Galileo.---His Life and Discoveries.

After Archimides, the first person who passed beyond the point at which the ancients stopped, and made an advance in Mechanics, was Galileo Galelei, who was born at Pisa in Italy, on the 15th of Feb. 1564.

Like most experimental philosophers, Galileo, in his early years, gave indications of that bent of mind, and intellectual superiority, which has made him rank so high among the philosophers of antiquity. Although his father was by no means wealthy, Galileo received a tolerable education. He was desirous of following the profession of a painter, but in obedience to his father's desire he entered as scholar of arts at the university of Pisa, on the 5th of November, 1581, and applied himself to the study of medicine. Music was a favorite study of Galileo's In studying the principles of this science, he found it necessary to learn something of geometry, and commenced at Euclid's Elements. The demonstrations of the mathematician, and the new and wondrous truths which this science unfolds, took such hold of the ardent mind of Galileo, that after many fruitless attempts to confine him to the study of medicine, his father gave up the attempt and allowed him to follow his own inclinations. From Euclid he ascended to the higher mathematicians ; and, while studying Archimedes' treatise on hydrostatics, he wrote an essay on the hydrostatical balance, explaining its construction, and the mode by which the philosopher of Syracuse detected the fraud committed by the jewellers in making Hero's crown. This work introduced Galileo to Guido Ubaldi, an eminent mathematician, who engaged him to investigate the subject of the centre of gravity in solid bodies ; and the treatise which he produced upon this subject was the foundation of his future celebrity.

Through his connection with Ubaldi, Galileo was appointed lecturer on mathematics at Pisa in 1589, with a yearly salary of sixty crowns, which he increased by devoting some time to private teaching At the early age of eighteen, Galileo doubted the philosophy of Aristotle ; and on his establishment at Pisa, commenced to overthrow the doctrines of this philosopher. His first inquiries were into the mechanical doctrines of Aristotle, which he soon discovered to be untenable. The errors which he found existing, he exposed to his pupils, and a rancorous controversy commenced between the followers of Aristotle on the one side, and Galileo and his pupils on the other. Argument and even experiment, failed in convincing Galileo's opponents. The doctrine that the heavier of two falling bodies would fall quicker, was disproved by the experiment of dropping bodies of different weights from the leaning tower at Pisa ; but although these bodies struck the ground nearly at the same instant, the followers of Aristotle remained unconvinced, or at least unconverted. Conscious of his superiority, and the truth of his doctrines, Galileo turned not only the powers of argument, but the shafts of ridicule and sarcasm against his opponents ; thus raising up a personal enmity, which afterwards developed itself in bitter persecution. Other circumstances increased the rancor of his enemies, and at last made his position so uncomfortable, that he gave up his situation at Pisa, and accepted the professorship of mathematics at the university of Padua, with an income of 180 florins. The death of his father having burdened Galileo with the family, he had to apply himself here as at Pisa to private teaching. Nothwithstanding his public and private duties, however, he still found leisure to make several discoveries and inventions, which were circulated in manuscript among his friends. Some of these abused the confidence reposed in them, and published several of Galileo's inventions as their own.

The doctrines of Copernicus, regarding the stability of the sun and the revolution of the planets, were the subject of disputation with the learned in the time of Galileo. He early became a convert to the new doctrines, and believed in them even at the the time he was teaching the opposite or Ptolemaic system, which regarded the earth as stationary, and the sun a revolving body. Shortly after he went to Padua, he published a treatise on the sphere, in which the system of Ptolemy was supported by the very arguments which he afterwards ridiculed. It is rather considered, however, that it was sometime after the publication of this treatise that Galileo changed his opinions. About this time he commenced a correspondence with Kepler, the German astronomer, which continued till his death.

In 1593, he contracted a chronic disorder, from inadvertently sleeping at an open window, which afflicted him at intervals during the rest of his life. At this time Galileo's reputation as a philosopher was widely extended over all Europe, and many of the nobility became his pupils. His first engagement as professor at Padua was for six years. On the expiration of this term, he was re-engaged for other six years, at an advanced salary of 320 florins.

The first important discovery of Galileo was, that the vibrations of a pendulum are performed in equal times, whatever be the size of the arc described within certain limits. In 1604, a new star was discovered by astronomers in the constellation of Opiuchus, and formed the subject of much speculation. By some it was set down as a meteor; but from the absence of parallax, Galileo proved it to be one of the fixed stars, situated far beyond the bounds of our own system.

Galileo was again appointed professor at Padua, in 1 06, and his salary increased to 520 florins. So great had his fame as a philosopher became, that the lecture room could not contain his hearers, which obliged him to lecture in the open air. Among other pursuits he investigated the property of the loadstone, and discovered a method of arming them so as to double their magnetic power.

Galileo still kept up communication with the family of the Duke of Tuscany, who had been his early patron. Cosmo, who had succeeded his father Ferdinand, had been one of Galileo's pupils, and being imbued with an ardent wish to promote science, formed the desire of attaching his former master to his household.

Negotiations were accordingly commenced. His salary as professor at Padua was to be greatly increased on the expiring of his engagement. The seclusion of private life, however, offered far greater charms to the studious philosopher. He was anxious to escape the performance of public and private duties which continually interrupted his own studies. He accordingly accepted the situation of philosopher and principal mathematician to the Grand Duke of Tuscany, with a salary of 1000 florins, and his only duties, were to lecture occasionally to sovereign princes. It was also expressly stipulated that he should have the most perfect command of his own time, to devote to study and the completion of some projected works.

During the progress of the arrangements for leaving Padua Galileo paid a visit to Venice. Here he became informed of an optical instrument, presented by a Dutchman to Prince Maurice of Nassau, which possessed the property of enlarging objects, and bringing them nearer the observer. This was confirmed by a letter which Galileo received a few days afterwards from Paris. To the consideration of this subject he immediately applied himself, and the first night after his return to Padua, he discovered what he sought in the doctrine of refracting light. He fitted a spectacle-glass to each end of a leaden tube, one of which was plano-convex, and the other plano-concave, and on applying his eye to the concave glass, he found that it magnified. Delighted with his discovery, he carried his little instrument in triumph to Venice, where it created a most intense excitement, and for a month thousands flocked to see it. He made a present of it to the Venetian Senate, and received in return a perpetual grant of the professorship at Padua, and an increase of salary from 520 to 1000 florins. It was shortly after this that he entered the household of the Grand Duke of Tuscany.

After disposing of his first instrument, which magnified only three times, Galileo applied himself to the making of another which magnified eight times, and "at length," as he says himself, "sparing neither labour nor expense," he constructed an instrument which magnified thirty times. With this instrument he discovered the inequalities of the moon's surface. "The dark and luminous spaces he regarded as indicating seas and continents, which reflected in different degrees the incidental light of the sun ; and he ascribed the phosphorescence, as it has been improperly called, or the secondary light, which is seen on the dark limb of the moon in her first and last quarters, to the reflection of the sun's light from the earth." With the telescope he discovered a striking difference between the appearance of a fixed star and the planets. The latter exhibited round and well defined discs like the moon, while the former, even of the first magnitude, appeared but as lucid points. He was likewise enabled to resolve portions of nebula and clusters, which appeared to be hazy spots in the heavens, into distinct and numerous stars.

(*To be continued.*)

Electro Magnetism as a Motive Power.

The following is the report of the select committee of the Senate, presented by Mr. Benton on the 28th ult. on the application of Dr. Page for aid in testing his new invention in Electro Magnetism.

"That the memorialist represents that he has discovered a mode of applying electro-magnetic power for the purpose of navigation and locomotion, and as a general substitute for the dangerous agency of steam ; that he has been engaged in the investigation of the subject for more than twelve years, at great expense and sacrifice ; that he is now able to demonstrate the availability of the electro-magnetic power, as a mechanical agent, upon a scale of magnitude commensurate with his limited means; that means larger than his own would be necessary to test the availability of the power in its application to the great purposes of useful navigation and locomotion; that he deems his invention worthy of national encouragement, upon the same principle that encouragement was extended by Congress to Professor Morse for telegraphing by electro-magnetism : and he prays that a select committee may be appointed to examine his invention, and to witness his experiments, and that an appropriation may be made to enable him to apply his invention on a large and useful scale.

"In pursuance to their appointment, the Committee attended the lectures now in a course of delivery in this City by Prof. Page, on electro-magnetism, and witnessed his experiments in the application of that power as a mechanical agent, and are satisfied that his past success, with his limited means, justifies the expectation of farther success from the enlarged means. The power was exhibited (among other ways) in the suspension of a mass of iron of 50 pounds, without visible support, and in the capacity of the great electro-magnet to sustain all the weight that could be crowded upon it, consisting of masses of iron and several persons, and believed capable of sustaining a weight of 10,000 pounds. Its application was exhibited in the propulsion of miniature engines, and in driving an engine of considerable power by which boards are planed with ease and smoothness.

"That the power is great, and can be applied to the useful purposes of navigation and locomotion, the committee see no reason to doubt. The inquiry which rests upon their mind is as to the cost of the production of this power, and whether it can be produced at a rate to justify its common use as a mechanical agent. On this point experience can be the only safe guide, and thus far experience is favourable. Dr. Page informs the committee that he has succeeded in largely reducing the cost of production, and expects to be able to bring it within the limits of an economical power, especially when the saving of life, as well as money, shall be comprehended under the idea of economy—safety being one of the great objects of his invention.

"Upon the examination of the power and applicability of Professor Page's invention, the committee deem it an object of national interest, that its entire ability be completely tested; and, the sum of twenty thousand dollars being deemed necessary for him for that purpose, they recommend an appropriation accordingly, and direct their chairman to propose it as an item in the Naval Appropriation bill."

Music and Motion.

Mr. Editor.—In your Journal of Dec. 30, you state that you have received a letter from Mr. E. B. Henrick, of this place, informing you that, about ten years ago, I communicated to him facts explaining the phenomenon of sound and rapid motion similar to those recently read by Mr. Scott Russell before the meeting of the British Association for the promotion of Science. I thank Mr. Henrick for thus connecting my name with an interesting fact in musical science, and you for the opportunity given me to furnish an account of what he calls *my* discovery. I know not, nor have I taken pains to ascertain, how far I am entitled to such honor The deep interest I have ever felt in all that relates to music has led me, from boyhood, to observe and reflect upon phenomena like those to which you refer, and you may be assured I read Mr. Russell's explanation with the delight one naturally experiences on finding his own early and matured views confirmed by such high authority. As Mr. Henrick, from his friendship no doubt, has requested me to furnish an account of my observations, I cheerfully comply, simply premising that it must be brief from the nature of the case.

My attention was first attracted to this subject as far back as 1819 I was riding in a sleigh, the horses going at a brisk rate, when I observed that the bells on the horses passing me in an opposite direction *flatted in pitch* after the sleigh had passed. I noticed this fact repeatedly afterwards. Four or five years later, I began to observe and study the effect of church bells and their echoes. Fire alarms gave me frequent opportunity for observation. Going hurriedly towards the church I heard, when about midway between it and a building in the vicinity, the bell's echo from the latter. The pitch of the bell *before* me was sharper than that of its echo *behind* me. I then stopped running, and found that both agreed in pitch. On running again towards the church, and of course farther from the building, the pitch of the bell grew sharper, while that of the echo grew flatter. These curious phenomena induced me to seek other occasions for observation.

In 1834 or 1835, the Lowell Railroad went into operation. This gave me the opportunities wished for. At a crossing, say ten or fifteen feet from the track, I was standing when the engine came towards me with considerable velocity. Its bell, weighing from 50 to 75 lbs., was ringing to give warning, and it continued to ring until sometime after the engine passed. I observed that, immediately after it had passed, the pitch of the bell was flatted about half a tone. This observation was often repeated with the same result. I mentioned the facts to Mr. Henrick and other intelligent persons, and our explanation was upon the theory of vibrations urged by Mr. Scott Russell. Respectfully yours,

H. P. Munroe.

Cambridgeport, Mass. Feb. 14, 1849.

Umbrellas in Rome.

A Roman shower is a shower indeed. Put up a Parisian umbrella and it is laid flat in a twinkling. The native carries (when apprehensive of rain, which may continue three days without cessation) a ponderous machine, which, when opened out, resembles a little tent suspended in the air, under which he walks securely. The construction of the Italian umbrella is simple enough,—a mass of oiled calico is attached to a stout pole ; and this, when spread, resists the torrent wonderfully.

Cochineal.

The editors of the Savannah Republican have been shown veritable specimens of the cochineal insects taken from a cactus growing on end of the sea islands not far from that city. They exactly resemble those of commerce, while the beautiful color is precisely of the same intensity and color. The Cochineal insects have hitherto been found principally in Mexico and New Spain.

The Danish Government is about purchasing a steamer in England, to be equipped as a man-of war.

Thirty-one millions of pounds of tea were brought to London from China, last year.