

COTTON, the name of the soft and beautiful vegetable down with which the seeds of the gossypium, or cotton plant, are enveloped. This plant grows naturally in the tropical climates of Asia, Africa, and America, and has been transplanted to the southern parts of Europe, where it is cultivated in considerable quantities. The genus gossypium belongs to the class monadelphia and order polyandria. See BOTANY. The different species of gossypium are distinguished by the size of the tree, and the form of the leaf, and are ten in number :

- | | |
|--------------------------|---------------------------|
| 1. Gossypium Herbaceum. | 6. Gossypium Hirsutum. |
| 2. Gossypium Indicum. | 7. Gossypium Religiosum. |
| 3. Gossypium Micranthum. | 8. Gossypium Latifolium. |
| 4. Gossypium Arboreum. | 9. Gossypium Barbadense. |
| 5. Gossypium Vitifolium. | 10. Gossypium Peruvianum. |

The Europeans cultivate very few of the species. Some of the plants are perennial and others annual, and the method of cultivating the two kinds is very different. A dry gravelly soil is generally preferred for the annual cotton tree, and if the country is hilly it should be exposed to the east. During the rainy weather of March and April, a quantity of cotton seed is placed in holes about seven or eight feet distant from each other. When the plants have grown to the height of six or seven inches, all but two or three of the finest are plucked up; the remainder are pruned twice, in order to keep them about four feet high, because if suffered to grow to their natural height it much increases the difficulty of gathering, without at all adding to the quality of the cotton. Showery weather is said to produce the most plentiful crops. The perennial cotton tree alone is cultivated in many countries, particularly in the coast of Guiana and the Brasils. It is planted in the same manner as the annual tree, in Guiana, generally in the months of December, January, April, and May; the former months are preferred, and in this case the plants will require pruning in June,

when they will be about three feet high; and at the same time all the branches shooting from the stem more than a foot from the ground are pulled off. The plant generally yields some cotton by Christmas, but does not produce a full crop till the second year. The ground should be carefully weeded every month till the trees are full grown. When a tree fails another is planted in its place, at the time of weeding, and thus the cotton field is supplied. After the first year the trees are annually pruned some time between April and July, according to the weather. About the end of July, or beginning of August, if the weather is good, the cotton tree begins to blossom, the pods form in succession, and commonly open in about six weeks. There is seldom however any quantity ripe before the latter end of October, when the general picking commences, and commonly lasts till the end of December. After the gathering of the first crop, the ground should be well weeded; the rainy season then commences, the trees grow rapidly and blossom, so that the second crop should begin in February, and last till the middle of April. In Guiana, however, the second crop is frequently injured if not destroyed by the prevalence of cold winds and rain from December to April. The blue clay is considered in Guiana to be the soil best suited to the growth of this plant; but in other countries, dry or gravelly soil is equally productive, if situate near the sea; a circumstance which has given rise to the opinion that salt contributes to the growth of the cotton tree. The cotton when gathered is exposed to the rays of the sun, on a tile or wooden platform, for two or three days, till it is perfectly dry and hard. The seed is then separated by being passed between two wooden rollers, about a quarter of an inch in diameter, which are slightly grooved; this is called ginning. When ginned, the cotton is carefully picked to clear it from broken seeds, leaves, &c. The practice of switching the cotton was introduced but not generally adopted because disapproved of by the manufacturers. The cotton is afterwards compressed into bales ready for exportation, which is done by means of a screw-press.

The cotton tree is frequently infested with a most destructive insect, called the chenille, of which several travellers have given various accounts. Dr. Chisholm describes it to be a beautiful insect about an inch in length, with a stripe of white down the back, and one on each side, the intermediate spaces being of a fine glossy black. The head is round, and corneous, armed with two lateral corneous jaws, forming a powerful instrument of destruction. The most singular circumstances respecting this insect, are, the fragrant scent which is emitted from the plant on which it feeds; though neither the insect nor the plant possesses any separately; the manner in which the ova are sometimes preserved for a whole year, without any appearance of the chenille, and resisting the efforts of the planters to destroy them by the use of fire and other methods; and the surprising speed with which its ravages are carried to the most distant parts of the plantation. The only effectual method which has yet been discovered of curing this evil, is the application of sulphureous vapours to the plants infested. The chief objection made to this remedy, is the expense of purchasing the apparatus and the labour of applying it separately to each plant, but this has been proved by experiment to bear no proportion to the loss occasioned by the depredations of the chenille. The cotton tree is also subject to a disease called the blast or blight, which seems to be occasioned by two opposite causes, an excess of vegetation, resembling the plethora of animals, which destroys the fruit only, and an exhaustion of vegetation, producing a state similar to gangrene, which nearly if not entirely destroys the whole plant. This disease is also sometimes brought on by the root being for any considerable

time immersed in water. Little progress has yet been made in the curious and useful study of tracing the resemblance between the diseases of plants and animals; of this resemblance however the cotton tree is a striking example, and the treatment adopted should be of a similar kind. In cases where disease is occasioned by the excessive vegetation of the plants, produced by a redundancy of moisture, every means should be used for draining the fields. Besides the common methods of deepening the channels into the sea, and putting on larger floodgates, the placing a steam-engine so as to throw the water over the dam into the sea, has been tried, and with good success. The want of sufficient moisture, which occasions a still more destructive disorder, is not so easily remedied; this may be done however by carrying a canal into the interior of the country, so as to obtain a supply of fresh water from the springs. When the gangrene, which is properly speaking the blast, appears, a cure is impossible; all that can be done must be by prevention, or curing the first state of the disease. Insects, called by the planters the cotton bugs, are found by thousands in the pods of the diseased plants, and seem to hasten their destruction.

Having thus presented our readers with a sketch of the natural history of the cotton tree, we refer them to the following article for the history of the various improvements in the art of manufacturing cotton from the earliest period to the present time.

COTTON MANUFACTURE. Among the early writers Piny is the first who mentions cotton as known to the ancients; its beauty and utility must naturally have led mankind at an early period to apply it to many useful purposes. It appears to have been manufactured in most countries which have been visited by navigators in the last three centuries, by means of the distaff and spindle. This method of spinning was introduced into this country in the time of Henry VIII. but was superseded about the middle of the seventeenth century by the use of the well known and simple machine called the one-thread wheel. The demand for cotton goods increased so rapidly that this method was insufficient to supply it, and several contrivances were had recourse to in order to effect the object with greater expedition. But they were all unsuccessful, till the invention of the jenny by Hargreaves, an illiterate but industrious weaver of Lancashire, in 1767. The idea was suggested to him by seeing a spinning wheel which had been overturned continue in motion after it fell. The populace were so prejudiced against him, that he was obliged to remove to Nottingham, after having constructed machines of from twelve to sixteen spindles. Many improvements were afterwards made; the vertical wheel was substituted for the horizontal one, which greatly lessened the labour, and the dimensions were enlarged so as to contain eighty spindles. Hargreaves is said also to be the author of an improvement in the method of carding. This operation, which had always been performed by hand cards in a very tedious and laborious manner, he contrived to accomplish with ease and expedition by means of his stock cards; the lower card being fixed on a stock, and leaving both hands at liberty to manage the upper one. The most important part of the improvement, consisted in applying two or three cards to one stock, suspending the upper ones, which would else have been unmanageable, to the ceiling of the room, by a cord passing over a pulley, and having a weight attached to the other end. This contrivance was soon followed by that of the cylinder cards, the invention of which has been claimed by so many persons that it is impossible to determine to whom it belongs. It is certain however, that the late Mr. Peel was among the first who made use of it; and he was assisted by Hargreaves

in erecting his machine in 1769. Notwithstanding his useful discoveries, Hargreaves lived and died in poverty.

About the middle of the eighteenth century, Mr. Arkwright, of whom we have before given some account (see the article ARKWRIGHT) made one of the most important improvements ever accomplished in the art of cotton spinning, by substituting machinery for the human finger. He contrived, by means of rollers, to perform the operation, which in the common method is performed by the finger and thumb of the spinner. The application of this simple contrivance to the common spinning wheel, produced the water spinning frame, for which he obtained his first patent. In 1769 he obtained a patent for spinning by means of rollers; and built a mill at Nottingham, which was worked by horses. As he soon found, however, that this was a very expensive mode, he erected another mill, at Crawford, in Derbyshire, which was worked by water. Mr. Arkwright afterwards applied the same principle to different stages of the preparation of the raw material, for which he obtained a patent in 1775. The most important and striking of these improvements was that of stripping the cotton from the machine in a continued fleece, by means of a comb moving perpendicularly, and a number of narrow cards, called fillets, wound spirally round one of the cylinders of the machine. By this contrivance the cotton is gradually contracted into a narrow ribband, flattened between the rollers, and delivered in the form of a uniform carding. During the periods in which these improvements were made, several disturbances were excited by the populace, who more than once destroyed all the machinery within their reach. The yarn produced by Sir Richard Arkwright's mode of spinning was, on account of its strength and smoothness, best calculated for the warp, while that produced by the jenny of Hargreaves was best suited for the woof, on account of its fulness and softness.

About the year 1779 Mr. Samuel Compton invented a machine compounded of both the former ones, and which was on this account called the mule. Its chief advantage seems to be that of producing much finer yarn than was before possible, as well as a much greater variety in the quality of yarns intended for different purposes. Of this some idea may be formed, when it is stated that a pound of fine cotton has been spun on the mule into 350 hanks, each hank measuring 840 yards, and forming together a thread 167 miles in length. The variety of movements in this machine rendering it very difficult to make the working of it by water or steam sufficiently simple to be generally adopted, it was for a number of years worked by hand. After some time, however, Mr. William Kelly, a manufacturer in Scotland, obtained a patent for working the machine by power, which has been found very beneficial to the health of the spinners. A machine for cleaning and opening the raw material is the greatest improvement made since this period.

As it would exceed our limits to enter into a minute detail of the many and curious operations performed in the manufacture of cotton, we shall give only a brief view of the principal ones, which are of course varied according to the purpose for which the article is intended, and the degree of fineness required.

Batting is the operation which prepares the cotton for carding, by opening and disengaging the hard compressed masses, in which it comes from the bales. It is performed by beating the cotton with sticks on a square frame, across which are stretched small cords, about the thickness of a goose quill, with intervals sufficient to suffer the seed, leaves, &c. to fall through.—Carding is the operation in which the first rudiments of the thread are formed. It is

performed by cylinders covered with wire cards, revolving with considerable swiftness in opposite directions, nearly in contact with each other. By this means the separation of almost every individual fibre is effected, and the cotton spread lightly over the surface of the finishing cylinder, from which it is stripped by the contrivance already described.—Drawing and doubling belongs only to the mule, and water spinning. When the cardings have been passed four or five times through the drawing frame, every fibre is stretched out at full length, and disposed in the most even and regular direction.—Roving is the operation by which the prepared cotton, as it comes from the carding engine, or drawing frame, is twisted into a loose and thick thread, and wound upon a spindle or bobbin.—Spinning is the last operation which the thread undergoes, and is that in which it receives the final extension and twisting. It is performed either on the jenny, twist frame, or mule. The method of weaving cotton is of course similar in substance to that employed in other articles, though it has been brought to an unprecedented state of perfection in this country.

Having thus traced the history of this art, and given a general description of the nature of the operations employed, it remains only to present to our readers a statement of the different kinds of cotton made use of by the manufacturers, and their respective value. Cotton, as an article of commerce, is distinguished by its fineness, the length of its fibres, and its colour. Yellow is generally of a better quality than white.—The South American cotton is very highly esteemed. The two principal kinds are the Pernambuco, which is rather short in the staple or fibre, but of superior quality; and the Maranh, which is equal in quality, but inferior in strength and cleanness to the Pernambuco.—Demarara cotton is fine, white, and glossy, very well calculated for any thing of a moderate fineness. Owing to the great industry of the Dutch, it is generally considered to be worth 10 or 15 per cent. more than other wool, on account of its greater cleanness and evenness of quality. There are several other kinds, as the Surinam, the Cayenne, the Berbice, &c. of the same general description, but differing in quality.—In North America the cultivation of cotton has been recently introduced, principally in Georgia. Of this wool there are also two kinds, the Sea Island, and the Bowed; the former is superior to any known, except the Bourbon; the latter is a weak, short-fibred, and inferior cotton. Neither of these however is the production of the gossypium, but of a shrub which decays, and is rooted up after bearing two crops.—The East India cotton has never been imported into England in any great quantities.—The Bourbon is considered preferable both for fineness and strength; and is the only wool used for the finest yarn. Inferior kinds are brought from India, which are so short in the fibre as scarcely to admit of being spun.—The cotton of the West Indies is generally strong and coarse, and is used for the manufacture of stout fabrics, but is unfit for lighter articles.—Smyrna wool is now seldom met with, being so little esteemed that it fetches a very low price. It is soft and silky, but very weak, and short in the fibre. It is used chiefly for candlewicks.

The progress of the cotton manufacture in this country has been incredibly rapid. Cotton was scarcely known as an article of commerce in this country in 1765. In 1782 the whole produce of the cotton manufacture was about two millions sterling: in 1801 it was fifteen millions.