THE NECROMANCER.

Dr. John Dee was a man who made a conspicuous figure in the 16th century. He was born in London in 1527: he was an eminent scholar and an indefatigable mathematician; when at Cambridge, he was mostly occupied eighteen hours out of the twenty-four in study. While here he superintended the exhibition of a Greek play of Aristophanes, among the machinery of which he introduced an artificial scarabæus, or beetle, which flew up to the palace of Jupiter with a man on his back, and a basket of provisions. The astonished spectators ascribed this feat to the arts of the magician; and Dee, annoyed by these suspicions, found it convenient to withdraw to the Continent.

Dee's principal study in early life lay in astrology; and accordingly, upon the accession of Elizabeth, Robert Dudley, her chief favourite, was sent to consult the doctor as to the aspect of the stars, that they might fix on an auspicious day for celebrating her coronation. Some years after, we find him again on the Continent; and in 1571, being taken ill at Louvaine, the queen sent over two physicians to attend him. Elizabeth afterwards visited him at his house at Mortlake, to view his collection of mathematical instruments and curiosities; and about this time employed him to defend her title to
[pg 118] countries discovered in different parts of the globe. He says of himself, that he received the most advantageous offers from Charles V., Ferdinand, Maximilian II., and Rodolph, emperor of Germany; and from the czar of Muscovy an offer of 2000*l.* per annum, on condition that he would reside in his dominions. Had Dee gone no further than this, all would have been well; but he was ruined by his enthusiasm; he dreamed perpetually of the philosopher's stone, and was haunted with the belief of intercourse with spirits.

One day in November, 1582, he tells us that as he was at prayer, there appeared to him the angel Uriel at the west window of his museum, who gave him a translucent stone, or crystal, of a convex form, that presented apparitions, and even emitted sounds; so that the observer could hold conversations, ask questions, and receive answers from the figures he saw in this *mirror*.

With this speculum, black-stone, or show-stone, Dee used to "call his spirits," and Kelly, his associate, "did all his feats upon." Kelly, who acted as seer, reported what spirits he saw, and what they said; whilst Dee, who sat at a table, recorded the spiritual intelligence. A folio volume of their notes was published by Casaubon; and many more, containing the most unintelligible jargon, remain in MS. in the British Museum, together with the consecrated cakes of wax, marked with mathematical figures and hieroglyphics, used in their mummeries.

At length, Dee fell into disrepute; his chemical apparatus, and other stock in trade, were destroyed by
[pg 119] the mob, who made an attack upon his house; but the mirror is stated to have been saved. It subsequently passed into the collection of the Mordaunts, Earls of Peterborough, in whose catalogue it is called *the black stone, into which Dr. Dee used to call his spirits*. From the Mordaunts it passed to Lady Elizabeth Germaine, and from her to John, Duke of Argyle, whose son, Lord Frederick Campbell, presented it to Horace Walpole; and on the breaking up of the collection at Strawberry Hill in 1842, this precious relic was sold: it was described in the catalogue as "a singularly interesting and curious relic of the superstition of our ancestors on the celebrated speculum of Kennel coal, highly polished, in a leathern case."

Bulwer, in his romance of *Zanoni*, introduces a mirror of this kind; and every tale of superstition has its magic glass. It is worth while to compare Dee's speculum with the celebrated ink mirror described in Lane's work on the *Modern Egyptians*; it may, at least, illustrate the curious inquiry upon coincident superstitions.

VOYAGE OF MANUFACTURE.

The produce of our factories has preceded even our most enterprising travellers. Captain Clapperton saw at the court of the Sultan Bello, in the interior of Africa, pewter dishes with the London stamp, and had at the royal table a piece of meat served up on a white wash-hand basin of English manufacture. The cotton of India is conveyed by British ships round half our planet, to be woven by
[pg 120] British skill in the factories of Lancashire. It is again set in motion by British capital, and transported to the very plains whereon it grew; and is repurchased by the lords of the soil which gave it birth, at a cheaper price than that at which their coarser machinery enables them to manufacture it themselves. At Calicut, (in the East Indies,) whence the cotton cloth called calico derives its name, the price of labour is a fraction of that in England, yet the market is supplied from British looms.

SIR DAVID BREWSTER'S KALEIDOSCOPE.

The idea of this instrument, constructed for the purpose of creating and exhibiting a variety of beautiful and perfectly symmetrical forms, first occurred to Sir David Brewster in 1814, when he was engaged in experiments on the polarization of light, by successive reflections between plates of glass. The reflectors were, in some instances, inclined to each other; and he had occasion to remark the circular arrangement of the images of a candle round a centre, or the multiplication of the sectors formed by the extremities of the glass plates. In repeating, at a subsequent period, the experiments of M. Biot on the action of fluids upon light, Sir David Brewster placed the fluids in a trough, formed by two plates of glass, cemented together at an angle; and the eye being necessarily placed at one end, some of the cement, which had been pressed through between the plates, appeared to be arranged into a regular figure. The remarkable symmetry which it presented led to Dr. Brewster's investigation
[pg 121] of the cause of this phenomenon; and in so doing, he discovered the leading principles of the kaleidoscope.

By the advice of his friends, Dr. Brewster took out a patent for his invention; in the specification of which he describes the kaleidoscope in two different forms. The instrument, however, having been shown to several opticians in London, became known before he could avail himself of his patent; and, being simple in principle, it was at once largely manufactured. It is calculated that not less than 200,000 kaleidoscopes were sold in three months in London and Paris; though, out of this number, Dr. Brewster says, not, perhaps, one thousand were constructed upon scientific principles, or were capable of giving anything like a correct idea of the power of his kaleidoscope.

LORD ROSSE'S LEVIATHAN TELESCOPE.

The late Earl of Rosse, with a devotion to science which has few parallels, constructed this gigantic telescope, at his seat, Parsonstown, in the south of Ireland. To the frame of the vast instrument is fixed a large cubical wooden box, about eight feet wide; in this there is a door, through which two men go in to remove, or to replace, the cover of the mirror. To this box is fastened the tube, which is made of deal staves, and hooped like a huge cask. It is about 40 feet long, and 8 feet diameter in the middle. *The Dean of Ely once walked through the tube with an umbrella up!* The stupendous speculum weighs
[pg 122] three tons; the casting and polishing of it were labours of wonderful skill. The telescope is not turned to any part of the sky, but limited to the range of half an hour on each side of the meridian, through which its motion is given by powerful clockwork, independent of the observer. For this purpose it stands between two pieces of masonry, of gothic design, which harmonize with Lord Rosse's castle; one of these piers sustaining the galleries for the observer, and the second the clockwork and other apparatus. There is an elegant arrangement of counterpoises to balance the enormous mass, so that a comparatively slight force only is required to elevate or depress it. A correspondent of the *Mechanics' Magazine* thus describes the capacity of this wonderful instrument:—

"Such is its power, that if a star of the first magnitude were removed to such a distance, that its light would be three millions of years in reaching us, this telescope would, nevertheless, show it to the human eye. Is it to be wondered at, then, that, with such an instrument, grand discoveries should be made? It has been pointed to the heavens; and, although in the beginning of its career, it has already accomplished mighty things. There are nebulous spots in the heavens which have baffled all the instruments hitherto constructed, but this telescope resolves their true character completely. Among the wonderful objects which have been subject to its scrutiny, is the nebula in the constellation of Orion. I have had an opportunity of examining it. It is one of the most curious objects in the whole
[pg 123] heavens. It is not round, and it throws off furious lights. From the time of Herschel it has been subjected to the examination of the most powerful instruments—but it grew more and more mysterious and diverse in its character. When Lord Rosse's great telescope was directed to its examination, it for a long time resisted its power. He found it required patient examination—night after night, and month after month. At length, a pure atmosphere gave him the resolution of its constitution; and the stars of which it is composed burst upon the sight of man for the first time!"

ORIGIN OF REFLECTING LIGHTHOUSES.

In the last century, at a meeting of a society of mathematicians at Liverpool, one of the members proposed to lay a wager, that he would read a paragraph of a newspaper, at ten yards' distance, with the light of a farthing candle. The wager was laid, and the proposer, having covered the inside of a wooden dish with pieces of looking-glass, fastened in with glaziers' putty, placed his reflector behind the candle, and won his wager. One of the company marked this experiment with a philosophic eye. This was Captain Hutchinson, the dockmaster, with whom originated the reflecting lighthouses, erected at Liverpool in 1763.

WASTE OF HUMAN LIFE.

[pg 124] In 1825, there was opened in Cochin-China a canal, 23 miles long, 80 feet wide, and 12 feet deep. It was begun and finished in six weeks, although carried through large forests and over extensive marshes. Twenty thousand men worked upon it day and night; and it is stated that 7,000 died of fatigue.

LIFTING HEAVY PERSONS.

One of the most extraordinary pages in Sir David Brewster's *Letters on Natural Magic*, is the experiment in which a heavy man is raised with the greatest facility, when he is lifted up the instant that his own lungs, and those of the persons who raise him, are inflated with air. Thus, the heaviest person in the party lies down upon two chairs, his legs being supported by the one, and his back by the other. Four persons, one at each leg, and one at each shoulder, then try to raise him—the person to be raised giving two signals, by clapping his hands. At the first signal, he himself and the four lifters begin to draw a long and full breath, and when the inhalation is completed, or the lungs filled, the second signal is given for raising the person from the chair. To his own surprise, and that of his bearers, he rises with the greatest facility, as if he were no heavier than a feather! Sir David Brewster states that he has seen this inexplicable experiment performed more than once; and he appeals for testimony to Sir Walter Scott, who had repeatedly seen the experiment, and performed the part, both of the load and of the bearer. It was first shown in England by a gentleman who saw it performed in a large party at Venice, under the direction of an officer of the American navy.

ORIGIN OF THE SOCIETY OF ARTS.

"To this Society," a well-informed writer has said, "some of our best artists have owed the most priceless of all services that can be rendered to men of genius at the outset of their career—appreciation on the part of an enlightened few—introduction under favourable auspices to the many."

The Society of Arts was established in 1754, chiefly by Mr. William Shipley, a drawing-master; but it was not until 1774 that the institution was fairly located in its own premises, built in handsome style by the Adams', in John Street, Adelphi; the object being denoted by the inscription upon the entablature of the pediment in the front of the mansion, in these words: "Arts and Commerce promoted."

There are many interesting anecdotes of the early awards of this Society. Thus, in 1758, Bacon, the sculptor, received for a small figure of Peace a reward of ten guineas; and the same artist gained the highest premium upon nine different occasions. In 1761, Nollekens received ten guineas for an alto-relievo of Jephtha's Vow; and two years later, fifty guineas for a more important piece of sculpture. Flaxman, in 1768, gained for one of his earliest attempts a grant of ten guineas; and for another work, in 1771, he obtained the Society's gold medal. Lawrence, at the early age of thirteen, received the reward of a silver-gilt palette, with five guineas, for his drawing in crayons of the Transfiguration; and
[pg 126] the painter in the height of his subsequent prosperity, was accustomed to speak of the impulse thus given to his love of art. In 1807, Sir William Ross, at the age of twelve, received the Society's silver palette for a drawing of the death of Wat Tyler; Mr. Edwin Landseer gained a similar mark of approbation in 1810, for an etching; and to Mr. Wyon was adjudged the gold medal, in 1818, for a medal die. But to artists there is a feature of still greater interest in the Society's history: it was in its rooms that the first exhibition of paintings in England took place in 1760, which was continued with great success for some years.

Within about ninety years, the Society had distributed more than 100,000*l.* in premiums. The growth of forest trees was one of its early objects of encouragement; and we find among the recipients of its gold medals the Dukes of Bedford and Beaufort, the Earls of Winterton, Upper Ossory, and Mansfield; and Dr. Watson, Bishop of Llandaff. Then came agriculture, chemistry, manufactures, and mechanics. In the latter, the Society taught us, or at least aided those who did so, the manufacture of Turkey carpet, tapestry, weaving, and weaving to imitate the Marseilles and India quilting; also, how to improve our spinning and lace-making, our paper, and our catgut for musical instruments, our straw-bonnets, and artificial flowers.

The colonies shared in the Society's early encouragement: potash and pearlash were produced by its agent in North America; and it was busily engaged, just before the breaking out of the war of independence, in introducing the culture of the vine, the growth of silk-worms, and the manufacture of
[pg 127]))indigo and vegetable oils. But the rewards given to poor Bethnal-green and Spitalfields weavers, for useful inventions in their calling, illustrate, perhaps even better than any of the foregoing instances, the object of the Society which so honourably distinguishes it from other associations—its readiness to receive, examine, and reward every kind of useful invention that may be brought forward by those who have neither friends nor money to aid them in making their inventions known.

Nor must we forget Barry's grand series of paintings upon the Society's large room; of which Dr. Johnson said, "there is a grasp of mind there, which you will find nowhere else." Upon the walls, too, hang some fine portraits of the early presidents of the Society, painted by Sir Joshua Reynolds.

VAST MIRRORS.

Mirrors are cast of larger dimensions at St. Petersburg than elsewhere. In the imperial manufactory, there was cast for Prince Potemkin, a mirror measuring 194 inches by 100. One of the same proportions, valued at 3000 guineas, was cast for the Duke of Wellington many years since, but was broken to atoms in its conveyance from St. Petersburg to England.

TRANSPORTATION OF THE COFFEE-TREE.

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One of the most interesting episodes in the history of coffee is, that of the transportation of the plant of the coffee-tree, taken from the hothouses of Amsterdam, given to Louis XIV., and father of the three plants, one of which was taken to the French Antilles by Captain Declieux, who, in a scarcity of water experienced by the ship's crew, shared the small quantity which he had to drink, between himself and his dear coffee-plant. It is believed that from this plant has sprung all the coffee grown in the West Indies.

ARKWRIGHT'S SPINNING FRAME.

Mr. Arkwright tells us, that he accidentally derived the first hint of this great invention from seeing a red-hot iron bar elongated by being made to pass between rollers; and, though there is no mechanical analogy between that operation and the process of spinning, it is not difficult to imagine that, by reflecting upon it, and placing the subject in different points of view, it might lead him to his invention.

SPINNING FEATS.

Among the wonders of this branch of manufacture, the following deserve mention:—In 1745, a woman at East Dereham, in Norfolk, spun a single pound of wool into a thread of 84,000 yards in length, wanting only 80 yards of forty-eight miles, which, at the above period, was considered a circumstance of sufficient curiosity to merit a place in the records of the Royal Society. Since that time, however, a young lady of Norwich has spun a pound of combed wool into a thread of 168,000 yards; and she actually produced from the same weight of cotton a thread of 203,000 yards, equal to upwards of 115 miles:—this last thread, if woven, would produce about twenty yards of yard-wide muslin.

MARVELS OF THE ALCHEMISTS.

The pretended secret of the Alchemists was the transmutation of the baser metals into gold, which they occasionally exhibited to keep the dupes who supplied them with money in good spirits. This they performed in various ways. Sometimes they made use of crucibles with a false bottom. At the real bottom, they put a quantity of gold or silver. This was covered by a portion of powdered crucible mixed with gum or wax, and hardened. The material being put into a crucible and the heat applied, the false bottom disappeared; and at the end of the process, the gold or silver was found at the bottom of the crucible. Sometimes, they made a hole in a piece of charcoal, filled it with oxide of gold or silver, and stopped up the hole with a little wax; or they soaked the charcoal in solutions of these metals; or they stirred the mixture in the crucible with hollow rods, containing oxide of gold or silver within, and the end closed with wax. By these means, the gold or silver wanted was introduced during the operation, and considered as a product.

Sometimes the cunning wights used solutions of silver in nitric acid, or of gold in aqua-regia, or an amalgam of gold or silver, which being adroitly introduced, furnished the requisite quantity of metal. A common exhibition was to dip nails into a liquid, and take them out, half converted into gold. The nails were one-half gold and the other half iron, neatly soldered together, and the gold was covered with something to conceal the colour, which the liquid was capable of removing.

INVENTION OF THE HAND GEAR.

It has been said that we are indebted for the important invention in the steam-engine, termed hand gear, by which its valves or cocks are worked by the machine itself, to an idle boy named Humphrey Potter, who, being employed to stop and open a valve, saw that he could save himself the trouble of attending and watching it, by fixing a plug upon a part of the machine which came to the place at the proper times, in consequence of the general movement. If this anecdote be true, what does it prove? That Humphrey Potter might be very idle, but that he was, at the same time, very ingenious. It was a contrivance, not the result of accident, but of acute observation and successful experiment.—*Dr. Paris.*

POKER ACROSS THE FIRE.

Boswell and Johnson held a conversation upon this experiment as follows:—*Boswell.* "Why, sir, do people play this trick, which I observe now when I look at your grate, putting the shovel against it to make the fire burn?"—*Johnson.* "They play the trick, but it does not make the fire burn. *There* is a better (setting the poker perpendicularly up at right angles with the grate.) In days of superstition, they thought, as it made a cross with the bars, it would drive away the witch."

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Upon this, Dr. Kearney notes: "it certainly does make the fire burn: by repelling the air, it throws a blast upon the fire, and so performs the parts, in some degree, of a blower or bellows." These observations were made only as to the shovel, but the poker is equally efficacious. "After all," says Croker, "it is possible that there may be some magnetic or electrical influence, which, in the progress of science, may be explained; and what has been thought a vulgar trick, may be proved to be a philosophical experiment."

Whatever may be the cause, there is every-day evidence that a poker or shovel, as the case may be, if laid across a dull fire, will revive it; because, we think, the poker or shovel receives and concentrates the heat, and produces an additional draught through the fire.

THE ARTESIAN WELL OF GRENELLE, AT PARIS.

The boring of this well by the Messrs. Mulot occupied seven years, one month, twenty-six days, to the depth of 1794-1/2 English feet, or 194-1/2 feet below the depth at which M. Elie de Beaumont foretold that water would be found. The sound, or borer, weighed 20,000 lb., and was treble the height of that of the dome of the Hospital des Invalides, at Paris. In May, 1837, when the bore had reached 1246 feet 8 inches, the great chisel and 262 feet of rods fell to the bottom; and, although these weighed five tons, M. Mulot tapped a screw on the head of the rods, and thus, connecting another length to them, after fifteen months' labour, drew up the chisel! On another occasion, this chisel having been raised with great force, sunk at one stroke 85 feet 3 inches into the chalk![7]

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[7] The depth of the Grenelle Well is nearly four times the height of Strasburg Cathedral; more than six times the height of the Hospital des Invalides, at Paris; more than four times the height of St. Peter's, at Rome; nearly four times and a half the height of St. Paul's, and nine times the height of the Monument, London. Lastly, suppose all the above edifices to be piled upon each other, from the base-line of the Well of Grenelle, and they would but reach within 11-1/2 feet of its surface.—*Year-Book of Facts*, 1843.

"WET THE ROPES."

The property of cords contracting their length by moisture became generally known, it is said, on the raising of the Egyptian obelisk in the square facing St. Peter's, at Rome, by order of Pope Sixtus V. The great work was undertaken in the year 1586, and the day for raising the obelisk was marked with great solemnity. High mass was celebrated at St. Peter's, and the architect and workmen received the benediction of the Pope. The blast of a trumpet was the given signal, when engines were set in motion by an incredible number of horses; but not until after fifty-two unsuccessful attempts had been made, was the huge block lifted from the earth. As the ropes which held it had somewhat stretched, the base of the obelisk could not reach the summit of the pedestal, when a man in the crowd cried out, "*Wet the ropes!*" This advice was followed, and the column, as of itself, gradually rose to the required height, and was placed upright on the pedestal prepared for it.

THE DEATH OF DR. BLACK.

In the society of friends such as Adam Smith, Hume, Carlyle, Home, Hutton, Playfair, and Dugald Stewart, the closing days of this great and gentle chemist wore tranquilly away. Towards the end, he sank into a low state of health, and only preserved himself from the severe shocks of the weather in the changeable climate of Edinburgh, by a degree of care and abstemiousness rarely surpassed even by the devoutest Brahmin. "It was his generous and manly wish, that he might never live to be a burden to his friends; and never was the wish more completely gratified. On the 26th November 1799, in the seventy-first year of his age, he expired without any convulsion, shock, or stupor, to announce or retard the approach of death. Being at table with his usual fare—some bread, a few prunes, and a measured quantity of milk diluted with water; and having the cup in his hand when the last stroke of the pulse was to be given, he had set it down upon his knees, which were joined together, and kept it steady with his hand in the manner of a person perfectly at ease; and in this attitude expired, without spilling a drop, and without a writhe in his countenance; as if an experiment had been required, to show to his friends the facility with which he departed. His servant opened the door to tell him that some one had left his name; but getting no answer, stepped about half way towards him, and, seeing
[pg 134] him sitting in that easy posture, supporting his basin of milk with one hand, he thought that he had dropped asleep, which he had sometimes seen happen after his meals. The man went back and shut the door; but before he got down stairs, some anxiety that he could not account for made him return, and look again at his master. Even then, he was satisfied, after coming pretty near, and turned to go away; but again returned, and coming quite close, found his master without life."

ORIGIN OF THE TELEGRAPH.

When Arthur Young made his well-known journey in France, in the year 1787 to 1789, he met, he tells us, with a Monsieur Lomond, "a very ingenious and inventing mechanic," who had made a remarkable discovery in electricity. "You write two or three words on a paper," says Young: "he takes it with him into a room, and turns a machine enclosed in a cylindrical case, at the top of which is an electrometer, a small, fine, pith ball; a wire connects with a similar cylinder and electrometer in a distant apartment; and his wife, by remarking the corresponding motions of the ball, writes down the words they indicate; from which it appears that he has formed an alphabet of motions. As the length of the wire makes no difference in the effect, a correspondence might be carried on at any distance. Whatever the use may be, the invention is beautiful." This discovery, however, lay unnoticed until
[pg 135] about the year 1845; though the apparatus was designed to effect the same end as the electric telegraph, by means very similar.

The possibility of applying electricity to telegraphic communication was conceived by several other persons, long before it was attempted upon a practical scale. The Rev. Mr. Gamble, in his description of his original shutter-telegraph, published towards the close of the last century, alludes to a project of electrical communication. Mr. Francis Ronalds, in a pamphlet on this subject, published in 1823, states that Cavallo proposed to convey intelligence by passing given numbers of sparks through an insulated wire; and that, in 1816, he himself made experiments upon this principle, which he deemed more promising than the application of galvanic or voltaic electricity, which had been projected by some Germans and Americans. He succeeded perfectly in transmitting signals through a length of eight miles of insulated wire; and he describes minutely the contrivances necessary for adapting the principle to telegraphic communication.

It is, however, to the combined labours of Mr. W. F. Cooke and Professor Wheatstone that electric telegraphs owe their practical application; and, in a statement of the facts respecting their relative positions in connection with the invention, drawn up at their request by Sir M. I. Brunel and Professor Daniell, it is observed that "Mr. Cooke is entitled to stand alone, as the gentleman to whom this country is indebted for having practically introduced and carried out the electric telegraph as a useful
[pg 136] undertaking, promising to be a work of national importance; and Professor Wheatstone is acknowledged as the scientific man whose profound and successful researches had already prepared the public to receive it as a project capable of practical application."—*Penny Cyclopædia.*

NECESSITY THE MOTHER OF INVENTION.

When Vitiges, king of the Goths, besieged Belisarius in Rome in 536, and caused the fourteen large aqueducts to be stopped, the city was subjected to great distress, not on account of the want of water in general, for it was secured against that inconvenience by the Tiber, but on account of the loss of that water which the baths required, and, above all, of that necessary to drive the mills, which were all situated on these canals. Horses and cattle, which might have been employed in grinding, were not to be found; but Belisarius, a man of great ingenuity, devised an expedient to remedy this distress. Below the bridge that reached to the wall of Janiculum, he extended ropes, well fastened, and stretched across the river from both banks. To these he affixed two boats of equal size, at the distance of two feet from each other, where the current flowed with the greatest rapidity, under the arch of the bridge; and, placing large millstones on one of the boats, suspended in the middle space a machine by which they were turned. He constructed at certain intervals on the river other machines of the same
[pg 137] description, which, being put in motion by the force of the water that ran below them, drove as many mills as were necessary to grind provisions for the city. To destroy these, the besiegers threw into the stream logs of wood, and dead bodies, which floated down the river into the city; but the besieged, by making use of booms to stop them, were enabled to drag them out before they did any mischief. This is said to have been the first invention of floating mills.

A "DRY-MAKING" IN HOLLAND.

The conversion into solid land of the Lake of Beemster, in North Holland, is, after the Haarlemmermeer Polder (which is twice and a half its size), the largest specimen in the Netherlands of what the Dutch term "dry-makings." The scheme was first broached in 1570. In 1592 funds were applied for, which were not, however, promised by the States of Holland and West Friesland until 1597. In 1607, a company was formed at the Hague, by Dirck van Oss and others, to pump out the Beemster in whole or in part; and on their security the States lent the necessary capital. At the commencement, it was thought that sixteen windmills would suffice for the undertaking; but this number was shortly increased by ten, and the twenty-six mills were then divided into thirteen gangs. By the end of 1608, several of the mills began to pump, and early in 1609, they were all ready. Towards the end of this year, the bottom of the lake became visible in some places: but during a storm
[pg 138] on the 23d of January 1610, the great waterland sea dyke gave way, and the pressure on the ring dyke that had been constructed round the Beemster proved greater than it was capable of resisting. It gave way in turn in two places, and the lake was again filled. On the 5th February 1610, further and ample funds were advanced by the States; in 1611, more mills were put on to the work; on the 19th of May 1612, the dry-making was at last completed; and on the 30th July of that year, the distribution of the lots of land redeemed took place. The ring dyke is over 37,000 yards long, and has an average height of × 1·50 Z. P. (a metre and a half above the mean level of the sea). Thus was the Beemster pumped out; and from that day to the present, the name of Dirck van Oss has been held in deep respect in Holland, as the name of the first Dutchman who conquered the waters on anything like a large scale. The system he employed has been closely followed in all successive undertakings of this kind; and, with the exception of the application of steam, and certain improvements in machinery, the plans of Dirck van Oss for draining the Beemster were adapted with a like success to the Lake of Haarlem, by M. Gevers d'Endegeest, the hero of this last conquest, and the sanguine prophet (1867) of the ultimate reclamation of the Zuyder Zee. The drainage of the Lake of Haarlem, it may be mentioned, was accomplished in 1852, after thirteen years of toil and anxiety, at a cost of 11,000,000 florins
[pg 139] (£916,666); a sum which, large as it is, has nevertheless been completely recovered, both in capital and interest, by the sale of 42,481 acres of arable land.—*Report to Foreign Office.*

A SCIENTIFIC PILGRIM.

When Lord Napier (of Merchiston) first published his *Logarithms*, Mr. Briggs, Professor of Mathematics at Gresham College, London, was so surprised with admiration, that he could not rest till he had seen the noble inventor, and actually went to Scotland for that purpose in 1615. Lilly, the astrologer, thus describes the interview:—"Mr. Briggs appointed a certain day when to meet at Edinburgh; but, failing thereof, Merchiston was afraid he would not come. It happened one day, as John Marr and the Lord Napier were speaking of Mr. Briggs: 'Ah! John,' said Merchiston, 'Mr. Briggs will not come.' At the very instant, one knocks at the gate; John Marr hastens down, and it proved to be Mr. Briggs, to his great contentment; he brings Mr. Briggs up into my Lord's chamber, where almost one quarter of an hour was spent, each beholding the other with admiration before one word was spoken. At last, Mr. Briggs began, 'My Lord, I have undertaken this long journey purposely to see your person, and to know by what engine of wit or ingenuity you came first to think of this most excellent help unto astronomy, viz. the logarithms; but, my Lord, being by you found out, I wonder nobody else found it out before, when now, being known, it appears so easy.'" Briggs was nobly [pg 140] entertained by Lord Napier; and every summer after, during his lordship's life, this venerable man went to Scotland purposely to see him.

THE BURNING MIRRORS OF ARCHIMEDES.

Many have questioned the facts recorded by several historians, concerning the surprising effects of the burning mirrors of Archimedes, by means of which the Roman galleys besieging Syracuse were consumed to ashes. Descartes, in particular, discredited the story as fabulous; but Kircher made many experiments with a view of testing its credibility. He tried the effect of a number of plane mirrors; and, with five mirrors of the same size, placed in a frame, he contrived to throw the rays reflected from them to the same spot, at the distance of more than 100 feet; and by this means he produced such a degree of heat, as led him to conclude that, by increasing their number, he could have set fire to inflammable substances at a greater distance. He likewise made a voyage to Syracuse, in company with his pupil Schottius, in order to examine the place of the alleged transaction; and they were both of opinion, that the galleys of Marcellus could not have been more than thirty paces from Archimedes' mirrors.

M. Buffon also constructed a machine, consisting of a number of mirrors, by which he seems to have revived the secret of Archimedes, and to have vindicated the credit of history in this respect. His
[pg 141] experiment was first made with twenty-four mirrors, which readily set fire to combustible matter composed of pitch and tow, and laid on a deal board at the distance of seventy-two feet. He further pursued the attempt by framing a kind of polyhedron, consisting of 168 pieces of plane looking-glass, each six inches square; and by means of this machine, some boards of beech-wood were set on fire at the distance of 150 feet, and a silver plate was melted at the distance of 60 feet. This machine, in the next stage of its improvement, contained 360 plane mirrors, each eight inches long and six broad, mounted on a frame eight feet high and seven broad. With twelve of these mirrors, light combustible matter was kindled at the distance of twenty feet; with forty-five of them, at the same distance, a large tin vessel was melted, and with 117, a thin piece of silver. When the whole machine was employed, all the metals and metallic minerals were melted at the distance of twenty-five and even of forty feet. Wood was kindled in a clear sky at the distance of 210 feet. M. Buffon afterwards constructed a machine which contained 400 mirrors, each six inches square, with which he could melt lead and tin at the distance of 140 feet.

But perhaps the most powerful burning mirror ever constructed, was that of Mr. Parker, an eminent glass manufacturer of London; it was made in the begining of this century by one Penn, an ingenious artisan of Islington. He erected an outhouse at the bottom of his garden, for the purpose of carrying on his operations, and at length succeeded in producing, at a cost of £700, a burning lens of a
[pg 142] diameter of three feet, whose powers were astonishing. The most hard and solid substances of the mineral world, such as platina, iron, steel, flint, &c., were melted in a few seconds, on being exposed to its immense focus. A diamond weighing ten grains, exposed to this lens for thirty minutes, was reduced to six grains, during which operation it opened and foliated like the leaves of a flower, and emitted whitish fumes; when closed again, it bore a polish, and retained its form. Ten cut garnets, taken from a bracelet, began to run into each other in a few seconds, and at last formed one globular garnet. The clay used by Wedgewood to make his pyrometric test ran in a few seconds into a white enamel; and several specimens of lavas, and other volcanic productions, on being exposed to the focus of the lens, yielded to its power.

A subscription was proposed in London to raise the sum of 700 guineas, in order to indemnify the inventor for the expense he had incurred in its construction, and retain it in England; but, through the failure of the subscription, and other concurring circumstances, Mr. Parker was induced to dispose of it to Captain Mackintosh, who accompanied Lord Macartney in his celebrated embassy to China; and the mirror, much to the loss and regret of European science, was left at Pekin.

MAGNETIC CORRESPONDENCE IN THE SEVENTEENTH CENTURY.

[pg 143] In one of Addison's contributions to the *Spectator* (No. 241), we find the following curious instance of what may almost be considered as the foreshadowing of the electric telegraph. It is quoted from the writings of Strada, the celebrated Roman Jesuit, who died in 1649. In his "Prolusiones," a series of polished Latin essays upon rhetoric and literature, he gives an account of a chimerical correspondence between two friends, by the help of a certain loadstone, which had such virtue in it, that if touched by two several needles, when one of the needles so touched began to move, the other, though at ever so great a distance, moved at the same time and in the same manner. He tells us that two friends, being each of them possessed of these needles, made a kind of dial-plate, inscribing it with twenty-four letters—in the same manner as the hours of the day are marked upon the ordinary dial-plate. They then fixed one of the needles on each of these plates, in such a manner that it could move round without impediment so as to touch any of the twenty-four letters. Upon their separating from one another into distant countries, they agreed to withdraw themselves punctually into their closets at a certain hour of the day, and to converse with one another by means of this their invention. Accordingly, when they were some hundred miles asunder, each of them shut himself up in his closet at the time appointed, and immediately cast his eye upon his dial-plate. If he had a mind to write anything to his friend, he directed his needle to every letter that formed the words that he had
[pg 144] occasion for—making a little pause at the end of every word or sentence, to avoid confusion. The friend, in the meanwhile, saw his own sympathetic needle moving of itself to every letter which that of his correspondent pointed at. By this means, they talked together across a whole continent, and conveyed their thoughts to one another, in an instant, over cities or mountains, seas or deserts.... In the meanwhile (adds the Essayist, playfully), if ever this invention should be revived, or put in practice, I would propose that upon the lovers' dial-plate there should be written, not only the twenty-four letters, but several entire words which have always a place in passionate epistles; as flames, darts, die, languish, absence, Cupid, heart, eyes, hang, drown—and the like. This would very much abridge the lover's pains in this way of writing a letter—as it would enable him to express the most useful and significant words with a single turn of the needle.

NAVIGATION BEFORE THE COMPASS.

Before the invention of the mariner's compass, the Phœnician, the Greek, and the early Italian navigators were compelled to creep from headland to headland, without venturing to quit the shore—except when an island, so near as to be distinctly seen from the continent, offered them an equally secure retreat from the violence of an accidental tempest. Yet, the bolder Norwegians, though exposed to far greater perils, from the habitual inclemency of a high northern latitude, and from the
[pg 145] frequent cloudiness of their atmosphere, were in the habit of attempting, and often with success, a voyage of some length upon the ocean. It may be supposed that a patient observation of natural phenomena, attention to the flight of migratory birds and to the direction of currents, and some few simple devices which, being no longer necessary, are now forgotten, served as substitutes for the more valuable guides of modern navigation. Of one of the devices here enumerated, it is related that when Flok, a famous Norwegian navigator, was about to set out from Shetland for Iceland, then called Gardarsholm, he took on board some crows, "because the mariner's compass was not yet in use." When he thought he had made a considerable part of his way, he threw up one of his crows, which, seeing land astern, flew to it; whence Flok, concluding that he was nearer to Shetland (or perhaps Faroë) than any other land, kept on his course for some time, and then sent out another crow, which, seeing no land at all, returned to the vessel. At last, having run the greater part of his way, another crow was sent out by him, which, seeing land ahead, immediately flew for it; and Flok, following his guide, fell in with the east end of the island. Such was the simple mode of steering their course, practised by those bold navigators of the stormy northern ocean. This story at once and strikingly recalls the use made of birds by the first sea captain of whom we read—Noah; but such expedients evidently could not be supposed to have inspired the old northern navigators with the courage and
[pg 146] confidence that enabled them, as there is reason to believe, to discover America before Columbus.

SEMAPHORE *v.* ELECTRIC TELEGRAPH.

An anecdote will suffice to illustrate the advantages of the electric over the visual variety of telegraph —the one being only workable in certain states of the weather; the other available in all states. Upon one occasion, when the British army were fighting in Spain, intelligence was every day feverishly expected from Wellington through the medium of the semaphore at the Admiralty. Long delayed, it came at last, and was apparently of a fearful character. It ran thus: "Wellington defeated." Parliament and the people were stunned for a time, and rumours flew about like wildfire to this effect. It turned out, however, that just as the word "defeated" was deciphered, a fog intervened, and cut off the rest of the communication. When the dark pall disappeared, the bright sky disclosed to a jubilant people, not "Wellington defeated," but "Wellington defeated—the French!"

A WRENCH TO OLD ST. PAUL'S.

When, after much mean and yet costly endeavour to patch up the cathedral of St. Paul's, after the great fire, Sir Christopher Wren at last had his advice accepted, to rebuild the whole structure, the
[pg 147] demolition of the old fabric gave ample play to his scientific knowledge and engineering skill. One of his exploits, perhaps now more remarkable because at the time it was at once rare and bold, has thus been described:—"In order that the rubbish and old materials might not hinder the setting out of the foundations, for the purpose of proceeding with the works, Sir Christopher constructed scaffolds high enough to extend his lines over the heaps that were in the way; and thereby caused perpendiculars to be fixed upon the points below for his various walls and piers, from lines drawn carefully upon the level plan of the scaffold. Thus he proceeded, gaining every day more and more room, till he came to the middle tower that formerly carried the lofty spire. The ruins of this tower being nearly two hundred feet high, the labourers were afraid to work above, which induced him to facilitate the labour by the use of gunpowder. To perform this work, he caused a hole to be dug, of about four feet wide, by the side of the north-west pier of the tower, in which was perforated a hole two feet square, reaching to the centre of the pier. In this he placed a small deal box containing eighteen pounds of gunpowder. To this box he affixed a hollow cane, which contained a quick match, reaching to the surface of the ground above; and along the ground a train of powder was laid, with a match. The mine was then closed up, and exploded, while the philosophical architect waited with confidence the result of his experiment. This small quantity of powder not only lifted up the whole angle of the tower, with two
[pg 148] great arches that rested upon it, but also two adjoining arches of the aisle, and the masonry above them. This it appeared to do in a slow but efficient manner, cracking the walls to the top, lifting visibly the whole weight about nine inches, which suddenly dropping, made a great heap of ruins in the place, without scattering or accident. It was half a minute before the heap already fallen opened in two or three places, and emitted smoke. By this successful experiment, the force of gunpowder may be ascertained; eighteen pounds only of which lifted up a weight of more than three thousand tons, and saved the work of a thousand labourers. The fall of so great a weight from a height of two hundred feet gave such a concussion to the ground, that the inhabitants round about took it for the shock of an earthquake."

SNOW SPECTACLES.

Ellis, in his *Voyage to Hudson's Bay*, written in the middle of last century, says of the Esquimaux:—"Their snow eyes, as they very properly call them, are a proof of their sagacity. They are little pieces of wood or ivory, properly formed to cover the organs of vision, and tied on behind the head. They have two slits, of the exact length of the eyes, but very narrow; and they see through them very distinctly, and without the least inconvenience. This invention preserves them from snow-blindness, a very dangerous and powerful malady, caused by the action of the light strongly reflected from the
[pg 149] snow, especially in the spring, when the sun is considerably elevated above the horizon. The use of these eyes considerably strengthens the sight, and the Esquimaux are so accustomed to them, that when they have a mind to view distant objects, they commonly use them instead of spy-glasses."

A SELF-TAUGHT MECHANIST.

The following description is given of an ingenious and singular piece of mechanism—constructed by a boy of the name of John Young, who in 1819 resided at Newton-on-Ayr—which attracted much notice among the scientific of the day:—"A box, about three feet long by two broad, and six or eight inches deep, had a frame and paper covering erected on it, in the form of a house. On the upper part of the box are a number of wooden figures, about two or three inches high, representing people employed in those trades and sciences with which the boy is familiar. The whole are put in motion at the same time by machinery within the box, acted upon by a handle like that of a hand-organ. A weaver upon his loom, with a fly-shuttle, uses his hands and feet, and keeps his eye upon the shuttle, as it passes across the web. A soldier, sitting with a sailor at a public-house table, fills a glass, drinks it off, then knocks upon the table, upon which an old woman opens a door, makes her appearance, and they retire. Two shoemakers upon their stools are seen, the one beating leather, and the other stitching a
[pg 150]
shoe. A cloth-dresser, a stone-cutter, a cooper, a tailor, a woman churning, and one teasing wool, are all at work. There is also a carpenter sawing a piece of wood, and two blacksmiths beating a piece of iron, the one using a sledge, and the other a small hammer; a boy turning a grindstone, while a man grinds an instrument upon it; and a barber shaving a man, whom he holds fast by the nose with one hand. The boy was only about seventeen years of age when he completed this curious work, and since the bent of his mind could be first marked, his only amusement was that of working with a knife, and making little mechanical figures. This is the more extraordinary, as he had no opportunity whatever of seeing any person employed in a similar way. He was bred a weaver with his father, and since he could be employed at the trade, has had no time for his favourite study, except after the work ceased, or during the intervals; and the only tool he ever had to assist him was a pocket-knife. In his earlier years he produced several curiosities on a smaller scale; but the one now described is his greatest work, to which he devoted all his spare time during two years."

THE AMSTERDAM PILE.

In an interesting report on the "Waterstaat" of the Netherlands, presented to the British Government, we read: "To appreciate the beauty of the Dutch science of hydrodynamics, it is necessary to understand that, from first to last, it is a question of comparative levels. The error of a centimètre in
[pg 151] level might drown a province, or frustrate the purpose for which some canal had been designed. Thus it may be said, without exaggeration, that the most important institution in the kingdom of the Netherlands is a certain antiquated pile at Amsterdam—but one of many million pine-trees brought from Norway, on which the city is perched,—which indicates the rise and fall of the outer waters of the Zuyder Zee and German Ocean. For 200 years this pile has been watched with anxiety by the burghers of the Netherlands, and a graduated scale has been marked upon it, in which the mean water level is represented by zero. It is known as the 'Amsterdamsche Peil,' and every hydraulic undertaking in the country is measured by its standard, as having a level of so many mètres or centimètres above or below the usual level of the sea. The initials A. P. (Amsterdamsche Peil), O. A. (Zero of Amsterdam), or Z. P. (Zero of Pile), are the forms of abbreviation most generally used to represent the starting-point in all hydraulic calculations; and one of these, with the signs + and -, must therefore necessarily occur in every intelligible description of Dutch public works."

THE PERILS OF EXPERIMENT.

M. Rouelle, an eminent French chemist, was not the most cautious of operators. One day, while performing some experiments, he said to his auditors: "Gentlemen, you see this cauldron upon the
[pg 152] brazier; well, if I were to cease stirring for one moment, an explosion would ensue, that would blow us all into the air." The audience had scarce had time to reflect on this comfortable piece of information, when the operator actually did forget to stir, and his prediction was amply verified. The explosion took place with a terrible crash; all the windows of the laboratory were smashed to pieces, and two hundred auditors were whirled away into the garden. Fortunately, no one received any serious injury, the chief violence of the explosion having been in the direction of the chimney. The demonstrator himself marvellously escaped without further harm than the loss of his wig.—A certain Scotch Professor—not of the present generation—as remarkable for the felicity of his experimentation as Rouelle could be for his failures, was once performing an experiment with some combustible materials, when the mixture exploded, and the phial which he held in his hand flew into a thousand pieces. "Gentlemen," said the Doctor to his students, with the most unaffected gravity, "I can assure you that I have performed this experiment often with the same phial, and never knew it break in my hands before." The simplicity of this somewhat superfluous assurance gave rise to a general laugh, in which the Professor, instantly discerning the cause of it in his own excellent Irishism, most heartily joined.

THE SIBERIAN MAMMOTH REMAINS.

About 40,000 lbs. of fossil ivory—that is to say, the tusks of at least 100 Mammoths—are bartered for
[pg 153] every year in New Siberia, so that in a period of 200 years of trade with that country, the tusks of 20,000 Mammoths must have been disposed of—perhaps even twice that number, since only 200 lbs. of ivory is calculated as the average weight produced by one pair of tusks. As many as ten of these tusks have been found lying together, weighing from 150 to 300 lbs. each. The largest are rarely sent out of the country, many of them being too rotten to be made use of, while others are so large that they cannot be carried away, and are sawn up in blocks or slabs on the spot with very considerable waste, so that the loss of weight in the produce of a tusk before the ivory comes to market is of no trifling amount. A large portion of this ivory is used by the nomad tribes in their sledges, arms, and household implements, and formerly a great quantity used to be exported to China; a trade which can be traced back to a very distant period. Notwithstanding the enormous amount already carried away, the stores of fossil ivory do not appear to diminish; in many places near the mouths of the great rivers flowing into the Arctic Ocean, the bones and tusks of these antediluvian pachyderms lie scattered about like the relics of a ploughed-up battlefield, while in other parts these creatures of a former world seem to have huddled together in herds for protection against the sudden destruction that befell them, since their remains are found lying together in heaps. In 1821, a hunter from Yakutsk, on the Lena, found in the New Siberian Islands alone 500 poods (18,000 lbs. English) of Mammoth tusks,
[pg 154] none of which weighed more than 3 poods; and this, notwithstanding that another hunter on a previous visit in 1809 had brought away with him 250 poods of ivory from the same islands. Entire mammoths have occasionally been discovered, not only with the skin (which was protected with a double covering of hair and wool) entire, but with the fleshy portions of the body in such a state of preservation that they have afforded food to dogs and wild beasts in the neighbourhood of the places where they were found. They appear to have been suddenly enveloped in ice, or to have sunk into mud which was on the point of congealing, and which, before the process of decay could commence, froze around the bodies, and has preserved them up to the present time in the condition in which they perished. It is thus they are occasionally found when a landslip occurs in the frozen soil of the Siberian coast, which never thaws, even during the greatest heat of the summer, to a depth of more than 2 feet; and in this way, within a period of a century and a half, five or six of these curious corpses have come to light from their icy graves. A very perfect specimen of the Mammoth in this state was discovered in the autumn of 1865, near the mouth of the Jenissei; an expedition was despatched to the spot by the Imperial Academy of Sciences in the summer of 1866, and the result of that expedition, it is considered, will be the disclosure of some interesting facts in the natural history of a former creation.—*Mr. Lumley's Report on Russian Trade.*

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VELOCITY OF ELECTRICITY.

One of our most profound electricians is reported to have exclaimed, "Give me but an unlimited length of wire, with a small battery, and I will girdle the universe with a sentence in forty minutes." Yet this is no vain boast; for so rapid is the transit of the electric current along the lines of the telegraph wire, that, supposing it were possible to carry the wires eight times round the earth, it would but occupy *one second of time*. The immense velocity of electricity makes it impossible to calculate it by direct observation; it would require to be many thousands of leagues long before the result could be expressed in the fractions of a second. Yet Professor Wheatstone devised some apparatus for this purpose, among which was a double metallic mirror, to which he gave a velocity of eight hundred revolutions in a second of time. The Professor concluded, from his experiments with this apparatus, that the velocity of electricity through a copper wire, one-fifteenth of an inch thick, exceeds the velocity of light across the planetary spaces; that it is at least 288,000 miles per second. The Professor adds, that the light of electricity, in a state of great intensity, does not last the millionth part of a second; but that the eye is capable of distinctly perceiving objects which present themselves for this short space of time.

MONOCHROMATIC PAINTING.

A very delicate experiment, yet a very natural one, which Buffon appears to have first noticed, led in all probability to the invention of the monochromatic mode of painting, or painting with a single colour. If, at the moment which precedes sunset, at the close of a cloudless day, a body is placed near a wall, or against another polished body, or on a smooth chalky soil, the shadow carried by this body is blue, instead of being black or colourless. This effect is produced by the light of the sun being so weakened, that the blue rays which are reflected from the sky—which has always this colour on a clear day—fall, and are again driven back or reflected on that part of the wall which the dying light of the sun cannot strike; for even at its last moment, the light which falls straight and direct, is sufficiently strong to destroy that of the heavens, which is only reflected, wherever they meet.

THE MARINER'S COMPASS.

The time at which the attractive property of the magnet was discovered, is by no means known; certain, however, it is, that mankind were acquainted with it at a very early period. Father Kircher endeavours to prove that the Jews were aware of the magnet's singular property of attracting iron;
[pg 157] and from Plutarch, it appears that the Egyptians were not ignorant of it. Pythagoras, Ptolemy, and several other ancient philosophers, knew and admired this wonderful property of the magnet. Thales and Anaxagoras were so struck with it, as to imagine that the magnet had a soul; and Plato said that the cause of its attraction was divine. But the *directive* property of the magnet was not known to the ancients. To the simple application of this property, which was either discovered or introduced into Europe about 500 years ago, mankind is indebted principally for the discovery of a new continent nearly equal to the old one, for an extensive commerce between the most distant nations, and for an accurate knowledge of the shape and size of the world we inhabit. The use of the magnetic needle was not known in Europe before the thirteenth century. The honour of its discovery has been much contested; but by the consent of most writers, it seems to belong to Flavio Gioja of Amalfi. He lived in the reign of Charles of Anjou, who died in 1309; and it was, it is said, in compliment to this Sovereign that Gioja distinguished the North Pole by the emblem of France, the *fleur-de-lis*. Du Halde, in his book upon China, indeed, intimates that the use of the magnetic needle was known to the ancient Chinese. Speaking of the Emperor Hoang-ti, when he gave battle to Tchi-Yeou, he says: "He, perceiving that thick fogs saved the enemy from his pursuit, and that the soldiers rambled out of the way and lost the course of the wind, made a car which showed them the four cardinal points. By this
[pg 158] method he overtook Tchi-Yeou, made him prisoner, and put him to death. Some say that there were engraven on this car, on a plate, the characters of a rat and a horse, and underneath was placed a needle to determine the four parts of the world. This would amount to the use of the compass, or something near it, being of great antiquity and well attested." In another place, speaking of certain ambassadors, Du Halde says: "After they had their audience of leave, in order to return to their own country, Tcheou-Kong gave them an instrument, which on one side pointed towards the north, and on the opposite side towards the south, to direct them better on the way home, than they had been directed in coming to China. The instrument was called *Tchi-ran*, which is the same name as the Chinese now call the sea-compass by; this has given occasion to think that Tcheou-Kong was the inventor of the compass." This happened in the twenty-second cycle, about 1040 years before Christ; but, notwithstanding the assertions of Du Halde, strong reasons have been adduced against the mariner's compass being known among the ancient people of China and of Arabia. The French also have laid claim to the discovery of the compass, and in the Imperial Library at Paris there is a poem, contained in a curious quarto manuscript of the thirteenth century, on vellum, in which the mariner's compass is evidently mentioned; but still it appears that the Neapolitan, Flavio Gioja, if not the original discoverer, was at least the first who used the mariner's compass, or constructed it for the use of vessels in the Mediterranean.

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THE DISCOVERY OF LITHOGRAPHY.

The invention, or more properly the discovery, of lithography, claims a high rank among those of the present age, on account of its extensive usefulness. The honour of the invention belongs to Alois Sennefelder, originally a performer at the Theatre Royal of Munich. He had conceived the idea of etching on stone instead of on copper, and was proceeding to make the experiment, when an accidental discovery gave a more beneficial turn to his speculations. The discovery, which was that of the lithographic art, has been thus narrated by Sennefelder himself:—

"I had just succeeded, in my little laboratory, in polishing a stone plate, which I intended to cover with etching ground, when my mother entered the room, and desired me to write her a bill for the washerwoman, who was waiting for the linen. I happened not to have even the smallest slip of paper at hand, as my little stock of paper had been entirely exhausted by taking proof impressions from the stones; nor was there even a drop of ink in the ink-stand. As the matter would not admit of delay, and we had nobody in the house to send for a supply of the deficient materials, I resolved to write the list with my ink prepared with wax, soap, and lamp-black, on the stone which I had just polished, and from which I could copy it at leisure."

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"Some time after this, I was going to wipe this writing from the stone, when the idea, all at once, struck me to try what would be the effect of such a writing with my prepared ink if I were to bite it in the stone with aquafortis; and whether, perhaps, it might not be possible to apply printing ink to it in the same way as to wood engravings, and to take impressions from it." Sennefelder surrounded the stone with a border of wax, and applied aquafortis, by which in a few minutes the writing was raised. Printing ink was then applied with a common printer's ball, impressions were taken off, and the practicability of the important art of lithography thus was fully established.

The first application of the art to purposes of usefulness unconnected with the fine arts, was made by the Duke of Wellington in the Peninsular War, for the purpose of rapidly multiplying copies of general orders, instructions, etc., and accompanying them with sketches of positions. It has since been introduced into the public offices of almost every state in Europe; and its uses in every department of commercial, social, and artistic activity are innumerable.

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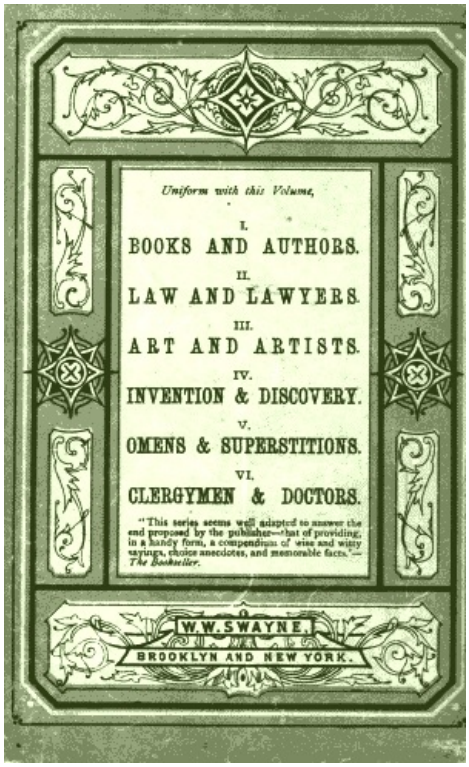
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