Plantains and Bananas.

Of all plants which are the produce of the tropics, none are superior in interest to the plantains and bananas, two closely allied species of the genus *Musa*. Of the several species of this genus, one has received the specific name of *paradisiaca*, under the supposition that it was the "tree of life," or the "tree of the knowledge of good and evil," spoken of in the Scriptures. St. Pierre observes that the violet cone at the end of a branch of plantains, with the stigmas peering through like gleaming eyes, might well have suggested to the guilty imagination of Eve the semblance of a serpent tempting her to pluck the forbidden fruit it bore, as an erect and golden crest. Though some of the species attain a height of 20 to 30 feet, they are herbaceous plants, growing up, flowering, fruiting, and then dying down to give place to other shoots from the same root. The fruit ripens in succession from the base to the apex of the flowering stem, so that on the same plant flowers and ripe fruit will be found associated. One stalk of fruit will attain three feet, and bear from 120 to 150, even 180 plantains, the entire weight of which would be from 50 to 70 lb. Dried plantains form an article of internal commerce in India, and, in a few instances, have been exported. When deprived of their skin and dried in the sun, they are reduced to meal, in great request in the West Indies for children and invalids. A recent French exchange states that efforts are being made in Venezuela to get up an export trade for meal of this sort, the supply being much greater than the home demand. Professor Johnston states that the fruit approaches most nearly in composition and nutritive value to that of the potato, and the meal to that of rice.

All the species contain a large number of spiral vessels, and afford a strong and valuable fiber, from which cloth and cordage are made. The substance called manila hemp, much employed for cordage in America and Europe, is obtained from one of the species (*Musa textilis*). Scarcely any parts of these useful plants are devoid of use to man. A limpid fluid issues from wounds in the body of the plant, which is used in medicine, as is also the root. It has been recently stated in a foreign medical journal that the property which these plants possess of keeping the surrounding soil moist (as pointed out by Boussingault) has been taken advantage of to afford shade and moisture to the coffee plant in Venezuela; and that the cultivation of the latter has therefore been greatly increased.

Still another industrial use has lately been proposed for the fruit in the latter country, this being the distillation of brandy. Banana brandy, even from the first distillation, is said to have a pleasant taste and smell, recalling that of the fruit. It contains 52 per cent of alcohol. As two hundredweight of the fruit produces about ten quarts of alcohol of 96°, banana brandy may yet be destined to play as important a part in economy as the alcohol of the sugar cane.

Ramie Fiber and its Manufacture.

This fiber, the utilization of which in textile manufactures has for many years engaged the attention of practical men, still continues to command a large amount of notice. It is undoubtedly deserving of all it receives, because if the difficulties that have hitherto stood in the way of its extensive use can be overcome, we shall have at command a fiber that will do much to emancipate manufacturers from dependence upon the American cotton, the Russian flax, and the Italian and Chinese silk crops. Besides the independent position it would take on its own merits, it possesses qualities that would enable it to be substituted, by means of a little ingenuity, for any of those fibers. If it can be produced sufficiently cheap it may even become a permanent substitute for one or more of them, and to a considerable extent displace them. Whether such an occurrence would be an advantage or otherwise time only could reveal.

During the past month we have had submitted to our notice some specimens of goods manufactured entirely from the rhea plant fiber. The raw material in its dried state, as it is taken in the first process, was shown. This is a pliant, reddish brown, straw-like substance. After passing through the first stage it yields a long, light flaxen-colored fiber, of great strength and fineness, and which appears to be divisible to an extreme degree. The next forms in which it was exhibited were in wet spun and dry spun yarns. In the former it possessed a solidity which gives it a somewhat wiry appearance and great strength; in the second it is almost as soft as wool, and may almost be mistaken for it. These yarns wrought into cloth display similar characteristics. One specimen appears very much like a good brown Hessian, and another a Belfast brown linen. A third had passed through the bleaching process, and showed its capability of being adapted for table linen, napkins, diapers, etc. It bleaches clearly and evenly, coming up of a rich pearly whiteness, with a cool, pleasant feel, but with more fiber on the face of it than a linen article would possess. In each phase of it the distinguishing features are great strength and probable durability. In another case the fiber had been reduced to its finest condition, spun into a soft, pearly-white hosiery yarn, and worked into an undershirt, possessing all the softness, luster, and beauty of a similar article in silk.

So far as the samples allowed us to discover, it would appear to be free from the distinguishing fault of China grass, from which creases cannot be removed. The inventor stated that he had numerous other fabrics woven from yarns entirely of this fiber, such as dress goods, ribbons, dyed and printed fabrics, either completed or in process, and which could be shown when necessary. The specimens exhibited formed an interesting display, the importance of which, however, depends entirely upon whether, as affirmed, they have been produced by a process and at a cost that will enable the rhea fiber to take its position in commercial markets as a practically useful article.—*Textile Manufacturer.*

THE EDIBLE MUSSEL.

The common edible mussel, *Mytilus edulis*, attracts our special attention on account of its value as an article of diet and commerce.

In the accompanying engraving, Fig. 1 shows the animal laid open to view, the left half of the triangular shell having been removed, while the brim of the mantle has been thrown back a little to allow a better inspection of the inner organs. Both parts of the shell are alike in shape and size. The hinge or lock uniting them is located in the smallest

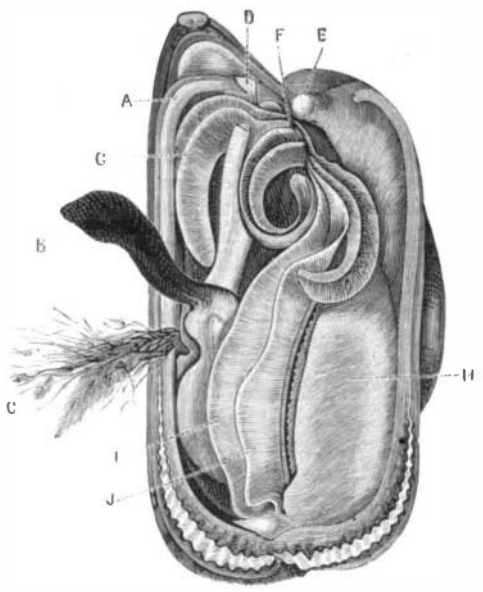

Fig. 1.—EDIBLE MUSSEL.

angle of the triangle formed by the shell, and both of the latter end at this point in short conical elevations. At the opposite end there is a small opening in the shell corresponding to the anus of the mussel; and in close proximity runs a short fringed tube connecting with the inner organs of respiration.

The peculiar digital form of the foot and the presence of a spinning gland or byssus are characteristic, and both are undoubtedly related to the stationary mode of life of the animal. The hypothenuse of the shell being the face side of the mussel, A is the brim of the mantle of the latter. On both

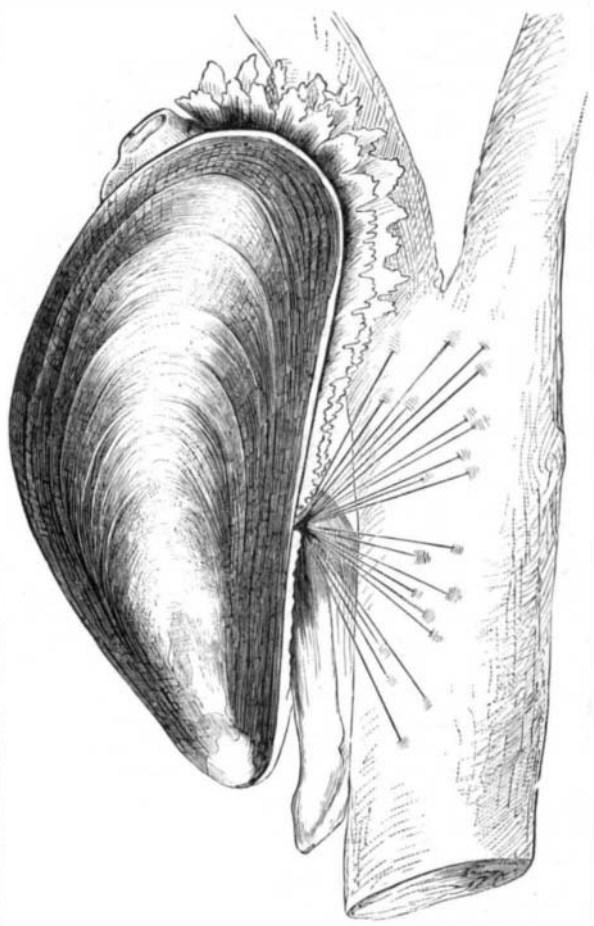

Fig. 2.—EDIBLE MUSSEL.—(*Mytilus Edulis.*)

sides of the mouth, F, will be noticed the long, narrow, folded tentacles, G; J is the exterior, I the interior respiratory muscle; E and D are muscles controlling the foot, B, under and behind the base of which is situated the byssus or spinning gland. From its cavity a groove extends along the lower side of the foot, and ends at its tip in a transverse cavity containing a small plate, perforated by seven small apertures, used for sucking.

By means of the foot and the byssean gland the animal is enabled to spin a net or barb, C, consisting of numerous thin threads, attached firmly to the surface of the rock or other object forming its abode. These threads are produced from a viscid liquid substance secreted in the byssean gland, which is sucked up into the apertures of the end of the feet and drawn out into threads, which become quite firm in a short time. Once attached to a rock or log they resist the action of the strongest current and the heaviest gale. Fig. 2 is a correct representation of the mussel as attached to a fixed object.

If the mytilus desires to change its residence it draws itself forward as far as possible, and attaches a few threads as far ahead as the feet reaches. At the same time a few of the old threads are severed. This manipulation is repeated until a suitable site is reached. Although this mode of locomotion is extremely slow, the animal nevertheless manages to traverse considerable distances in this manner.

The edible mussel inhabits, by preference, those portions of the shore which are laid dry at low tide; and in the neighborhood of the mouths of rivers, where the percentage of salt in the water is low, broad thick bands may be observed covering that particular section and marking it distinctly. Sometimes as many as 2,000 individuals have been counted on an area of one square foot.

As above mentioned, the animal prefers water containing only a little salt. It abounds, therefore, especially in those European waters cut off partly from free communication with the Atlantic, as in the German North Sea, the Baltic, and the Adriatic. They have also been acclimatized in the Caspian Sea, the water of which is not extremely salt.

In northern waters the edible mussel attains its full size in four to five years, and in the Mediterranean in one to two years. When they propagate each individual produces (they being hermaphrodites) millions of offspring.

Besides being almost indispensable as bait for certain fish, they are extensively used as an article of food. They are largely cultivated in all European waters, in so-called "parks." In the North Sea these consist of large numbers of trees, from which the smaller branches only have been cut, and which are planted in the bottom of the sea at such a distance from the shore that their upper portion is partially laid bare at low water. After four or five years they are raised, stripped, and replaced by others. In the bay of Kiel, Germany, alone about 1,000 of these trees are annually planted and about 1,000 tons of mussels are brought on the market. Bad seasons occur, however, both with respect to quality and quantity, owing to various causes. In the Adriatic the mussels are raised on ropes extended between poles rammed into the ground. The ropes are raised and stripped once in eighteen months.

American Sumac.

Dr. William McMurtrie, Chemist of the Department of Agriculture, has been making elaborate investigations as to the relative amount of tannic acid and coloring matter in American and Sicily sumac. He finds the American product, when properly gathered, to be fully equal to the foreign. Samples of Winchester, Va., sumac were collected in the months of June, July, and August respectively. Of these samples those collected in June and July were mixed varieties, and of the product collected in August we secured samples of the leaves of *Rhus glabra* and *Rhus copallina* separately.

In reporting his experiments Dr. McMurtrie states that in some of the tests the precipitates obtained by means of the solution of the June collections of Winchester mixed sumac were perfectly white and very much cleaner than any obtained with the Sicilian product. "The difference in the color of the precipitates obtained from the solution of the June collection and that obtained from solutions of the samples of later collections, was sufficiently marked to prove that the great difficulty in the way of the universal employment of the American to the exclusion of the expensive Sicilian product may be obviated by making our collections early in the season—that is, in the month of June. The percentage of tannic acid is not, it is true, quite as high as obtains in July, but it compares favorably with the Sicilian product, which, be it remembered, communicates a slightly yellowish tinge to the gelatine precipitate. The amount of coloring matter found in the July collection is sufficient to account for the difference of $50 a ton in the market values of the sumac of home and foreign growth, regardless of the proportion of tannic acid. We would therefore advise that, for the purpose of tanning white and delicately colored leather, the collection be made in June, while for tanning dark colored leathers, and for dyeing and calico printing in dark colors, where the slightly yellow color will have no injurious effect, the collections be made in July. It appears that for all purposes the sumac collected after the 1st of August is inferior in quality. In view of the facts here presented, we cannot help urging upon manufacturers the importance of encouraging the home production—of insisting that the collections be made early in the season, in order thus to bring about such a change in this matter as to prevent the annual expenditure of over $600,000 in gold for the sumac of foreign growth."

NEW AGRICULTURAL INVENTIONS.

An improved trap attachment for corn cribs, patented by Mr. Adam Harper, of Boswell, Ind., consists in combining with the raised and slatted bottom of the corn house a series of swinging side racks that rest inwardly on a subjacent floor.

Mr. James W. Rudolph, of Carmi, Ill., has devised an improved agricultural implement, that is adapted for both hoeing and digging, and is easily adjusted for either use.

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A machine for dropping corn and other seed at regular intervals, and also dropping at the same time a regulated supply of fertilizing material into the hill, has been patented by Mr. Geo. W. Miller, of Fawn Grove, Pa.

An improvement in harrows, patented by Mr. George Lettenmyer, of Little Georgetown, W. Va., consists in an arrangement of yielding teeth, which renders the draught of the implement light, and lessens the chance of breakage.

Mr. Henry M. Keller, of Newark, O., has patented an improved harrow having teeth of peculiar form, and provided with a clod crusher, that breaks up the clods as the harrow advances.

GERARD MERCATOR, THE COSMOGRAPHER.

Gerard Mercator, the cosmographer, and inventor of the map projection which bears his name, was born on the 5th of March, 1512, in the small town called Rupelmonde, in East Flanders, about eight miles from Antwerp. He was the youngest of six children of a poor shoemaker. Losing both parents at an early age, he was kindly cared for by a great-uncle, to whom he became indebted for the advantage of an education in the best schools of the Netherlands. At the age of eighteen he entered the University of Louvain, where he was eventually matriculated under the faculty of arts, which nearly corresponded with the faculty of philosophy in a modern German university. Remaining at Louvain till his removal to Germany, he at first devoted himself to philosophical studies of such abstruse subjects as the origin, nature, and destination of the physical universe, and became absorbed in the great problems of science and revelation. He found it impossible to reconcile the Mosaic account of creation with the doctrines of Aristotle. Here he began to tread upon dangerous ground, for in Louvain, as at Paris, the authority of Aristotle in the domain of physical philosophy was sacred and supreme. To dispute or question the perfect consistency and harmony of his teachings with those of the church was heresy. Finding no one to sympathize with him in his doubts, Mercator left Louvain and secluded himself for study at Antwerp for several months; but whatever skeptical views he may have had in regard to the divine inspiration of the Scriptures were dispelled before he returned to Louvain.

As Mercator grew older he began to turn his attention to the practical problem as to the best means of carning a livelihood. Having obtained permission from the Faculty of Arts of the University of Louvain to give private instruction in mathematics, he thus began to support himself; and having previously chosen for his vocation the manufacture of mathematical instruments, he was thus enabled to establish a workshop of his own, where he manufactured astrolobes, astronomical rings, globes, etc., of great accuracy.

As a chartographer, Mercator appears to have begun his career by the publication of a map of Palestine, at Louvain, in 1537. Increased interest in religious matters naturally led to an increased demand for such maps. No copy of this has come down to us; but it seems to have been well received, as it was highly praised by his contemporaries. His next work was a map of Flanders, undertaken at the request of certain Flemish merchants. He traveled over the country, making surveys and measuring heights and distances. It took three years to complete the work, and it was published at Louvain in the year 1540. A masterpiece of his handiwork, at this period of his life, was a large terrestrial globe, which he finished in 1541. This is now lost, but the original drawings for its exterior surface are still preserved at Brussels. This became the means of commending him to the favor of Charles V., from whom he received an order for a complete set of mathematical instruments for use on his expeditions. About this time he was maimed. In 1544, there occurred in his life an incident which has been only recently brought to light—he was imprisoned as a heretic. It appears that an imperial edict was issued at Brussels, by Mary, queen dowager of Hungary, condemning all heretics to death. Under the operation of this edict, forty-three citizens of Louvain, Mercator among the number, were accused of participation in what was styled the "Lutheran heresy."

We have no information as to the cause or circumstances of Mercator's discharge from imprisonment; all is shrouded in mystery; we can only glean from the records of the time that he must have been imprisoned nearly four months. After his release he resided at Louvain seven or eight years. He made a new set of instruments for the Emperor, to replace the former, which had been destroyed; and completed and dedicated to the Bishop of Liege a celestial globe of the same size and style as the terrestrial one which he had before presented to Granville.

In 1552 he removed to Duisburg, in Germany. Here he shortly after completed for the Emperor an astronomical ring and a set of globes elegantly equipped and ornamented. There was a celestial globe of glass or crystal, and on it were engraved the constellations with a diamond. Inside of this was a terrestrial globe of wood. Attached to this set were a compass, an hour circle, a quadrant of altitudes, and other instruments. In 1554 Mercator published at Duisburg a large map of Europe, which, more than any other work of his, contributed to his fame as a chartographer among his contemporaries. This is now lost, although a reduced copy of it published by his son still exists. In 1564 he published a map of Great Britain; in the same year, a map of Lorraine, based on a trigonometric survey made by himself. In 1569 he made his first appearance, after his removal to Duisburg, as the author of a printed book—a folio volume on chronology, written in Latin and published at Cologne.

Even after the discoveries of the 15th and 16th centuries, and in the lifetime of Mercator, the works of Ptolemy were still regarded as the groundwork of all geographical knowledge. Mercator was a great admirer, but not an implicit follower, of this author, and in 1578 published a corrected and revised edition of the maps or charts of Agathodæmon which accompanied the work of Ptolemy. Six years later, he republished this collection of charts, twenty-seven in number, together with the text of Ptolemy's eight books on geography. This work added greatly to the reputation of Mercator as a geographer and scholar, and is still held in high estimation by modern authorities.

We now come to the work of Mercator commonly known as his Atlas of Modern Geography, and which he did not live to complete. The modern application of the word "atlas" we owe to Mercator, and originated with this work. The introductory pages of the book, which was published by his son after his father's death, contain a genealogical tree of the ancestors and descendants of Atlas of Grecian Mythology, who, as a punishment for leading the Titans in their war against Jupiter, was condemned to bear the heavens upon his shoulders. As Humboldt has adopted the Greek word "Kosmos" as a title to the crowning work of his life, so Mercator adopted "Atlas" as the title to the work which he planned and projected as the crowning work of his life. He did not mean to call it an Atlas, or the Atlas, but simply "Atlas." He never intended to give to it the generic sense in which it is now used, as applicable to any and every collection of maps; but as there was no word in the classical or modern languages that had done such service, the title was borrowed in course of time by other chartographers, until it has gradually lost its special application, and come to designate simply a collection of maps. From the treatment to which two of his works were subjected by the Catholic Church, Mercator has been supposed to have been a Catholic; but this is said to be an error. His posthumous work on the creation was condemned in the Index Expurgatorius because its treatment of the doctrine of original sin bore too close a resemblance to the teachings of Luther; and his chronology was prohibited on account of the extracts contained in it from writings that had been condemned. Mercator, having lost his wife in 1586, married again. His second wife was the widow of a burgomaster of Duisburg. The issue of his first marriage was six children, three sons and three daughters. He died in December, 1594.

The fame of Gerard Mercator rests chiefly upon his achievements in the department of mathematical geography and chartography. He is known to us, principally, as the inventor of the projection which bears his name. The value of what is now known as the "Mercator Projection" was so little appreciated at first that his successors did not deem it of sufficient account to place it in the Atlas of Modern Geography. If it ever occurred to the inventor that this rather than any other of his productions would immortalize him, he probably banished the idea long previous to his death. It seems to have been thrown aside and forgotten, or only remembered as a scientific curiosity. It is unknown exactly when Mercator's projection was first used; we only know that about the year 1630, the French seaport Dieppe was the principal emporium for the sale of nautical charts, and that those then sold at that place were mostly on this projection. The practical signification of Mercator's projection is this: He says to the mariner: "If you wish to sail from one port to another, here is a chart and a straight line on it, and if you follow this line carefully, you will certainly arrive at your port of destination. The length of the line is not correct, yet it points exactly in the right direction. Consequently, if you follow the line, you may get to your destination sooner than you expect, or you may not get there as soon. But you will certainly get there."

Such are the leading features in the life of one to whom Malte-Brun paid an eloquent and fitting tribute when he said: "Modern geography dates from Mercator." The memory of Mercator has been sadly neglected by the English speaking races, and until the recent paper of Mr. Elial F. Hall before the American Geographical Society, no full account of his life has appeared in our language. We are indebted to Mr. Hall's paper for the materials of this brief sketch of the celebrated cosmographer.

DAVID PAGE.

In the death of Professor David Page, LL.D., which occurred at his residence, Newcastle-on-Tyne, March 9, geology loses one of its most popular expositors and voluminous and practiced writers.

Professor Page was born in Fife, and the earlier years of his life were spent in literary occupations in his native country. Subsequently he entered the employ of Messrs W. & R. Chambers, of Edinburgh, and took an active part in the preparation of their large series of educational works. During his connection with this house, the once-celebrated but now half-forgotten "Vestiges of Creation" made its appearance. Although Robert Chambers has always been credited with the greater share of this anonymous volume, Page is supposed to have lent powerful assistance with his versatile pen. Leaving the service of the Messrs. Chambers, he embarked on the sea of successful authorship, and, following in the wake of Hugh Miller, kept up an interest in geological science, by his voluminous writings, which were characterized by a graceful and easy style not usually possessed by scientific men. He rewrote his "Introductory Text-Book of Geology," and prepared an advanced textbook on the same science. He also published works on physical geography, and various popular works on geological subjects. Taking up the study originally as an amateur, he ultimately devoted himself to it professionally, although he is not credited with much original power as an observer. In fact, field work for him was almost impossible, owing to physical infirmity, yet he had a most lucid and pleasing way of presenting the discoveries of others before non-scientific readers. On the establishment of the College of Physical Science, at Newcastle, he was chosen Professor of Geology. Here he pursued his vocation with much zeal and success until within a short period of his death. He was in the sixty-fifth year of his age.

The New Northwest.

In a long review of the condition, prospects, and possibilities of the vast and comparatively undeveloped country lying to the north and west of Minneapolis, Minn., the *Northwestern Miller* says that the Northern Pacific Railroad passes nearly through the center of the finest wheat region on the face of the earth. Nearly 300 miles further north another great trans-continental railway is being constructed, and our Canadian neighbors even contemplate building a railroad having its northern terminus on the shores of Hudson's Bay. It will thus be seen that to the north and west of Minneapolis is a vast and productive agricultural region, extending far up into the British possessions on one side, and losing itself in the mountains of Montana on the other. It is capable of producing wheat enough to supply the world, and the water powers of Minnesota alone are capable of converting the larger part of its product into flour. It embraces within its limits immense forests of pine and hard wood, and mines of iron, copper, silver, and gold. Nature has provided in abundance the elements necessary to the support of a great population, and the population is now coming.

It is only within the last few years that a systematic effort has been made to develop this valuable section of the national domain. The success of the pioneer settlers has been such as to attract the attention of others seeking homes in the West, and the stream of immigration thus started has suddenly swollen to gigantic proportions. Last year the settlers poured into Western Minnesota and Eastern Dakota by thousands; this year they are coming by tens of thousands. As yet only a tithe of the magnificent wheat lands of the western portion of this State are under cultivation, and the sod of the greater part of Dakota's fertile prairie is unbroken. There is a steady exodus from the eastern part of this State and from Wisconsin and other States, of young men and old men, to the "promised land," which, if it does not literally flow with milk and honey, does promise an abundant harvest and a competence to those who are willing to work hard and wait patiently.

It cannot be doubted, the *Miller* remarks in another connection, that this great accession to the wheat growing territory of the United States will have a marked influence on the milling industry of the country. With an abundant supply of breadstuffs prices must rule low, and the margins in flour manufacturing be small. Every effort of inventive skill will be made to cheapen the manufacture and better the product. The inevitable result must be that the making of wheat into flour will be done in large mills employing immense capital, and that the class of small combined merchant and custom mills will become a thing of the past. The present high standing of spring wheat flour, which many have thought and some have hoped would be lost with the exhaustion of the Minnesota wheat fields, will be maintained through the superabundant supply of the choicest kinds of hard wheat from the new fields now being opened.

Scientific Views of Nature.

Who does not see that Galileo, Descartes, Newton, Lavoisier, Laplace, have changed the foundation of human thought in modifying totally the idea of the universe and its laws, in substituting for the infantile imaginings of non-scientific ages the notion of an eternal order, in which caprice and particular will have no thought? Have they diminished the universe as some think? For my part I think the contrary. The skies as we see them are far superior to that solid vault spangled with shining dots and upborne some leagues above us by pillars which contented the simpler ages. I do not much regret the little spirits that had wont to guide the planets in their orbits; gravitation does the work much better, and if at times I have a sad remembrance of the nine angelic choirs wheeling round the orbs of the seven planets and for the crystal sea that lay at the feet of the Eternal, I console myself with the thought that the infinite into which we look is really infinite, and a thousand times more sublime to eyes of true contemplation than all the azure circles of Angelico of Fiesole. M. Thiers rarely allowed a fine night to pass without gazing upon that boundless sea. "It is my mass," he said. In how far do the chemist's profound views upon the atom surpass the vague notions of matter on which the scholastic philosophy was fed!—*Renan.*

Clothes Moths.

To keep furs and woolen goods from moths close wrapping in paper is enough, though a little camphor may be put into the package to keep off other insects. Any paper will do if there are no holes in it, and no openings are left for the moth to creep in. Of course care must be taken to have the articles free from moths when put away.

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