

**Scenes of commerce, by land and sea, or, "Where does it come from?"  
answered / upon a plan arranged by the Rev. Isaac Taylor.**

**Contributors**

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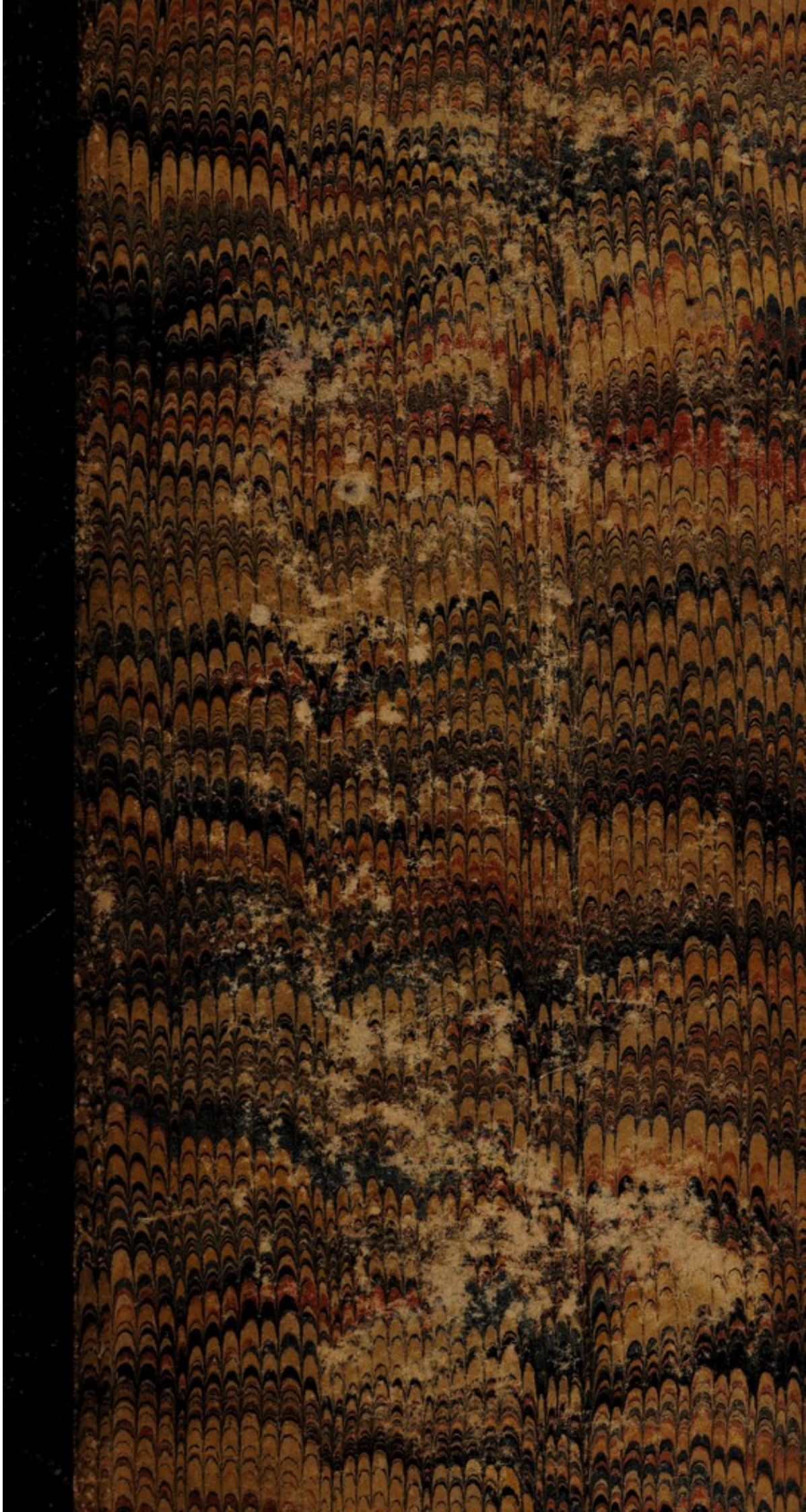
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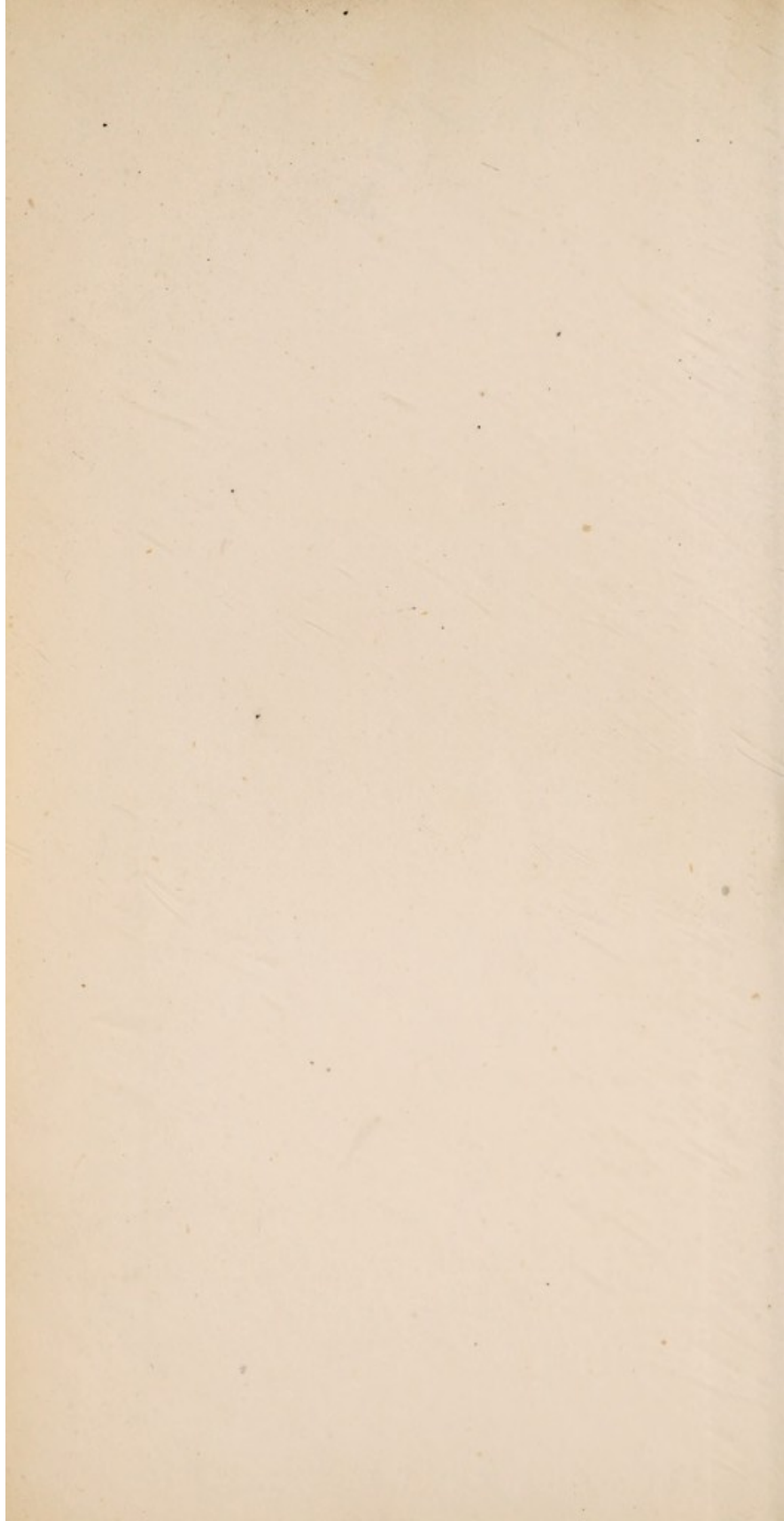
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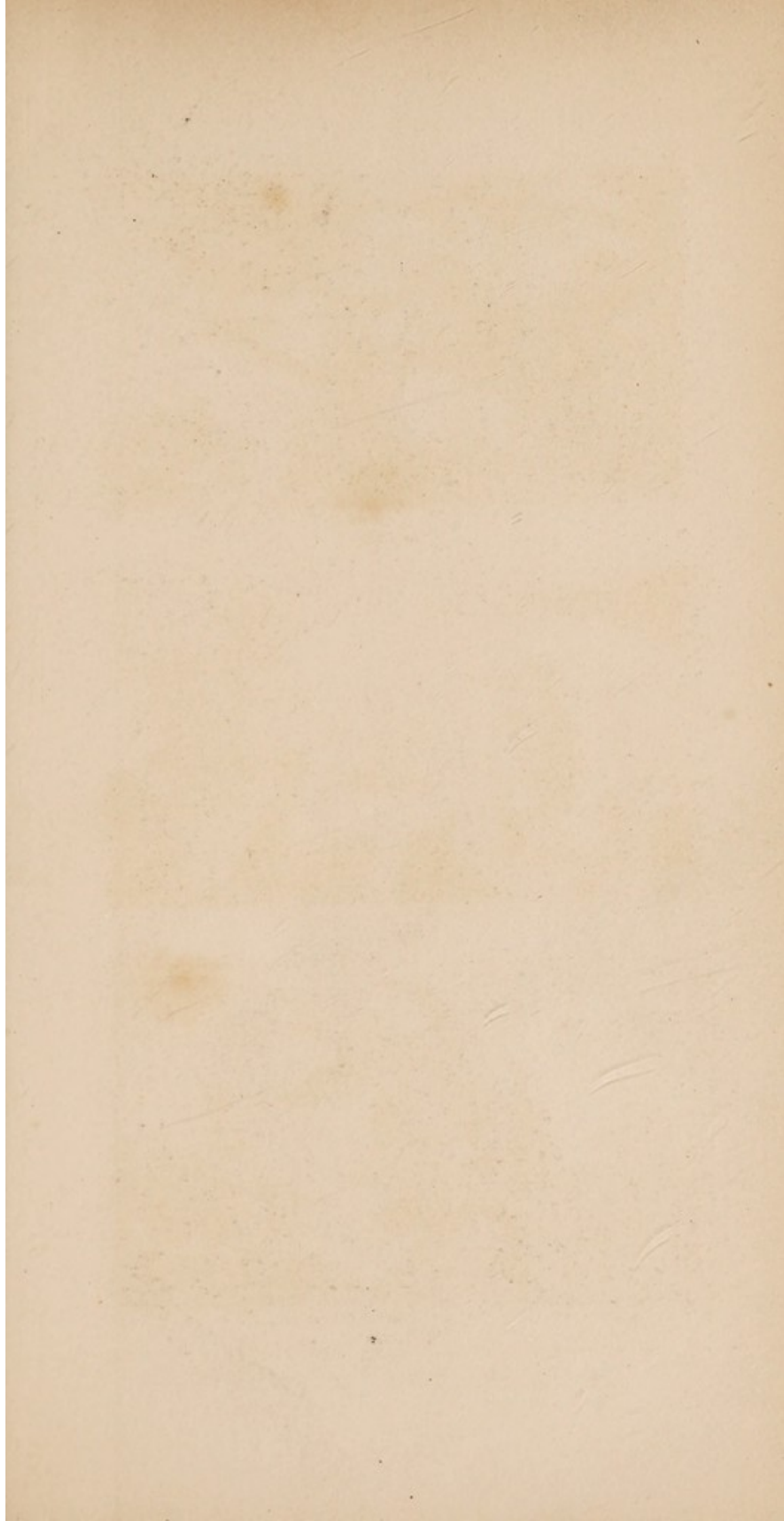
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SCENES OF COMMERCE.

SCIENCE OF COMMERCE

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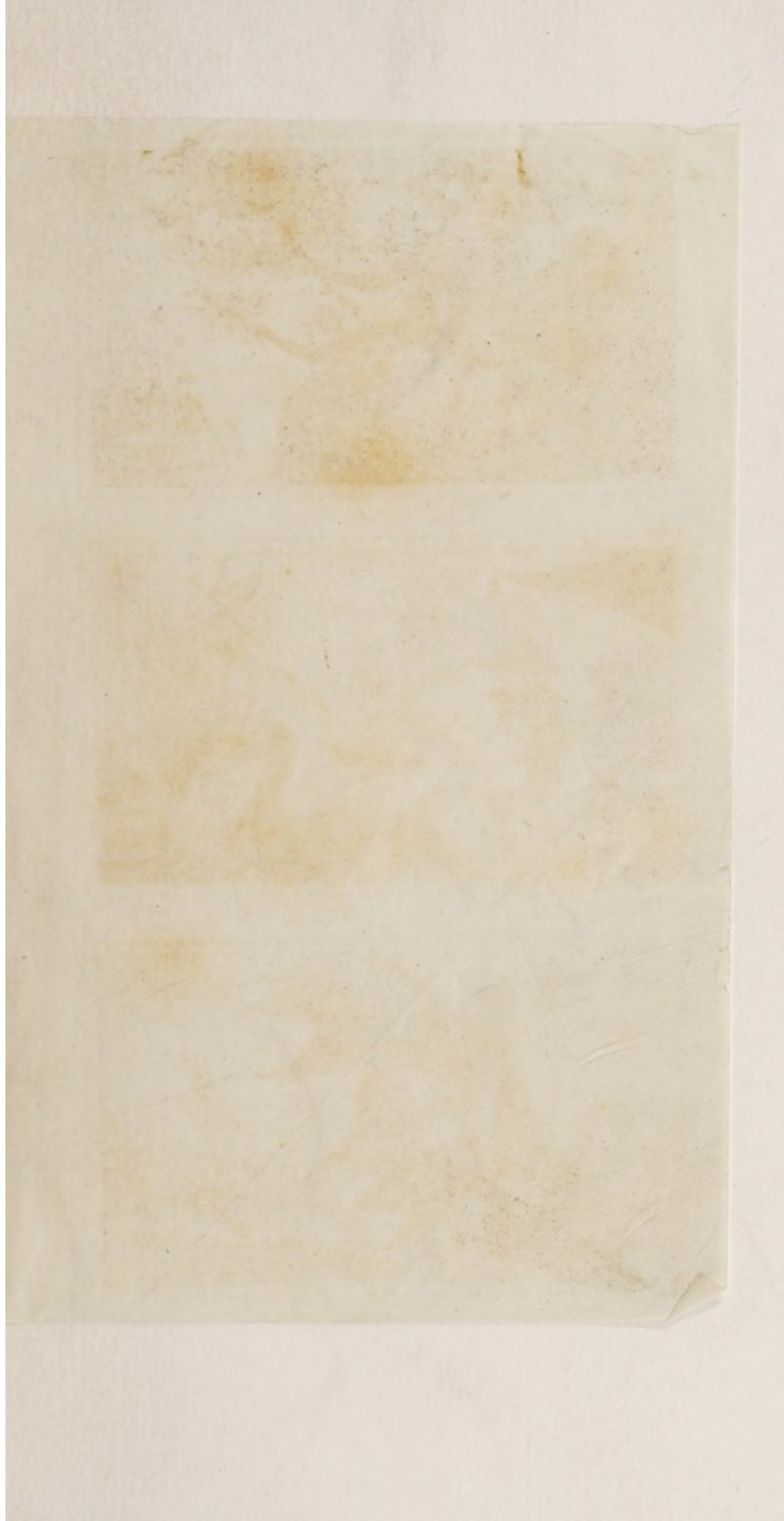
*Page 11.*




*Page 13.*



*Page 18.*





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# SCENES OF COMMERCE,

BY LAND AND SEA ;

OR,

“ WHERE DOES IT COME FROM ? ”

ANSWERED.

UPON A PLAN ARRANGED BY

THE LATE REV. ISAAC TAYLOR,

OF ONGAR, ESSEX.

THIRD EDITION.

WITH SIXTY-SIX ENGRAVINGS.

“ When anything new comes in their way, children ask the common question — *What is it ?* ” — LOCKE.

LONDON :

JOHN HARRIS, ST. PAUL'S CHURCH-YARD.

1839.

WELLINGTON 1840-1841

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## P R E F A C E.

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It were but a trite observation to say, that a desire of knowledge is inherent in human nature; the fact is universally felt and admitted: it may, however, be quoted in reference to the purpose of the following sheets. In juvenile minds, the thirst for information manifests itself with peculiar ardour; and hence the questions, incessantly reiterated, — “What is it?” — “Where does it come from?” — “How is it made?” — The answers to these queries, may be made vehicles of very useful information; indeed, opportunities should be embraced, as they occur, of anticipating such questions, by bringing into notice apparently trivial and familiar subjects, in order to engraft instruction upon their relative or remote connections.

A short time before his death, Mr. Taylor laid down a practical model of such a system; contained in two volumes, entitled “Scenes of Commerce,” and “Scenes of British Wealth;” and as the actual SCENES OF COMMERCE are every day improved by new discoveries in science, and inventions in art,

it has been found necessary to rewrite the greater portion of both works, and to embody them in one publication; so that the book, in regard to improvement, may be said to be new; yet care has been taken to preserve the original plan, because upon that an intelligent public has set the seal of its approbation.

LONDON,  
1st May, 1836.

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## ADVERTISEMENT

TO

## THE THIRD EDITION.

THIS edition has been carefully revised, and enriched by the addition of descriptions of several new articles, which the progress of science and arts have recently introduced into the commercial and manufacturing departments; such as the adaptation of *Indian Rubber* to various articles of dress and convenience; the application of *Asphaltum*, as a cement and commodity for paving; the introduction of a new and important article into our woollen manufactures, under the title of *Mousseline de Laine*, with many similar accessions to our previously extended sources of British wealth.

LONDON,  
1st May, 1839.

# CONTENTS.

---

INTRODUCTION . . . . .	Page 1	THE STOREROOM . . . . .	Page 76
THE BREAKFAST . . . . .	6	Oil . . . . .	76
Tea . . . . .	7	Whale Fishery . . . . .	79
Coffee . . . . .	15	Cod Fishery . . . . .	84
Sugar . . . . .	19	Candles . . . . .	86
THE KITCHEN . . . . .	25	Soap . . . . .	87
Spices . . . . .	25	THE DINNER . . . . .	88
Salt . . . . .	31	Fish for the Table . . . . .	89
Bread . . . . .	32	AFTER DINNER . . . . .	101
Corn . . . . .	34	Wines . . . . .	102
Wheat . . . . .	35	Spirits . . . . .	107
Maize . . . . .	39	Corks . . . . .	112
Rice . . . . .	40	THE DESERT . . . . .	113
THE PANTRY . . . . .	43	THE DRAWINGROOM . . . . .	120
Milk . . . . .	43	Mahogany . . . . .	121
Butter . . . . .	44	Rosewood . . . . .	124
Cheese . . . . .	45	Glass . . . . .	125
Cattle . . . . .	46	Spars . . . . .	135
Sheep . . . . .	48	Carpets . . . . .	135
Bacon . . . . .	49	Curtains . . . . .	138
Salted Provisions . . . . .	50	Chair Bottoms . . . . .	139
Geese . . . . .	51	THE CHINA CLOSET . . . . .	140
Potatoes . . . . .	52	Porcelain . . . . .	141
THE BREWHOUSE . . . . .	53	Pottery . . . . .	143
Barley . . . . .	54	THE SICK CHAMBER . . . . .	150
Malt . . . . .	54	Sago . . . . .	150
Hops . . . . .	56	Tapioca . . . . .	152
Ale and Beer . . . . .	57	Arrow-root . . . . .	153
Birch Brooms . . . . .	60	Tamarinds . . . . .	154
THE STUDY . . . . .	61	Camphor . . . . .	155
Paper . . . . .	61	Use of Medicines . . . . .	156
Parchment . . . . .	65	Mineral Waters . . . . .	158
Blacklead Pencils . . . . .	66	Sea Bathing . . . . .	162
Indian Rubber . . . . .	67	THE BEDROOM . . . . .	164
Clocks . . . . .	69	Bedsteads . . . . .	165
Watches . . . . .	72	Paillasses and Mattresses . . . . .	167
Japanning . . . . .	74	Feather Beds . . . . .	168



<i>THE BEDROOM, continued.</i>	Page	<i>THE HOUSE, continued</i>	Page
Down Beds . . . . .	169	Tiles . . . . .	285
Blankets . . . . .	171	Mortar . . . . .	285
Linen . . . . .	172	Cement and Stucco . . . . .	286
Cotton . . . . .	179	Marble . . . . .	287
Counterpanes . . . . .	187	Timber . . . . .	288
Bed Furniture . . . . .	188	Deal . . . . .	289
<i>THE WARDROBE</i> . . . . .	191	Turpentine and Rosin . . . . .	292
Hats . . . . .	192	Tar and Pitch . . . . .	293
Straw Bonnets . . . . .	194	Asphalte . . . . .	294
Silk . . . . .	196	Oak . . . . .	297
Muslin . . . . .	210	Iron . . . . .	300
Mousseline de Laine . . . . .	211	Steel . . . . .	306
Lace . . . . .	212	Cast Iron . . . . .	308
Furs . . . . .	216	Copper . . . . .	311
Hair . . . . .	224	Tin . . . . .	319
Feathers . . . . .	225	Lead . . . . .	324
Wool . . . . .	227	Coal . . . . .	329
Waterproof Cloth . . . . .	236	Coke . . . . .	334
Leather . . . . .	237	Gas Light . . . . .	335
Pins . . . . .	242	Naphtha . . . . .	336
Needles . . . . .	246	<i>THE BANK OF ENGLAND</i> . . . . .	338
<i>THE TOILET</i> . . . . .	248	Gold . . . . .	341
Jewellery . . . . .	250	Silver . . . . .	344
Diamonds . . . . .	251	Quicksilver . . . . .	347
Coloured Stones . . . . .	258	<i>THE EXCHANGE</i> . . . . .	350
Pastes . . . . .	262	<i>LLOYD'S COFFEE HOUSE</i> . . . . .	352
Pearls . . . . .	263	<i>THE DOCKS</i> . . . . .	353
Coral . . . . .	268	Tobacco . . . . .	359
Perfumes . . . . .	275	Quays and Wharfs . . . . .	362
Sponge . . . . .	278	<i>THE CUSTOM HOUSE</i> . . . . .	363
<i>THE HOUSE</i> . . . . .	279	<i>MODES OF CONVEYANCE</i> . . . . .	367
Stone . . . . .	281	<i>BASKET MAKING</i> . . . . .	380
Bricks . . . . .	283		

# SCENES OF COMMERCE.

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## INTRODUCTION.

MR. PATERSON had retired from the bustle of mercantile pursuits, to a pleasant villa, a few miles from London, to enjoy the fruits of his commercial speculations. His family consisted of himself, his amiable wife, and four interesting children; of whom, Emma, the eldest, was turned of fourteen; James, the next, was about twelve years old; Richard was nearly nine years; and Louisa, the youngest, was about the age of six years. To improve the minds of their offspring, and enlarge their capacities for the stations they might occupy in subsequent life, constituted at once the care and the delight of the parents; and to accomplish this, no event was allowed to pass unimproved.

It happened, one morning, that the accustomed serenity of the breakfast was interrupted by some whispering among the young folks, which, though not loud enough to be distinctly understood by the parents, was sufficiently audible to shew that some matter was in debate, which neither of the speakers perfectly understood, "I am sure he does!" and "I know he does not!" were affirmed and retorted,

for want of better arguments, between James and his little sister Louisa.

Mr. Paterson, after listening a while, inquired the cause of this warfare of words; and found that Louisa, on seeing the tea taken out of the caddy and put into the teapot, had asked her sister Emma “How the grocer *made* it?” Such a question from a child of Louisa’s age was, perhaps, natural enough: and, though she was in error, her elder brother, James, who had made some progress in learning, ought not to have laughed at her simplicity, but rather have given her information on the subject. This, it seems, he was incapable of doing; as is frequently the case with those who are foremost to laugh at the mistakes of others. “The grocer,” said he, “only *sells* the tea; he does not make it.” “I am sure he does!” was the reply. “And I know he does not!” was as quickly rejoined. The father was here on the point of interfering, when James, collecting all his knowledge of the subject into one short sentence, laden with hard words, added, “Tea is a product of the vegetable kingdom, and comes from a transmarine country ten thousand miles off.”

LOUISA.—“What! Do you call tea a *vegetable*, James? We have vegetables of different sorts at dinner; but I am sure tea is nothing like any of them. Besides, we do not eat the tea, as we eat cabbages and potatoes.”

Emma, to whom the question of *making* tea had been originally addressed, and who had been restrained from answering by James’s intrusion, now

took the opportunity of telling Louisa that the term *vegetable* was a general name for all sorts of plants, whether trees, bushes, shrubs, flowers, or grass. “And to prove to you, my love, that these little curled up lumps are leaves of a tree, I will put one of the largest of them into some water, and when it has been soaked a while, we shall be able to unfold and spread it out. — There! You see, it is a long, narrow, pointed leaf, jagged at the edges like a saw. This will convince you that the leaves of a vegetable, or tree, are what we call *tea*. It grows chiefly in China, a country in the farther part of Asia, and is called by the natives *theh*, and by their neighbours the Japanese *tcha*, from which, with us, it has obtained the name of *tea*.”

Louisa, though she would not disbelieve the evidence thus produced, could scarcely persuade herself that her first impression was altogether erroneous. The tea, as well as the sugar, came from the grocer, whom she had seen shewing samples to her mother; and how could this be, unless he were the maker of them? At length she appealed to her father, who desired James, as he had been so forward to contradict his sister, to give her the requisite information as to whence tea, and its usual accompaniment, sugar, came, and how they were produced in their native countries.

James began confidently enough. “They both come from the Indies.” — “East or West, James?” asked Mr. Paterson. “Oh! Why — the East — Yes, the East Indies. I know the East-India Company sell tea, because Mr. Trett, the tea-broker,

used to go to their sales, to make purchases.”—  
“And the sugar, James? Did Mr. Trett buy sugar of the East-India Company?”

James was here confused. “Your knowledge,” said the father, “though something beyond Louisa’s, is not yet sufficiently extensive to warrant that positive air of self-sufficiency which you are too fond of assuming.” James held down his head, as he well might; when Emma gave a turn to the conversation, by saying, “I am sure, if papa would tell me a little about these things, I should be glad. I often feel myself quite puzzled, if I try to guess **WHERE DOES IT COME FROM**, in regard to what I eat, or drink, or wear: indeed, I should like to know, not only about tea, and sugar, and coffee, but about whatever I see or use.”

“A few lessons of this kind said Mrs. Paterson, “might be very instructive: and if by the force of imagination and the clearness of the descriptions, we could be, as it were, carried to the places where the articles described grow, or are produced by the skill of man, such scenes might be exhibited as would be equally amusing and useful. We would call them **SCENES OF COMMERCE**; and in a commercial nation like ours, education appears to be very incomplete without something of the kind.”

Richard inquired if papa could not buy a book, that would inform them about such things.

“I am not aware,” said the father, “of any book suited to your purpose. I agree with your mother, that a little information on these points is requisite, to prevent your appearing ignorant, in a way that no

person possessed of a proper regard for his reputation would wish. And I am also confident that much valuable knowledge, and equal entertainment, may be thus obtained."

"Then pray, papa, do you tell us yourself!" said the children, all in a breath, while the mother sanctioned the request with a smile; although she was aware of the labour which any efficient communications of such a nature would require.

"Now pray do, papa!" was the joint petition of the children; and Mr. Paterson, seeing they were in earnest, gave his assent.

After a moment's reflection, he observed, "The request is so extensive in its nature, and embraces such a multiplicity of objects, that some mode of arrangement must be adopted, to prevent the instruction becoming desultory in its nature, and inefficient in effect. As this inquiry has originated at the breakfast-table, I shall endeavour to qualify myself to answer all 'lawful questions' concerning the foreign materials of that meal, by next Monday morning; and subsequent lectures on other topics shall take place, from time to time, as convenience or circumstances may happen to lead."

The children loudly expressed their gratification at this arrangement, and went from the breakfast-table with minds full of expectation, knowing that their father never disappointed them of anything he had promised.

## THE BREAKFAST.

BETWEEN the time of the foregoing conversation and the appointed Monday morning, several little debates took place privately among our young friends, as to which way papa would manage his promised lecture. These were at length brought to an end by the arrival of the morning itself. Expectation was so highly excited, as to render the accustomed notice of breakfast being ready, unnecessary: all were in their places in due time.

It was understood that the first lesson was to refer exclusively to the foreign commodities used at this meal—namely, tea, coffee, and sugar.

“ I keep a great many servants,” said Mr. Pater-son, as he commenced his lecture, “ and I had need keep a great many.” The children, who could recollect only the housemaid, the cook, and nurse, besides the gardener and groom, looked upon each other with surprise. “ I had need keep a great many servants,” continued the father, who had observed the astonishment depicted in his children’s faces: “ for, before I can have my breakfast, some of them must go four thousand miles to fetch my sugar, and others ten thousand miles for my tea.”

“ Ah! you mean sailors, papa, to make voyages, to bring you all these things !”

“ Certainly; for, without their assistance, I must be content with the produce of my own country, as

my ancestors were. I will not stop to inquire if we have improved by the change; our business is to take things as we find them, and endeavour to extract entertainment and instruction from each, as it may, present itself. And first for our tea. But have you a map of the world spread out on that table? You can understand little of commerce without a map, Now all of you look for China, in Asia, at the eastern extremity, for that is the place whence our tea comes."

This preliminary was soon settled: the map was displayed, and China pointed out.

## TEA.

"The tea plant, of which the leaves have become a necessary of life to every cottager in England, is a native of China. It grows also in Nepaul, Japan, and some adjacent places; but it is from China that we receive our supply, and to the tea of China our observations must be confined. The plant belongs to the same natural family, or *genus*, as botanists call it, as that beautiful flowering shrub the *Camellia Japonica*. Some travellers affirm that all the tea we have is taken from one sort of plant; the difference observable in the various kinds of tea depending solely on the period of growth at which the leaves are gathered. Others contend that there are several species of the tea plant; but certainty in this respect we cannot obtain, on account of the jealous care with which the Chinese exclude Europeans from the interior of their country. In the English nurseries, two sorts, called *green* and *black* tea, are cultivated.



These differ a little in the shape of their leaves, and materially so in their flowers, those of the green sort having nine petals, and those of the black only six. The colour of both is green; and when the leaves are gathered of equal age, and both dried in the same manner, those of the *black* plant are of no darker hue than the leaves of the *green*. In England, these plants are cultivated merely as curiosities. They are hardy greenhouse plants, and it is supposed might bear cultivation in the open fields of our southern counties. But if tea could be cultivated as well in England as in China, the labour of gathering the leaves and preparing them for use, would be too expensive for that general consumption which it has among us. We should also be deprived of the advantages which the China trade affords to our commerce and manufactures. It occupies a great number of ships, in the construction of which carpenters are employed, and sailors are required to navigate them. Timber, and iron, and ropes, with many other things are wanted for building and rigging out the ships; these all give employment to our artisans, and cause an extensive circulation of money both at home and abroad; for some of the articles are imported, that is, fetched from other countries, for use. In some cases, the produce of our manufactories are taken in exchange; in others, they are paid for in money.

“ The quantity of tea consumed in England, every year, is really surprising; I was going to say, it exceeds calculation; it would load at least eighty thousand horses: and nearly as much more goes to

the other nations of Europe. From what comes into Great Britain, our government obtains a revenue of between three and four millions of pounds sterling every year.

“ The use of tea, in Europe, is comparatively modern. It was first brought over, by the Dutch, in the year 1610 ; fifty years afterwards, it was introduced in London, at the coffee-houses, as a luxurious rarity ; and about two years afterwards it began to be used in the families of the nobility. At this time, the latter end of the reign of Charles II, tea was sold at sixty shillings a pound, so that it was not commonly used at that period ; but, as larger supplies were brought over, the price declined, and the consumption gradually increased, till it has become a necessary of life to people in the humblest stations.

“ It is said that the finest tea shrubs grow in Japan, on one particular mountain, which is enclosed with a strong hedge and wide ditches, and carefully guarded by persons who are charged not to allow the dust to remain on the leaves, neither must they breathe upon them, nor touch them with their fingers when they gather them, but must wear very delicate gloves. This tea is set apart for the Emperor’s use ; and, when fully prepared, is conveyed to his palace, under a strong military guard. Of course, this is not the tea we get ; indeed, we are not allowed to trade with Japan. The tea we use comes, as I have already stated, from China, where the farmers cultivate it, as the English farmers cultivate corn and vegetables, for a livelihood. It is not in the

warmest, nor in the most fertile districts of China, that tea attains the greatest perfection; for in these situations the plants run up to too great a height, and the leaves become harsh and rank.

“ Generally speaking, the tea plant resembles a myrtle, with a root like that of a pear tree, and a flower nearly resembling the white wild rose, or blossom of the dog-briar. The flower is succeeded by a pod, containing from one to three seeds, some of which we now and then find among our tea.

“ These seeds are sown in March, in regular rows, and will grow with only the trouble of weeding and hoeing. At the end of three years, the plants bear a crop of leaves, which are gathered one by one. This continues for about three years longer, by which time the leaves become rank, and unfit for use. The plant is then cut down almost to the ground, which occasions a new set of shoots to spring up; and these, in their turn, yield young and excellent leaves for three seasons more.

“ The gathering of the leaves takes place at three periods. The first is about the middle of March, when the leaves are small, and not above a week old. This is called *imperial tea*, and reserved for the use of the emperor and grandees of the country. The second crop is ready for picking early in April, when some of the leaves are fully grown, and others are still young. They are all plucked and afterwards sorted; the smaller sort being frequently sold as belonging to the first crop, at a high price. The third and principal gathering is in June, when the leaves are very numerous, and at full growth. This tea is

of coarser flavour than either of the two former gatherings, and obtains a lower price. At this time, the country exhibits a busy scene, and may be compared to our harvest or hop season.

“ The black teas come mostly from the province of Fo-kien, on the south-east coast of China; and Bohea derives its name from a very beautiful mountain in that province, of which some idle stories are told; such as the following:—The tea is said to grow wild upon the steep sides of mountains and rocks, inaccessible to man, but inhabited by troops of monkeys. The country people provoke these animals, by pelting them with stones; and the monkeys, as the story goes, return the compliment by breaking off branches of the tea plants, and hurling them against their assailants, who thereby become possessed of a crop of tea otherwise beyond their reach. This story is probably an invention of the Chinese, for the amusement of our sailors. The fact is, the mountain is thickly covered with houses, and the tea plant is carefully cultivated by the inhabitants.

“ The green teas come from the province of Kiangnan, of which the capital is Nankin. It is more northerly than Fo-kien, more mountainous, and colder. The Singlo tea also, has its name from a mountain.

“ After gathering, the leaves are steamed, and then dried on metallic plates, or on earthen tiles. Black teas are exposed to the sun, and thereby acquire their dark colour, and are also deprived of that peculiar astringency which we meet with in green

teas. The latter are never so exposed, but, immediately after they are gathered, undergo a process called *titching*; that is, the leaves are thrown into a flat cast-iron pan, which is made very hot, and there they are stirred about with the hands. When they become too hot for the hand to bear, they are shovelled off the plates upon mats, spread on a table, around which the workmen sit, and roll them in the palms of their hands, to curl them up regularly and closely. They are then again put into the pan, and thoroughly dried. In this state, they are picked and sorted; after which, they are once more heated in the pan, then tossed in baskets to cleanse them from dust, and finally, while still warm, packed in chests, and carried to the warehouses for sale. Were the leaves allowed to get cold before they are packed, they would become brittle, and break; and it is reckoned best to keep the tea a full year in the warehouse before it is used.

“ If the leaves of tea crumble to powder, it is a sign that they have been over dried, or kept too long. Such teas have always a bitter flavour; yet the leaves that go to powder are frequently the best of them.

“ Of each kind of tea there are several varieties. The English import but little *Bohea*; it is mostly bought by foreigners: hence, though tea is cheaper in some countries, it is not so good; and what are called *rough-flavoured teas* by the London dealers, are adulterated with a mixture of bohea.

“ *Congo*—a name which means ‘much care taken in selecting and preparing the leaves,’—is twice dressed by the fire. The infusion of this tea is not

so dark-coloured as that of bohea. *Campoï* is a superior kind of congo.

“*Souchong* is made of the leaves of young trees, which are more delicately flavoured than such as are older. *Caper souchong* is the same kind of tea, rolled up in small balls, resembling capers. It is expensive, and only a small quantity of it is imported. *Padre souchong* is a very fine kind. Its leaves are of a yellower hue than those of the caper, and less twisted. It is usually in paper packets, of about a quarter of a pound each, and very costly, liable to adulteration, and rarely seen but in small parcels, as presents.

“Of green teas, the most ordinary kind is *Singlo*, which gives a yellowish tint to the infusion. *Twankay* is the same sort of tea, more carefully prepared.

“*Hyson* is a fine tea, affording a greenish infusion, with an agreeable smell and pungent taste. The coarse leaves are picked out, and sold under the name of *Hyson skin*, or *bloom*; which, though inferior to hyson, are better than singlo or twankay. *Gunpowder* tea is fine hyson, carefully picked and prepared, and rolled into small balls.

“*Chulau*, which has the flavour of cowslips, is a mixture of hyson with the berries of a plant called *chulau* by the Chinese. This, with *Ball tea* and *Brush tea*—names derived from the forms into which the leaves are twisted—are rarely brought to England.

“All our teas are purchased at Choo-keng, or, as we call it, Canton, a large city in the south of China, where the British have a factory; but no European is admitted within the gates of the city. The river

of Canton is rather broader than the Thames at London; and about five miles of its length are covered with boats, in which many of the people pass the whole of their lives, without ever going on shore.

“ Macao, a small island in this river, is below Canton, and the general residence of Europeans, while trading with the Chinese.

“ The tea comes to us closely packed in wooden chests, which are lined with a very thin sheet of lead, the more effectually to keep out the air, exposure to which would destroy the flavour. Before it reaches our teapot, it passes through many hands. The East-India Company, who were till lately our only importers, had periodical tea sales, when many hundred chests were put up by auction, and purchased by the large tea dealers. Merchants may now send their own ships to China, for tea; and they supply the grocers, in town and country, from whom we receive it. Each party, through whose hands the tea passes, gains something for his trouble; so that what in China costs but a small sum, is greatly enhanced in price before it reaches the consumer.

“ The Chinese do not drink tea, as we do, at one or two certain meals; but it is their ordinary beverage, whenever they are thirsty. They drink the pure tea, in a strong infusion, without either sugar or milk. The reason given for this practice is said to be the unwholesome quality of the waters of China, which is corrected by the tea. The Japanese sometimes grind their tea to a very fine powder, a little of which, taken up on the point of a knife, is stirred briskly in a cup of hot water, and then drunk.

“ Those who have written upon the subject of

tea are much at variance as to its qualities: some are loud in its praise, while others describe it as pernicious. Perhaps difference of constitutions in those who drink tea, makes a difference in its effects. That tea is exhilarating, especially under circumstances of great fatigue, is generally admitted: it seems, therefore, to have ready access to the nervous system; for which reason weakly people, who are generally most fond of it, should take it with caution. The sugar and milk, which we add to it, tend considerably to prevent this violent effect upon the nerves."

The young people were much gratified by this concise history of tea. James acknowledged his error, in having made a show of more knowledge than he possessed; the little Louisa confessed she had been too positive upon a subject with which she was unacquainted; and the whole party rose from the breakfast table in high glee, which was much enhanced by a hint from the father, that he purposed, on the following morning, to give them some account of coffee.

## COFFEE.

"Who can tell me where coffee grows?" said Mr. Paterson, as he took his seat at the breakfast table.

"It grows in Turkey," exclaimed James: "I am sure Turkey coffee is the best."

"No," said Louisa, forgetting her error of the former day, "it comes from—*Moco*."

"Nay, papa," cried Richard, "do we not have it from the West Indies?"

"You are all partly right, and partly wrong, in



your conclusions ; but totally wrong in being so positive upon a subject of which, it is evident, you have but an imperfect knowledge. James says Turkey coffee is the best ; and public opinion is on his side. But he is not aware that the best Turkey coffee, so called, is brought from Mocha—Louisa's *Moco*—which is a territory and port of Arabia, on the Red Sea. It is also true, as Richard observes, that we have much coffee from the West Indies ; for the coffee tree has been carried over, and is there cultivated with considerable success.

“ We are unacquainted with the history of coffee till about the year 1450, when a learned Arabian, of Ada, met with it as he was travelling in Persia, and contrived to transport it to his own country. How long it had been used in Persia, is not stated ; but from Ada, the use of coffee rapidly spread over Arabia and the neighbouring countries. In 1511, it was prohibited in Cairo ; but the prohibition was soon taken off : and when an attempt was made to revive the prohibition, in 1523, the people became riotous, and insisted upon having the free use of it. A similar attempt was also made at Constantinople, but with as little success ; and coffee is now a common beverage in all the Grand Signor's dominions.

“ In the west of Europe, coffee appears to have been first used about three hundred years ago. In 1644, it was introduced at Marseilles, in France, from Constantinople. In 1660, several bales of it were brought to that city, from Egypt ; and in 1671, a coffee-house was opened there, being the first establishment of the kind known in our quarter of the world. Previously to this, however, the great tra-

veller and historian, Thevenot, had brought a small quantity of coffee to Paris, in 1657; and in 1669, it was generally introduced into that metropolis by the Turkish ambassador. In 1672, a public coffee-house was opened there by one Pascal, an American, who afterwards removed to London.

“ In 1690, the Dutch governor of Batavia procured the coffee plant from Mocha, and had it cultivated in that settlement. From Batavia a plant was sent to Amsterdam, where it bore fruit; and from Amsterdam, in 1714, a fine plant was sent as a present to Louis XIV. King of France: this latter is said to have been the parent of all the coffee plants that have since been cultivated in the French and Dutch West-India colonies. According to other accounts, the coffee plant was not introduced into Batavia, from Mocha, till 1722 or 1723. In 1717, several plants had been sent to Martinique; in the following year, others were introduced into the Isle of Bourbon, from Arabia, and also into the French American colony of Cayenne. In 1732, the coffee plant was also cultivated in Jamaica. So lately as 1784, the cultivation of coffee was introduced into the Spanish colonies in South America; at first in the valley of Chacao, within a league of Caraccas, whence it spread throughout the other provinces, and in a great degree superseded the culture of the *cacao*, or *cocoa*, as we usually call it.

“ The coffee tree belongs to a rather important family of plants, some of which are very potent in medicine. That which is considered to have the finest flavour, grows in the south of Arabia, and is called *Mocha coffee*, from the place whence it is

exported. The next best coffee grows in the Isle of Bourbon; and coffee is also cultivated in Java and Sumatra, but it is of inferior quality. The West Indies, and northern parts of South America, yield great quantities, known under the denomination of *Plantation coffee*.

“ This tree requires a much warmer climate than tea, and is not found in any of the high latitudes. It also requires a rich soil, and a good deal of rain.

“ The flowers, which form clusters at the roots of the leaves, are funnel-shaped, of a white colour, and very fragrant. They are succeeded by an oval-shaped berry, somewhat resembling a cherry, which, when fully ripe, is of a deep red colour. The berries are not gathered, but shaken off the tree; for till they fall by shaking they are not sufficiently ripe. After they are collected together, they are placed in a mill between wooden rollers, by the pressure of which each berry is gently cracked into two parts, and cleared of its outer skin. A second and thinner skin, called the *parchment*, is taken off by another mill; and when wholly cleared of the husks, the coffee is fit for sale.

“ The coffee berry, in its raw state, is, as you perceive from the specimen on the table, of a high brown colour. To prepare it for use, it undergoes the process of roasting, which gives it the dark hue, approaching to black, which you may observe in the parcel taken from the coffee we are using for breakfast. The coffee-roaster consists of an iron cylinder, suspended at each end upon pivots. The raw berries are inclosed in this cylinder, and exposed to a brisk heat, which roasts the coffee, while the

turning of the cylinder upon the pivots not only prevents it from burning, but brings every part to the fire. Much of the flavour of coffee depends upon its roasting, which should be done as immediately before it is used as possible. With the mill for grinding coffee, you are sufficiently acquainted; I shall, therefore, only add to this part of my lecture, that the finer coffee is ground the better, as it gives out its flavour more freely in that state than when broken into large fragments. It should have boiling water poured upon it, and be kept as hot as possible; but should never be boiled, because the boiling throws off its finer parts, and extracts a nauseous resinous flavour from the residuum. Coffee is salutary, except to particular constitutions; and, mixed with half its quantity of boiled milk, is excellent for breakfast. It helps digestion, on which account it is much used by the French after dinner. It also relieves the head-ache; and when taken alone, and very strong, soothes and subdues the irritation of asthma.

“As the Chinese do not use sugar with their tea; so the Arabs do not take it with their coffee; but in England, few persons prefer it without that accompaniment.

#### SUGAR.

“Having spoken of sugar as an accompaniment to tea and coffee,” continued Mr. Paterson, “we must take notice of that article; for it forms an important item in our commerce, as well as in our manufactures.

“Sugar is prepared from the juice of a cane, or reed, growing in both the East and West Indies; though to which of these two it is indigenous, is dis-

puted among the learned. That the sugar-cane grows naturally in the East Indies, is well known; and that it grows wild in both continents of America, is equally attested. Yet in an early period of the Spanish domination in Hayti, the governor procured some plants of the sugar-cane from the Canary Islands, either as a curiosity or as a nicety; for in some stages of its growth, the sugar-cane is edible, and much sweet juice may be extracted from it. But the method of procuring sugar, as we now have it, was then unknown; and we are indebted to the ingenuity of the Spaniards and Portuguese for the process.

“Marco Paulo, a Venetian, who travelled into the East about the year 1250, says he found sugar plentiful in India; and when De Gama, by doubling, as the seamen call it, the Cape of Good Hope, in 1497, arrived at Calicut, he found sugar to be a considerable article of commerce among the natives.

“Sugar, or the sugar-cane, is said to have been first known to Europeans during Alexander’s expedition to India; and to have been brought thence by his naval commander, Nearchus, upwards of three hundred years before the Christian æra. But to the Jews it seems to have been known long before; for Moses, in *Exodus*, xxx. 23, is commanded to compound the sacred ointment with (among other articles) the *sweet cane*. Isaiah, in his prophecies, chap. xxxv. ver. 7, mentions the *sweet cane*; and Jeremiah, chap. v. ver. 20, speaks of “the *sweet cane* from a far country.” The plant, therefore, has long been known, though the method of extracting sugar from it is comparatively modern.



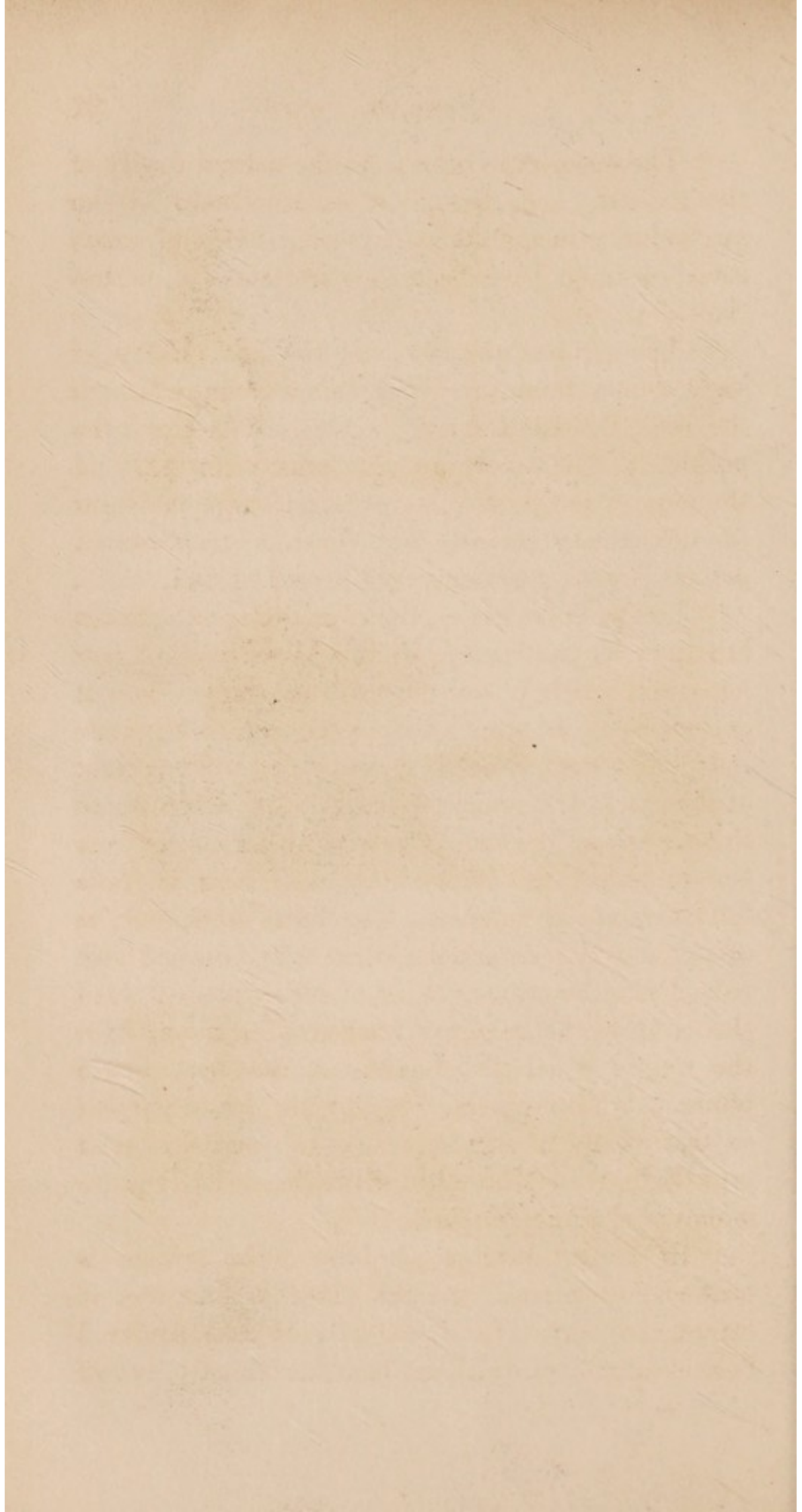
*Page 21.*



*Page 89.*



*Page 91.*



“ The sugar-cane belongs to the natural family of the grasses ; and, though it contains more of the saccharine principle than any other kinds of grass, some of those have been used in lieu of it in hot countries.

“ The greatest quantity, and the best quality, of sugar comes from the West Indies ; for, although the cane flourishes much better in the East, the people in the latter use the juice principally in the form of syrup, and do not manufacture the sugar so dexterously as do the West-India planters ; neither is it so much approved of in England.

“ To the West Indies, therefore, we must turn our attention for the culture of this luxurious, but now necessary, article in our domestic economy ; there it appears in all its beauty and usefulness. The sugar-cane, like a reed, is full of joints, rising to the height of three, six, and sometimes twelve feet, according to the nature of the soil. Several stems spring from one root, and the joints upon each stem are from forty to sixty in number. The bark, when ripe, is of a golden hue, sometimes beautifully streaked with red. From the centre, a kind of silver-coloured wand shoots up to the height of three feet, or more, from the top of which the blossom spreads out like a plume of white feathers, fringed with lilac or purple ; so that a field of sugar-canes, at this period of their growth, presents a beautiful spectacle, under the illumination of a tropical sun.

“ In laying down a plantation, the ground is marked out in small squares, three or four feet in extent each way. In the middle of each square a hole is dugged, in which are laid, horizontally, two of



the top shoots of such old canes as have yielded their sugar, each shoot having five or six joints. These are covered with mould, about two inches deep; and each joint sends up several stems, which appear in about a fortnight after the planting. The care is now to keep the plantation free from weeds, to watch against rats, who devour the young plants, and to destroy the numerous insects, which infest them. But the greatest enemies to a sugar plantation are the monkeys, who descend from the mountains in troops during the night, not only to regale themselves, but to play their antic gambols among the canes. They are so cunning, that they place sentinels around the intended scene of their depredation, to give an alarm in case of approaching danger; and when all is supposed to be safe, they play their tricks of running, climbing, quarrelling, and fighting, by which they do more mischief than by their voracity. To prevent this damage, as much as possible, a numerous watch of negroes, armed with guns, is set; and these poor people readily undertake the work, because they are very fond of monkey's flesh for food.

“The canes come into blossom in November, and the ripening season is in the following spring and summer; different plantations becoming ripe at different seasons; consequently the times of reaping are various.

“The time of the sugar crop upon a plantation is a period of rejoicing, similar to that of the vintage in some parts of Europe, or of the harvest in England. The juice of the sugar-cane is so gratifying, so nourishing, and so healthful, that all ranks reckon upon



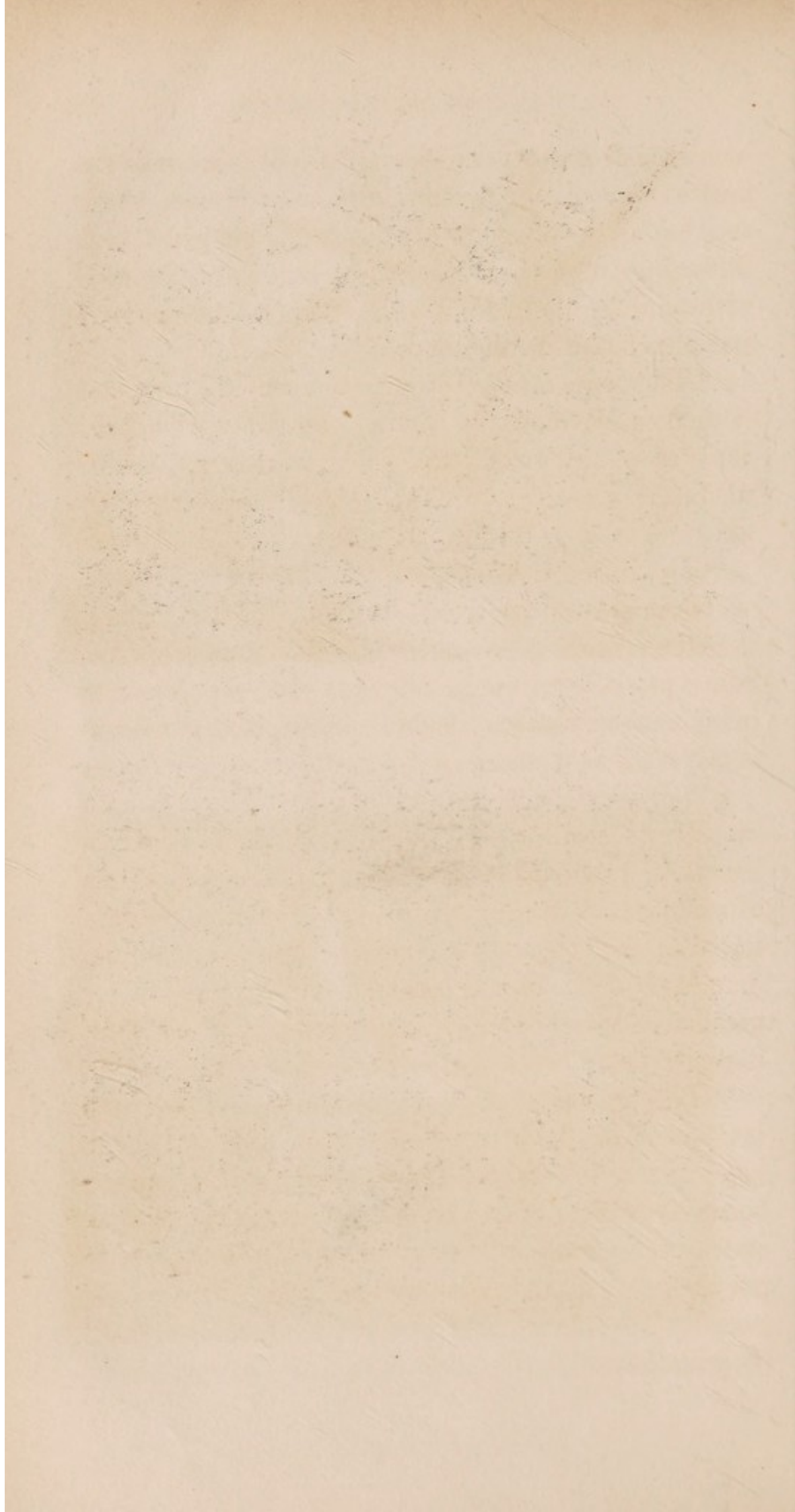
page 23

*Sugar Trade. Bristol Quay.*



page 165.

*Turner.*



it; sickly negroes recover their health, and the healthy become robust and vigorous. Horses, oxen, and mules, to whom the green tops are given with skimmings from the boiler, thrive and grow fat, notwithstanding their additional labour; and poultry and pigs fatten on the mere refuse.

“ The ripe canes, being cut down and stripped of their leaves and top shoots, are tied up in bundles, and carted off the field to the mill-house, where, by great pressure, the juice is squeezed out, and received into a proper vessel.

“ The juice, thus obtained, would speedily ferment, or become sour, were it not boiled: the boiling, therefore, takes place as expeditiously as possible. Some powdered lime is mingled with the juice, to imbibe an acid which abounds in it; and the scum is taken off as it arises.

“ To produce crystallization, the liquor is run into broad shallow vessels, called *coolers*, where it begins to granulate: but as it still retains a quantity of moisture, it is removed into other vessels, so contrived as to let the sweet moisture, called *molasses*, drain away. It now becomes pretty dry, and is denominated *muscovado*, or *raw sugar*; in which state it comes to us.

“ The process of refining, by which this raw sugar is made white, hard, and, as we call it, *lump sugar*, takes place in England, and consists in repeated boilings, which again reduce the sugar to a fluid state, when certain articles are mingled with it, which rise in scum; and this, being taken off, the remainder is left pure, and brought to crystallize again by great heat.

“ Sugar, taken in a moderate quantity, is not unwholesome ; indeed, it is very nourishing, and has the reputation of curing, or at least preventing, diseases of the skin ; yet living entirely upon it would produce quite an opposite effect. The nutritive part of all vegetables is very much allied to sugar ; and there are few vegetable substances which may not, in whole or in part, be converted into sugar. Many of these, however, cannot be entirely freed from the molasses, and consequently do not crystallize. In Poland, and some parts of Germany, a soft sugar, or rather syrup, is extracted from beet-roots, parsnips, potatoes, carrots, and various other substances.

“ Although sugar-canes grow plentifully in some parts of the East Indies, other parts are too dry for them ; and in some of these, sugar, or a syrup resembling sugar, is made from the juice of palm trees.

“ In North America, a tree, called *Sugar Maple*, yields sugar in considerable quantity ; but the flavour is much inferior to that produced from the cane ; yet its use is extensive, many farmers in the back settlements of the United States having no other.

“ Every substance that yields sugar may be also made to furnish wine, or beer, or ardent spirit, of some kind ; the peculiarities of the latter depending upon other substances in the plants, besides those that pertain to sugar. Rum is made from the refuse of the sugar-canes in the West Indies ; and arrack is procured from the juice of the palm in the East. Spirit drawn from manufactured sugar is always harsh in flavour.”

## THE KITCHEN.

“A LECTURE in the Kitchen!” exclaimed James, with his usual haste, on finding that the next conversation was to lead their attention to that apartment; “what connection can there be between the Kitchen and Scenes of Commerce?”

“Much more than you seem to be aware of,” replied Mr. Paterson. “We are not going into the kitchen to learn the art of cookery; but to explain where certain articles there used come from, and how they are produced. These you will find as much worth your attention as our late lectures at the breakfast table. We will begin with the spice box.

## SPICES.

“It may instruct, though it should not amuse you, to hear that common PEPPER, which you see upon the dinner table every day, comes from the East Indies. It is the powdered berry of a feeble climbing plant, or vine, which grows on the Malabar coast, also in Java, and several of the other Indian islands. The pepper vine has dark stalks and curious joints; the leaves, of a triangular shape, are green, veined with red; the flowers, which are small, are of a whitish hue; and the berries, or peppercorns, as we call them, grow in bunches, after the manner of currants. At first they are green, afterwards red, and finally black, from exposure to the sun.

“Each vine produces, on an average, about five pounds’ weight of pepper annually. In commerce, pepper is distinguished as *black* and *white*; but they

are both one berry, only the white is deprived of its outer skin, by steeping in sea-water and rubbing, which takes off a great deal of its natural heat. Pepper is brought into this country in the berries, and is ground in mills, by the grocers, or by families, for use. It is chiefly used by us as a condiment with food, to assist digestion; but in its native country, it is esteemed as a stomachic, and the people drink a strong infusion of it in water, to provoke appetite."

"I think," said Louisa, "I have heard of JAMAICA PEPPER; but papa says pepper comes from the East Indies. Jamaica, I believe, is in the West Indies."

"It is so, my dear," replied Mr. Paterson; "and the Jamaica pepper, which is also called *pimento*, comes from the West Indies."

"Ah! then we have pepper from both East and West Indies?"

"From both we receive articles under the same name; but they are essentially different in quality. The *pimento*, or Jamaica pepper, is the fruit of a large tree, somewhat resembling a myrtle, but growing to the height of thirty feet, on the mountains of Jamaica, where it perfumes the air very delightfully with the fragrancy of its blossoms. Perhaps, if I tell you that this *pimento*, or Jamaica pepper, is better known in the kitchen by the name of *allspice*, you will more readily understand my description of it."

"Oh dear! Then these three, which I supposed to be as many different things — *pimento*, *Jamaica pepper*, and *allspice*,—are one and the same?"

"Exactly so. The *pimento*-tree grows naturally

in such abundance, that there is no necessity for cultivating it. Indeed, it seems to mock all endeavours to extend or improve its growth: for, of various attempts to propagate young plants, or to raise them from seeds, in parts of the country where the tree does not grow spontaneously, not one in fifty has succeeded. The pimento-tree is a native of Mexico and the West-India islands; and as the berries are chiefly imported into this country from Jamaica, it has obtained the name of *Jamaica pepper*. It is also called *allspice*, from a resemblance in its taste and flavour to that of a mixture of nutmeg, cloves, and cinnamon. In June, July, and August, this tree puts forth its bunches of beautiful flowers, which, with every part of the tree, give out an aromatic fragrancv. The flowers are succeeded by clusters of berries, which, when at their full growth, but before they are ripe, are picked from the branches, and exposed to the sun till sufficiently dry; then they are packed in bags, or hogsheads, for the market. A single tree has been known to yield a hundred weight and a half of the raw fruit, or one hundred weight of the dried spice.

“ When Louisa is old enough to attend to the art of pickling, she will find herself in want of an article called LONG PEPPER, a considerable quantity of which is annually imported from Bengal and other parts of the East, as well for domestic as medicinal uses. It is of two kinds, distinguished in the shops as *long pepper* and *short long pepper*; but both are the fruit of a slender climbing shrub, or vine, with dark green heart-shaped leaves. The fruit, or seed, formed of a great number of small rounded



grains clustered closely together, is of a cylindrical form, from half an inch to an inch and a half in length, and sometimes a quarter of an inch thick in its upper end. Such as is intended for exportation is gathered before it is ripe; and it is an excellent stomachic, whether used as a condiment with food, or as an article of medicine.

“As we are on the subject of spices, perhaps James will tell us where the Spice Islands are to be found?”

“Oh, that I can,” replied James: “they consist of a number of small islands in the Indian Sea, between Celebes and Papua, or New Guinea.”

“Right,” replied the father. “Among these are Amboyna, and a cluster of ten small islands called the Bandas, which belong to the Dutch, who, indeed, exercise a degree of sovereignty over the whole of the Spice Islands. To Amboyna they restrict the growth of cloves; and they have rendered the Bandas the centre of their nutmeg plantations.

“The CLOVE, which has its name from the French *clou*, a nail, on account of its shape, consists of the unexpanded flower-buds of a very beautiful tree, of the myrtle family, but resembling the laurel in its leaves, and the olive in its bark. It has numerous branches, at the extremities of which are produced great numbers of flowers. The flower buds, when in a fit state to be gathered, are reddish and rather hard. The cloves are gathered before they come to maturity; for, when perfectly ripe, they lose most of their flavour. In the latter state, they are called *mother cloves*, and, if suffered to remain on the trees, will continue to increase in size till they are about an inch in thickness: these, falling off, pro-

duce new plants, which do not bear in less than eight or nine years. The season for gathering is from October to February, when the boughs of the trees are violently shaken; or the cloves are beaten off with long reeds. Large cloths are spread to receive them, and they are afterwards dried in the sun, or in the smoke of the bamboo cane. The wild clove is destitute of flavour; and a species of clove, which grows in South America, is greatly inferior to the clove of Amboyna.

“ The NUTMEG-TREE grows to the height of thirty feet, producing numerous branches, which rise in stories, with leaves, resembling bay leaves in shape, of a bright green colour on the upper side, and white beneath. It is an evergreen; and when at maturity has always upon it ripe fruit, blossoms, and fruit in various stages towards perfection. The fruit takes about nine months to ripen, and consists of three or four parts. First, there is the outer coat, somewhat resembling a peach, which is very good when preserved with sugar. Within this coat, which is about half an inch thick, is a husk, not very unlike the husk of a filbert, but of a bright red colour: this is the *mace*, which we also use as a condiment; and it closely envelopes a nut with a hard black shell, the kernel of which is the nutmeg.

“ When the fruit is ripe, the natives ascend the trees, and drop it as they gather it. Others below receive it, and take off the green peach-like covering, which is laid in heaps in the woods, where in time it putrefies. As soon as the putrefaction has taken place, up springs a kind of mushroom, which the natives consider as a delicacy. After the removal of

the outer coat from the nuts, the mace is carefully taken off with a knife, and laid in the sun to dry. It is then moistened with sea-water, to preserve it, and dried again; after which it is put into small bags, and squeezed very close for exportation. The nuts, in the mean time, are dried, first in the sun, afterwards before a fire, till they rattle in the shells, which are then broken by beating them with small sticks, and the nutmegs are collected and sorted. Such as are fit for exportation are put into a pickle of lime and sea-water, to preserve them; and after they are dried, they are packed up for commerce.

“ Wild nutmegs grow in several parts of India, but they are destitute of flavour. The true nutmeg is powerfully aromatic, and agreeable to the palate of most persons; but it should be used with caution, as it is apt to affect the head, and will even produce delirium, if taken in large quantities. A species of nutmeg grows in the island of Tobago, in the West Indies, which is very aromatic, but, if taken inwardly, produces intoxication and temporary madness.

“ CINNAMON, another of our condiments, is the inner bark of the young branches of a species of laurel, a native of Ceylon, where the best is produced, but which also grows in other parts of the East. The tree grows to the height of twenty or thirty feet, has a large root, and divides into numerous branches, covered with a bark, of a greyish brown colour on the outside, and of a reddish hue within. It is the inner bark, which constitutes the cinnamon of commerce, from which the two external barks must be carefully separated, otherwise they would vitiate its flavour. When the external barks

have been taken off, the smaller pieces of cinnamon are placed upon the larger, and, by exposure to the sun and air, they presently coil up, and require no farther preparation.

“As cinnamon is a very expensive article, it is not uncommon with dealers to substitute *cassia*, or *base cinnamon*, which is the bark of another species of laurel, imported from China and different parts of the East Indies. It has a very near resemblance to cinnamon, but may be distinguished from it by being of a thicker and coarser appearance, and by its breaking short and smooth, while the fracture of cinnamon is fibrous and shivery. Its flavour is aromatic, but less delicate than that of cinnamon, and rather weaker.”

“And GINGER, where does that come from? Is that also a fruit!”

“Ginger is not a fruit, Emma, but the *root* of a plant, somewhat like our rush. It does not grow deep, but spreads under the surface of the ground. We have it from the West Indies, particularly from Jamaica; but it also grows near Calicut, in the East Indies. In the store-room, you may probably find some preserved ginger, which is the root boiled with sugar and honey, just as it is dug up green. Of course it must be preserved near the spot where it grows.

#### SALT.

“Having examined the spice-drawers, let us next turn our attention to the contents of the salt-box.

“Common salt, one of the first necessities of life, is plenteously provided. It is diffused through the ocean, which is thereby kept from putrefaction; and much salt is annually obtained from sea-water. In

countries where the sun has more power than in Great Britain, large shallow pits are formed on the sea-shore, into which the water flows at high tide ; and it is prevented from returning when the tide recedes. The heat of the sun evaporates this water ; and the salt, which crystallizes on the edges of the pits, is carefully collected for use.

“ The land also supplies vast stores of this necessary and useful material. Some mountains are entirely composed of salt ; and mines have been opened, in which the miners work their way through arcades of rock salt, from among which they dig large quantities in lumps, like stone. This salt is of a brown dirty colour, but becomes white by refining. England, Italy, and Poland, have such mines : the Isle of Ormuz, in the Persian Gulf, is little else than a mass of salt ; and many stores of it are found in America.

“ The English salt mines are chiefly in Cheshire, in the neighbourhood of Northwich, Middlewich, and Nantwich. It is there dug out of mines with pickaxes, and conveyed by shipping to certain places to be refined. It is first dissolved by boiling in water ; eggs are then mashed and mixed with the liquid, by which a scum is made to rise, carrying up with it the impurities that were contained in the salt. This scum is taken off as long as it continues to rise, and then, by an increase of heat, the water is driven off in steam, and the pure salt crystallizes.”

#### BREAD.

The entrance of a new loaf gave a turn to the conversation. “ Bread,” observed Mr. Paterson, “ is so

very essential an article of our food, that it is popularly denominated ‘the staff of life;’ and the term *bread* is frequently used figuratively to denote the whole of our sustenance. Hence, when we say, ‘such a man earns his own bread,’ we mean that he maintains himself by his labour. But when we speak of bread generally, we must not suppose that all bread is made, like this, of wheat. In different countries, it is made of different substances. In many parts of Scotland, Ireland, and Wales, and also in some districts of England, bread is made of oats, or barley, or even of potatoes. On the continent of Europe, rye is the principal bread corn; it grows on poorer land than wheat, and much of the soil on the continent is light and sandy. In Lapland, bread is made of the bark of trees. In some parts of Hindoostan, the seeds of certain grasses are converted into a black bread, nearly as hard as a stone. In many districts of South America, dried peaches are used as bread. The natives of some of the South-Sea islands have their bread ready made from the bread-fruit tree, which, though very good, is much inferior to the wheaten loaf of England. The inhabitants of some small islands near Iceland, in the North Sea, make bread of fish-bones; and this, perhaps, is the lowest kind of bread used by the human race, as wheaten bread is the highest.

“ But the loaf before us, if all the parties concerned in its manufacture have been honest, is of pure flour, or wheat ground to powder by the miller.

“ The flour passes to the baker, who first mixes it with water mingled with yeast and a small quantity of salt, and then works it into a state called *dough*.

The yeast, or, as it is sometimes denominated *barm*, or *leaven*, is a frothy matter cast out by beer when fermenting in the cask, and, when thoroughly mixed up with the flour, causes the dough to ferment, or increase in bulk by means of the fixed air which it generates, so that every small particle swells into an air-bubble; and hence that honey-comb hollow appearance which we see in bread, and without which it would be heavy and unwholesome. The dough is then formed into loaves, and put into a hot oven, where so much of the moisture is expelled as is needful to make the dough palatable, and to fix the flour as a new substance.

“ Flour baked without yeast is close and hard; of this are formed some sorts of biscuits, which derive their name from the French *bis*, twice, and *cuit*, baked. Flour baked with eggs instead of yeast, becomes cake, though most cakes have some yeast in them; and they are made agreeable to the taste by the addition of sweetmeats, sugar, fruit, seed, &c.

#### CORN.

“ Having said so much about wheat, in the composition of bread, you are naturally desirous to know something more of it than the mere name. Well, I shall endeavour to gratify you; but, first, I must give you a short account of corn generally, of which wheat is a species.

“ Wheat, rye, barley, oats, rice, and grass, are all feeble plants of one family, produced from small seeds, and supply food to man and many other animals over the greatest portion of the world.

“ Larger fruits and vegetables are given by Divine

Providence to vary our enjoyments, as apples, pomegranates, oranges, onions, cabbages, melons, cucumbers, calabashes, &c. ; and many of these are of great importance during their seasons, especially in the warmer climates : but as they will not keep, no great store can be laid up of them. Many of these flourished in Egypt, in the time of Joseph ; yet he could not lay up food of them, for the supply of seven years of scarcity, as he did of corn. The wisdom and beneficence of the great Creator is seen to great advantage in these small, hard, farinaceous, and very nutritive grains.

## WHEAT.

“ It is not known of what country wheat is a native. It is supposed that, at a very remote period, it was introduced from Africa, by Ceres, into Greece, whence its culture gradually extended into Europe and the Lesser Asia.

“ More wheat is grown in England, in proportion to its size, than in any other country ; and, according to calculations made on the subject, about four times as much is now grown here as formerly. The quantity used in Great Britain is about thirteen millions of quarters every year, of which rather more than half a million is imported from Ireland and Canada, and, upon particular occasions, upwards of a quarter of a million is brought from other countries. It would take a square field of rather more than thirty miles every way, to produce all the wheat that is used in England ; and it would require a square field of more than ten miles every way, to supply the metropolis and its neighbourhood.



“ Wheat requires rich land and much manure ; hence few countries can grow it to advantage. In Poland, so much wheat was formerly grown, that it was called the granary of Europe ; but now the land is so much exhausted, that the natives live upon rye bread, and the little wheat that is cultivated is chiefly for exportation.

“ The wheat of Canada is of rather inferior quality, compared with that of England ; but as land is cheap, and not yet exhausted by repeated crops, a good deal of wheat is cultivated and exported.

“ From the United States of America, we also receive some supplies of wheat and wheat flour.

“ The best wheat grows in Egypt, and in some of the Barbary States ; but as a long voyage is injurious to the grain, it comes to us in a deteriorated state.

“ Wheat is sown in autumn or in the spring, according to the quality of the land. Where the soil will allow of autumnal sowing, the produce is greater, and the quality of the grain much superior to that of the spring wheat.

“ The cultivation of wheat is a primary object with most of our farmers ; it requires much care, indeed, but it ultimately rewards them for their labour.

“ The business of raising wheat begins with the ploughing. The ground should be well broken, to bring it into good *tilth*, or a proper state for culture. The manure is then laid on, and it is ploughed again, and harrowed ; for it cannot be too fine. The seed is sown in September, if the land will allow ; if not, about March. If sown when the soil is dry



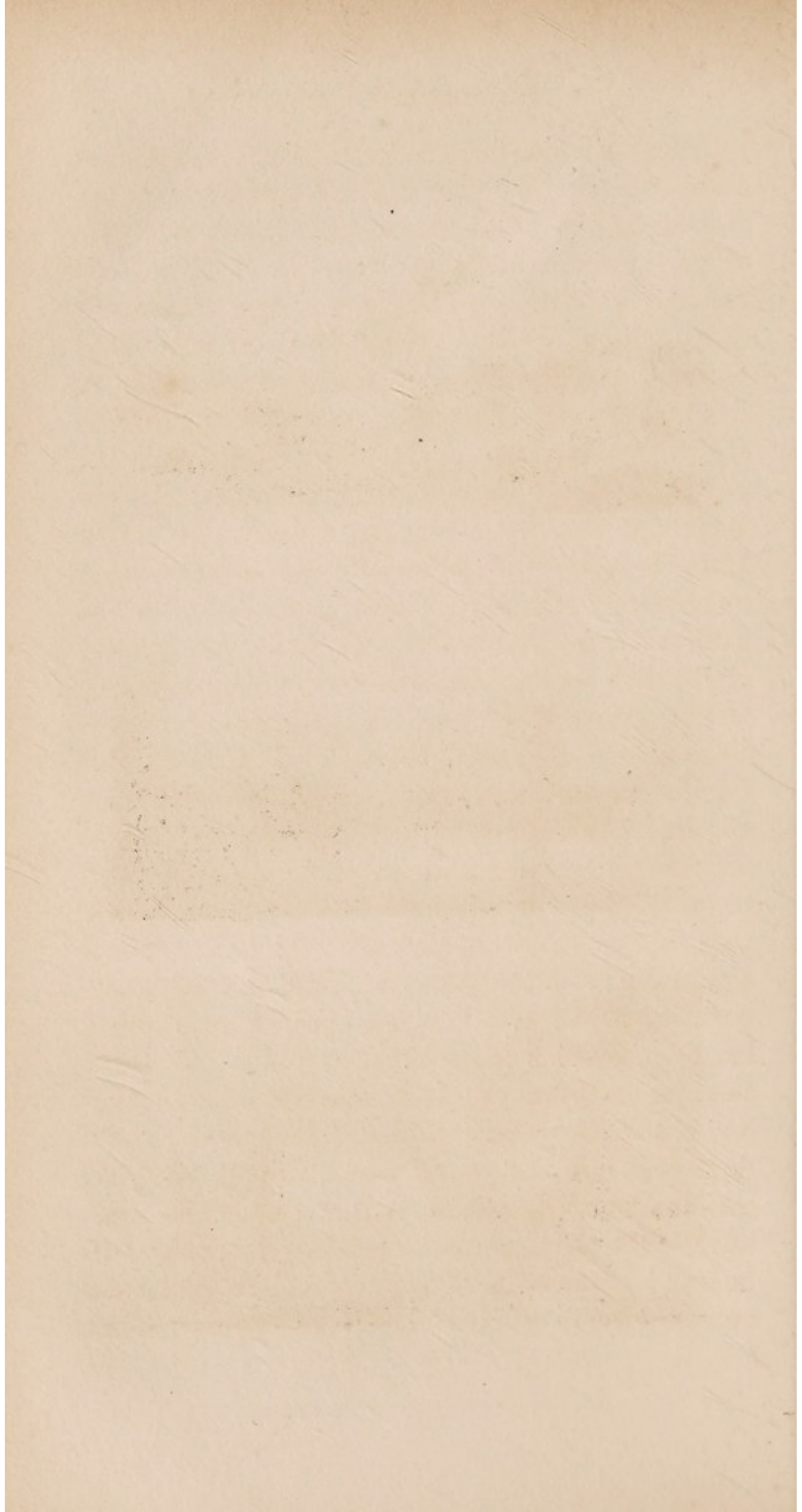
*Page 37.*



*Page 43.*



*Page 290.*



the birds are apt to pick up the seed ; therefore it should be sown just after rain. When it springs up, it must be kept clear from weeds, that it may have all the nourishment the earth can give. The green appearance of the corn during the spring is beautiful ; and towards the close of July, the wheat field begins to assume a golden hue, denoting that it is ripe ; and then all hands are employed in gathering the rich produce.

“ The reaper does not use a scythe, like the mower in the hay field ; but a sickle, or curved knife, furnished with a set of very fine sharp teeth along its inner edge. Thrusting in his sickle, he gathers a parcel of stalks, which he immediately grasps with his left hand, and then pulling his sickle forcibly forward, he cuts off the stalks, or straw, about a foot from the ground. Laying down that handful, he proceeds to cut a second ; and with these two handfuls he forms a kind of rope, or band, upon which he lays the subsequent handfuls, as he cuts them, till they are sufficient to form a *sheaf* ; and then he ties them together with the band. Six or eight sheaves, placed together upright, so as to support each other, constitute a *shock*. When the field has been wholly reaped, if not wetted by rain, so as to require the sheaves to remain to be dried, they are placed in a waggon, and carried home to the farm-yard, It is a joyous time, both to the farmer and labourers : to the farmer, in securing his crop, after many an anxious look at the progress of its growth and the state of the weather ; to the labourers, on account of their extra wages during a season

of very hard work, and the prospect of plenty during the impending winter.

“ It is common, in many places, at the close of the season, for farmers to give their labourers a harvest supper, to which their wives and children also go. It is an exhilarating scene, though too frequently attended with such excess as to render the festival detrimental to those who have partaken of it.

“ Farmers either stow their wheat in barns, where it is preserved from the weather till a convenient time for threshing out the grain ; or they build it in stacks, placing the ears inward.

“ Threshing is usually deferred till winter, when the men have little outdoor work to attend to. The sheaves are then brought into the barn, and laid in two rows, with the ears meeting each other in the middle of the floor. These ears are then beaten with a flail, which is a short heavy club, swinging upon a leather thong at the end of a long handle. With this instrument, the thresher strikes the ears ; and, as they are very dry, the kernels, or grains of wheat, are easily beaten out, and fall upon the floor, from which they are afterwards swept up in a heap. But as the beating forces off a great many particles of straw, and also the husks of the grain, it is necessary to cleanse the wheat from these, which is done either by a winnowing machine, contrived for the purpose, or by opening the doors at each end of the barn, so as to have a thorough draught of air through it, and then, with a shovel, throwing the wheat against the current. In this operation, the grains of corn, being the heaviest, go forward and drop on the floor ; but the chaff, or refuse, which is light, is blown back by the stream

of air and dispersed, leaving the grain clean, which is then measured off and sent to the miller, whose operations we have already noticed.”

## MAIZE.

The foregoing dissertations upon corn and wheat, gave rise to the question, “What is Indian wheat, papa?”

“The term, *Indian wheat*, though very commonly in use, is improper. It is applied to *Maize*, which, though a species of *corn*, has no pretensions to the character of *wheat*. It is called *Indian corn*, because it is produced in the country of the North American Indians, and formed their chief dependence, before they were visited by Europeans. They used to boil it till it became soft, before they ate it; and though they have now learned to grind it to flour, with which they make a kind of bread, much is still used after the ancient manner.

“Maize is a much coarser and larger plant than wheat; the ears, or cones, which grow out of the joints of the stalk, and not at the head, are sometimes a foot in length, and two or three inches in thickness. Around this cone, which is enveloped in several coverings, the seeds are thickly set, bearing a resemblance of flattened peas, closely compressed together. These seeds are sometimes of a blue or purple hue; but their more general colour is pale yellow, or straw colour. From the top of the stem springs up the blossom of the plant, in the form of a graceful plume of light feathers; and when the sun shines fully upon a field of blooming maize, the effect is very splendid.

“ Maize flour is imported into England, and frequently used by the bakers to adulterate our wheaten flour.

#### RICE.

“ We have here another grain, which affords extensive sustenance to the human race. Full half the people of Asia live upon rice. In many parts of Africa, it is almost the only food, especially among the Moors in the Barbary States. It is also in high esteem in Europe, where rice puddings are always acceptable. And in some countries, fowls and meat are stewed with rice, and served up together.

“ Rice is an annual plant; that is, it is sown every year, as wheat is. The stem does not exceed three feet in height; the leaves, at the joints of the stalks, are broader than those of wheat; and the seeds grow not in a close ear, but in a spreading panicle, much like oats.

“ Rice, in its culture, requires a great quantity of water, except one particular sort, which grows in the upland country, and is said to be in great esteem. The main produce is, however, from the low lands, where the crop can be conveniently flooded with water.

“ In China, the rice crop is of great importance; as it constitutes the chief food of the population; much of the land lies flat and low; and the country is plentifully intersected by canals, which afford opportunity for irrigation. From the time the seed is sown, till it is almost ripe, it requires the fields to be covered with one entire sheet of water.

“ The rivers of China annually overflow the low grounds, and deposit a rich manure of mud. After

the waters have retired within the channels of the rivers, and the mud has lain a few days to dry, the Chinese prepare to plant the rice. A plot of ground is enclosed with a clay bank, and the soil is ploughed and harrowed, with the help of buffaloes. The grain is then sprinkled rather thickly over the field, and immediately afterwards a body of water is let in, so as to cover the whole to the depth of a few inches. To effect this, channels are cut from the rivers and canals; or, where the grounds lie too high for such a process, the water is raised by wheels, pumps, and other hydraulic machines. This is the preparatory seed-bed.

“ Another plot of ground is next prepared by ploughing, harrowing, and levelling. As soon as the plants in the seed-bed are about seven inches high, they are plucked up by the roots, and planted separately in rows, either in furrows or in dibbled holes, about six inches asunder. Water is then brought over the whole field, which is divided by low clay banks into small compartments, so that the fluid may be retained or let out at pleasure. As the rice grows, the water is allowed to evaporate, so that the crop, when ripe, covers dry ground.

“ The rice is reaped with a small-toothed sickle, and tied up in bundles, or sheaves, which are laid upon frames, and carried off by men, who fasten a frame at each end of a long pole, or bamboo, and then balance the pole upon their shoulders.

“ The mode of threshing rice is various: sometimes a flail is used, as in the threshing of wheat; sometimes the heads of the sheaves are beaten against a board set up on its edge, or against



the edge of an open tub; but, more frequently, the sheaves are laid on the ground in a circle, and oxen are driven over them to tread out the seeds.

“ To separate the outer cowl, or husk, from the grain, it is frequently pounded in a kind of mortar, and sometimes it is rubbed between two flat stones, kept sufficiently apart to prevent the grain being cracked or ground to powder.

“ The first crop ripens in May, and the ground is immediately prepared for a second, which is reaped in October.

“ In the year 1697, some rice-seed was carried to Carolina, in North America, where the soil and temperature have so well suited it, that Carolina rice is now in greater repute than the Asiatic; the grain is larger, and it swells and softens more in the cooking. Some parts of Italy also produce excellent rice.

“ As an article of food, rice is very nutritious and wholesome, especially when boiled or baked with milk. In Hindoostan, and some other Oriental countries, rice, variously prepared, forms the principal food of the wealthier inhabitants, it being to them what wheat is to Europeans; but the poorer people live upon the coarsest and smallest grains.

“ Rice, when thoroughly boiled down to a jelly, dries into a substance as hard as marble, which it much resembles in colour; and with this paste the Chinese and Hindoos form many of their domestic idols.

“ In the inland parts of North America, a kind of wild rice is found, which has been very useful to new settlers, supplying them with food till their lands can be rendered productive. This is, however, very dif-

ferent from the true rice, being a marsh plant, and covering large portions of some of the shallow lakes. About the time that it begins to ripen from its milky state, the Indians drive into the midst of it in their canoes, and tie up large bunches of it, just below the ears or panicles, and so leave it. In about a month it becomes quite ripe and hard. Towards the close of September, they return, and, running their canoes under the several bunches, they beat out the grain into the canoes. Afterwards they dry it in smoke, and rub and tread off the husk."

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## THE PANTRY.

“FROM the Kitchen we will take a peep into the Pantry, which, if well stored, will afford pleasant subjects for observation. The first thing that attracts notice is

### MILK.

“Milk, the natural support of young animals, is highly nutritive. It is composed of three different parts: a sugary water, which is the *whey*; an oily matter, called *cream*; and a curdy substance, which forms *cheese*.

“When milk is allowed to stand for some time, the oily matter or cream, being the lightest, will rise to the surface; and it is skimmed off for various uses, the most considerable of which is the making of butter. The cream, when skimmed off the milk,

is not perfectly clear of the watery part : it is therefore put into a churn, in which the oily particles are beaten together till they adhere to each other, and then they become butter. The watery part, which remains, is called *butter-milk*.

#### BUTTER.

“ Two sorts of churns are in use for the making of butter ; the *tub* and the *barrel*. The *tub-churn* which is the original and more simple of the two, consists of a tall narrow tub, in which a staff with a round flat board, just the size of the tub, is moved up and down, something after the manner of pounding with a pestle in a mortar. This motion compresses the thicker parts of the cream together, while the watery liquid passes through some holes in the flat board. The work is continued one, two, or more hours, according to the richness of the cream and the temperature of the weather, till all the butter is obtained that the quantity can afford. It is then taken out of the churn ; washed in cold water, to free it from any remaining buttermilk ; and sprinkled with salt, to preserve it from becoming rancid.

“ The *barrel-churn*, used mostly in large dairies, is a cask, or rundlet, hung, by means of a gudgeon, or axle, at each end, upon upright posts. It is turned round with a handle at one end, like a grindstone ; and by means of certain ledges placed within, the cream is beaten into butter. In some dairies, the barrel is very large, and set in motion by machinery attached to a horse, wind, or water mill.

“ Several counties are celebrated for their butter ; and you may take it as a standing rule, that wherever

good butter is made, the cheese is altogether as bad ; for as the butter takes all the cream, the curd produced from the skimmed milk is proverbially bad. Suffolk and Dorset are familiar instances of this : the butter of those counties is excellent ; but the cheese is hard and unsavoury. Much butter is made in Yorkshire and Devonshire, for the London markets, where Cambridge butter is also in request. From Ireland, we receive a great deal, but it has a smoky taste. The fresh butter preferred in London is called Epping butter : it is made in a wide district round Epping and Ongar, where the pastures for cows are of the first-rate quality.

“ About fifty thousand tons of butter are annually consumed in London.

#### CHEESE.

“ In order to convert milk into cheese, a small quantity of an acid kind of liquor, found in the stomachs of calves which have lived wholly on milk, is added. This liquor, called *rennet*, is also obtained by steeping in hot water the stomach of such a calf, which has been salted and dried, to be ready for use when required.

“ The rennet turns the milk into curds and whey ; that is, it separates the richer parts from the watery ; and when the separation is complete, the watery part, or whey, is poured off, and the curd is well washed ; for if any whey remain in it, the cheese will turn sour, and be good for little. After washing, the curd is broken into small pieces with the hand, as a farther precaution against any remaining whey. It is next put into a coarse cloth, which is gathered

up neatly round it, and, being secured on the outside with a hoop, it is placed in a press, and squeezed with considerable force. This process gets out more of the whey, and also consolidates the curd, so as to render it a close firm mass, which then becomes cheese. But this is not quite all; for, before the curd is pressed, a quantity of salt is added to the curd, besides some other articles, to give the cheese its peculiar colour, or flavour, according to the custom of the county, or dairy, where it is made.

#### CATTLE.

“ From the beauty which a good stock of dairy cows gives to a landscape, the bullock tribe, or *black cattle*, as they are called, rank high in the estimation of persons of taste; but their docility and usefulness, qualities more excellent than beauty, entitle them more especially to our notice.

“ Oxen are highly useful to the farmer in drawing his waggons and ploughing his fields. It is true, that the more rapid pace of the horse is for many purposes to be preferred; but where celerity of movement is not an object, the great strength of the ox may recommend him. About London, indeed, the sight of a team of oxen is rare; but in many counties both this and ploughing with oxen are quite common.

“ The cow is in high esteem with all good housewives; and well she deserves it. What a fine beverage is her milk for young people! And what a quantity does she yield! Some cows, indeed, give only five or six quarts a day; but many, where the pasture is good, afford from ten to fifteen quarts daily. Then, again, how nice are our tea and coffee

made by her cream ! And what should we think if we had not her butter?—ten or twelve pounds of butter in a week, besides the milk, after it has been skimmed ? All our cheese too is of her produce. In every shape, she supplies us with dainties. She is an income to a poor man, and goes a good way towards making the farmer rich.

“ Indeed, the bullock tribe are useful both in life and after death. The flesh makes the celebrated roast beef of old England ; the skin is tanned into several sorts of leather ; the hair is of great use in making mortar for plastering the walls of our houses ; the horns are metamorphosed into lanterns, combs, mock tortoiseshell, and various similar articles ; the bones are used as cheap substitutes for ivory ; or, if burned, the soot they produce makes an admirable black for painting, and the ashes are useful to the refiner of the precious metals. From the feet is procured an oil of great importance in several manufactures and in machinery : such of the fat as is not eaten makes our candles ; and the blood, gall, and other offal, has each its distinct use.

“ The breeds of cattle are various : the Dutch breed is large and bulky ; and hence its name, not because it comes from Holland : it is much esteemed in the eastern districts of England, because the cows yield a greater quantity of milk than most other kinds. The Lancashire is a fine breed, with long horns, and is spread over most of our central and western counties. A much improved sort of this breed is found in Yorkshire. The Welsh and Scottish breeds are small ; generally of a black colour, with delicate white horns. The Devon cattle re-

semble them in size, but are of a brownish red colour, and frequently without horns. These last, being brought up on bleak moors and mountains, are naturally lean; but fatten very fast when transported to richer pastures, near the metropolis. For this purpose, large droves of them are sent every year to the midland fairs, whence they find their way, when fattened, to the London markets.

“ London has many excellent markets for meat of all sorts; but Smithfield, with a recent short-lived exception, has long been the only market for live cattle. From all parts of the country, even from a hundred and fifty miles’ distance, droves of cattle are regularly sent to this market, which is held twice a week. Monday is the principal day for cattle, sheep, and pigs: Friday is for the same, but in a less degree, with the addition of horses. In 1836, a second market for live stock was opened at Islington, on the north side of London, but it did not succeed, and, after a few months’ trial, was closed at the end of the year. Upwards of one hundred and twenty-seven thousand head of cattle, eight hundred and fifty thousand sheep and lambs; besides many thousand carcasses sent up from the country, constitute the annual supply required for the consumption of London.

#### SHEEP.

“ Having said so much about cattle, we will just notice the sheep, to which we are indebted for our mutton.

“ The sheep is a very useful animal; its flesh furnishes savoury and wholesome food; its wool is the substance of our clothing; its skin forms leather for

gloves, bookbinding, and parchment; its bones and horns are wrought into various utensils; its intestines are spun into cord, frequently called *catgut*; and, in some places, its milk is used for making butter and cheese.

“The Lincolnshire breed of sheep is large and fat, with a great deal of wool, but very coarse, though the breed has been of late years greatly improved. On the contrary, the Shetland sheep are small, with wool beautifully fine and soft. The *short sheep* of Yorkshire have black faces; they run almost wild over the heaths, and furnish remarkably sweet mutton. The South Down breed is a hardy race, running over the downs of Sussex; its wool is fine, and the mutton peculiarly good. In Dorsetshire, the sheep are white-faced, and from these the metropolis is supplied with early lambs, reared with great care, and in a peculiar manner.

“The importance of the breeding of sheep is apparent from the value of the wool shorn every year in the kingdom, which is estimated at no less a sum than seven millions of money. By the labour and skill of thousands of poor people, the wool is worked into many useful articles, of the probable value of twenty-one millions of money.

#### BACON.

“We have talked so long about the good things of the table,” continued Mr. Paterson, “that a lunch appears desirable, and I know of nothing more suitable than a rasher of bacon. Of the mode of preparing bacon, I will just give you an idea. You know, of course, that it is the flesh, or rather the fat,



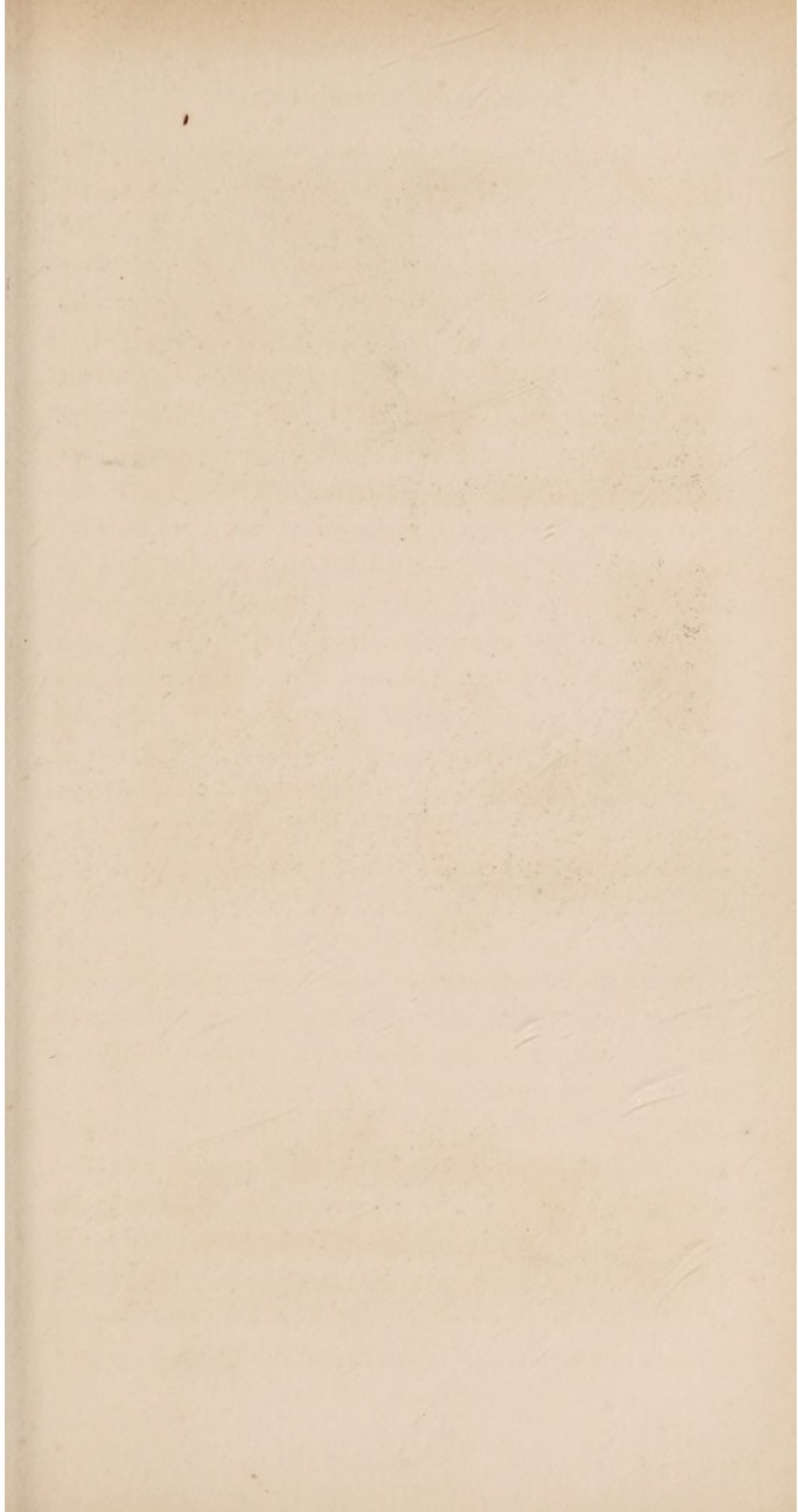
of the hog; and that the best comes to us from Hampshire; though very good bacon is also made in Yorkshire, and even in London.

“ The hog is, as Louisa observes, a nasty animal to look at, and he is equally nasty in his habits: yet he is very useful—I should rather say profitable, to his owner; indeed, he is more profitable to those who know how to manage him, than any other domestic animal, as he makes much quicker returns. And then as to the food he furnishes, the bacon now preparing will be one proof; and your recollection of roast pork, and of boiled pork, with the addition of a nice fowl, will afford you other proof, that, homely as is his outside appearance, he is intrinsically good.

“ When hogs are fattened large for bacon, the whole fat of the side, with the shoulder and leg, are cut clean off in one piece, which, after being salted, is dried in wood smoke. The *pork bones*, as the meat is called after the fat has been removed, are excellent eating, either fresh or pickled.

#### SALTED PROVISIONS.

“ In yonder bin, or tub, are some joints of beef or pork,—perhaps, a round of the former, or a pig’s head, in brine, or salt pickle, to preserve them till wanted for the table, and to give them an agreeable relish. As soon as an animal is killed, the flesh begins to undergo the process of decomposition, and, if not prevented, would soon be filled with maggots, and become offensive. Salt, however, when well rubbed into the flesh, which is cut into convenient pieces for the purpose, keeps it from putrefaction, and preserves it in a fit state to be eaten. When





*Page 168. & 52.*



*Page 171.*



*Page 32.*

ships go out on long voyages, you know, they cannot procure daily supplies of food from the market, as we do, and must, consequently, take with them sufficient for the consumption of many weeks, or perhaps months. And to furnish them with sufficient quantities, certain persons have established themselves at different seaports, and make it their particular business to provide salted provisions. The city of Cork, in the south of Ireland, is a celebrated place for provisions of this kind; and great numbers of ships are constantly resorting thither, to be victualled. Ireland is a fruitful soil, especially in its pastures, where vast herds of cattle are bred. These are driven from all parts to Cork, where they are slaughtered, salted, and packed in casks, ready to be conveyed on board ships. Large herds of swine are also reared, fed, and fattened, for similar purposes; pork, as well as beef, being taken by ships on long voyages. Sometimes, an outward-bound fleet, comprising a hundred or more ships will call at Cork, for provisions; and then what hurry and bustle! What rolling of casks, and wheeling of trucks! What hallooing to the boats, and splashing of oars! Everybody is busy; for a fleet is as a fair to the people of Cork."

## GEESE.

“The goose is a well-known bird, not only in England, but in most parts of Europe, and, indeed, in all the temperate climates. In their wild state, geese migrate, during the heat of summer, to some colder region, returning in the winter to their milder haunts. In these migrations, they fly in extensive

flocks, or companies, and in a very curious manner, one always taking the lead.

“ In the fenny parts of England, and particularly in Lincolnshire, extensive flocks of tame geese are kept. At certain periods, large flocks of them are driven to London; from eight to ten thousand are to be seen together on the road, travelling at the rate of about eight miles a day; their progress being urged by the *gozzard*, for so is the man called who has the care of them, by means of a piece of red rag tied at the end of a long wand.

“ The flesh of the goose is relished by most people; and hence the great demand for geese in the London markets. But it is not solely on this account that they are bred: their feathers and quills are so valuable, that to obtain them most unwarrantable means are resorted to. About the end of March, their quill feathers are pulled out, to make pens; and four or five times in the course of the summer, these poor animals are put to the farther torture of having their small feathers plucked off, that we may lie at ease upon our feather-beds, for which goose feathers are esteemed the best. At Michaelmas, a general slaughter is made of these birds, to gratify the appetites of the epicurean admirers of Michaelmas goose.

“ When taken care of, the goose will live to a great age; so much as seventy or eighty years; but the flesh is not good eating after the first year.

#### POTATOES.

“ I need not tell you that yonder corner contains a heap of potatoes, closely packed in dry sand, to pre-

serve them from frost during the winter. You saw the operation, and was told its intention. But whence came potatoes at first? That is the question we have now to answer; for in the days of Queen Elizabeth, they were unknown in Europe.

“The potato is an American root; originally, it should seem, of Peru, whence it was transported to North America. Sir Walter Raleigh found it there, and carried some of the roots to Ireland. Not knowing much about them, he desired his gardener to plant them: in the summer they grew, and blossomed, and bore those round green balls, which we call *potato apples*, and which, indeed, are the seeds of the plant. These were boiled, but they were not edible; and Sir Walter concluded that potatoes would not grow on this side of the Atlantic. In the winter, however, when his gardener was turning up the ground, to prepare it for the following spring crops, he found the true potatoes; and by cultivation they were soon spread through the country, where they now feed the great mass of Irish population. They were introduced into England, it is said, by a ship-load being wrecked on the Lancashire coast. For about fifty years, they were considered as rarities; but now every little cottage garden, and every slip by the road side, or on the sides of fields, as well as whole fields themselves, are planted with this profitable, pleasant, and wholesome root.”

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### THE BREWHOUSE.

“The pantry has brought us so near to the brew-house, that we must needs look in, and see how our

ordinary drink for dinner and supper is made. In addition to water, the two important articles used in brewing are malt and hops; some account of which is a necessary preliminary to a dissertation on the art of making beer and ale.

#### BARLEY.

“ Malt is made of barley, the grain next in value to wheat; not, indeed, much used for eating, but extensively so in the composition of beer. Barley is grown more or less in most counties; but more largely in Norfolk.

“ In the ear, barley is easily distinguished by the long filaments, called the *beard*, which project around it like a brush. In the southern counties of England, it is generally mown with a scythe, like grass; but in most of the northern districts, it is reaped, and made up into sheaves, like wheat. When brought home, it is usually stacked out of doors, in what is called a *barley-mow*, the raising of which is a season of mirth and jollity among the labourers.

#### MALT.

“ Beer, being a fermented liquor, or sort of wine, requires some saccharine matter, or sugar, without which no fermentation would take place. The grain of barley contains much of this matter, which is indeed the nourishment provided by nature for the young plant that would issue from it, were it put into the earth and suffered to vegetate. As soon as the germ begins to swell, the sugar is evolved, or thrown out, and would be all taken up by the young green spires, were they allowed to grow. Now the process

of malting is artificially to set the barley in full operation for growing, and then to stop its growth just as the sugar is evolved, and before any of it can be taken up by the green blade.

“ To produce this effect, the barley is thrown into vats, or large wooden vessels full of water, where it continues till it becomes soft and much swollen. It is then taken out and laid in heaps upon the floor, as well to allow the superfluous moisture to drain away, as to heat. In a short time, the heat becomes so great, that you would hardly bear your hand in it, and this heat causes the grain to sprout. In about fifteen or sixteen hours, the barley begins to throw out its little fibrous roots; and, if not prevented, would not be long in shooting out its green spires on the opposite side. The appearance of the roots is a sign that all the powers of the grain have been brought into action for producing sugar; and to stop its farther vegetation, it is spread out in smaller heaps and frequently turned over, that it may dry gradually, which it will take two days to do. The barley has now become malt; and when as dry as it can be made by this method, it is removed to the kiln to be baked, so as to put an end to any remaining tendency it may have to grow.

“ The malt is subjected to the heat of the kiln in three different degrees; in consequence of which it becomes either *pale malt*, or *amber-coloured*, or *high-dried*. The pale malt makes the strongest ale, because it retains most of its sweetness; ale from the amber-coloured malt is a favourite with many persons, who admire its bright deepish colour, and it retains much strength. High-dried malt, which, in fact, is



malt partly burned, yields a deeper colour than the other sorts ; but is proportionably diminished in strength.

“ Just before malt is wanted for use, it is coarsely ground, that it may give out its sweetness to the water with greater facility.

#### HOPS.

“ When hops were first used in brewing, a great outcry was raised against them ; but it is now well known, that hops not only give a pleasant flavour to malt liquor, but, by breaking its viscidty, they render it more wholesome than it otherwise would be ; and, by preventing it from turning sour make it capable of being kept for months, and even for years.

“ The hop is a native of Britain, and grows wild in many of our country hedges ; but the hops of commerce are cultivated. Those of Herefordshire and Kent are most esteemed. They are also extensively cultivated in the counties of Hants, Surrey, and Sussex ; and such as are grown in the neighbourhood of Farnham, on the borders of Surrey and Hampshire, fetch the highest price. The plant, which is hardy, dies down to the ground at the approach of winter, but rising again in the spring, runs up a pole, set in the earth for the purpose, to the height of fifteen or eighteen feet. The leaves exhibit a fine mellow foliage, but the blossoms only are used in brewing.

“ The hop begins to blossom in July, and is ripe for picking about the beginning of September, at which time the hop-ground presents a busy cheerful scene. The men cut the hop-binds, or plants, at

the bottom, a few inches above the ground, and then drawing the pole out of the earth, carry it, with all the foliage about it, to the bins. The bins consist of large frames, supporting a cloth, or bag. Two or three poles are laid across each bin; and then about a dozen of women, girls, and young boys, pick off the bunches of blossoms, and put them into the bags.

“ After picking, these blossoms, or hops, as we must now call them, are gently but thoroughly dried on a hair cloth, in a kiln, somewhat similar to the kiln for drying malt. They are laid nearly a foot thick, and take from ten to twelve hours in the drying. Some persons, when the hops get pretty warm, let down a tin cover over the whole mass, which reflects the heat back upon the top, and assists in drying the upper part thoroughly.

“ About three weeks after the hops have been dried, they are packed in bags, and so well trodden in, that the whole package becomes like a solid body. They are now ready for the market, and, if well got up, will keep good for some years.

#### ALE AND BEER.

“ After this account of malt and hops you naturally expect to hear of the process by which they are converted into ale and beer.

“ When the malt has been coarsely ground, it is thrown into a deep open vessel, called a *mash-tub*, where water that has been boiled, but subsequently reduced to a proper heat, is poured upon it, and the mixture is well stirred up for some two or three hours, so as to get all the sugary qualities of the malt incorporated with the water; this operation is called

*mashing*; and upon its good or bad performance, the quality of the ale very much depends. The liquor in this state is called *sweetwort*; and after it has been drawn off, a second quantity of water, less than the first, is poured on the malt, and a longer time is given for mashing. When this has been drawn off, a third supply of water is poured on the malt, and a third wort is obtained. The second wort is not so strong as the first, and the third is weaker still. The two first worts, mixed together, will make good ale, and the third will make small beer. If the second and third worts be mixed together, they will make excellent table beer, and the first wort alone will be capital strong ale.

“ When the malt has been thus deprived of all its strength, it is called *grains*, and becomes food for cows and hogs. The worts, either mixed together or separate, are then boiled with a due proportion of hops. Of themselves, the worts would make a ropy liquor, which, as before observed, would soon turn sour; but the hops prevent this. After boiling, the liquor, which is now *ale*, or *beer*, must be fermented. For this purpose, it is brought to a proper degree of warmth in a vessel called a *cooler*, and a quantity of yeast is added, which soon produces a general fermentation. When this is getting on pretty rapidly, the beer must be *tunned*, that is, put into the casks in which it is to remain till drawn off for use. As the fermentation proceeds in these casks, the beer throws out at the bung-hole a brown froth, which is new yeast, fit for setting other beer at work, or useful in making bread.

“ The art of making the ale good now consists in

knowing when to stop the fermentation. Were the barrels to be bunged down at first, the force of the gas set at liberty by the ferment would burst them ; on the other hand, were they not to be bunged till the fermentation was quite over, the beer would be vapid, as all its spirit and strength would be evaporated.

“ During the fermentation, the beer is turbid and unpleasant ; but when that is over, all the mash of the malt sinks down in *lees*, a kind of mud, at the bottom, and the liquor remains clear and sparkling. The stronger the ale, the longer it must be kept to acquire this brilliancy, and make it fit for drinking.

“ Such are the general principles of brewing. The chief difference between ale, beer, and porter, arises from additional ingredients, put in for the sake of colour or peculiarity of flavour. Porter is said to receive its deep brown colour from Spanish liquorice, or burned sugar. Ale differs from beer in having fewer hops, which, imparting less bitterness, leaves more of the soft smooth sweetness of the malt. It is usual, too, to brew it with pale malt, so that it is not so brown as beer made from high-dried malt. Diversities of flavour are also produced by the quality of the water used in different places, and peculiar modes of managing the brewing : hence we find at Dorchester in the south, and at York in the north, at Burton-upon-Trent, at Bristol, at Windsor, and at Nottingham, in Wales and in Scotland, ale and beer of great diversity as to flavour and quality ; and at each place we shall be told, ‘ Our ale, or beer, is the best in the kingdom !’

“ In the large breweries in London, the coppers and machinery are upon a very extensive scale. The coppers are of immense size; the mash-tubs are in some cases twenty feet across, and six feet deep; and the mashing, instead of being done with oars worked by the hand, is performed by machinery within the tub, and actuated by a steam-engine, which also pumps the water into the coppers, and again pumps the sweetwort back to them, to be boiled with the hops; and, when that is done, throws the beer into large coolers at the top of the building. But you must, some day, see all this, to understand it thoroughly.”

#### BIRCH BROOMS.

As they were quitting the brewery, a birch broom, standing behind the door, attracted the notice of the little auditory; and Mr. Paterson, always attentive to their motions, immediately made it a lesson of instruction. “ If,” said he, “ an article be worthy of notice on account of its usefulness, the birch may be remarked upon with propriety; for, when properly used, it produces cleanliness in places where better articles could not act so well; as you see by the brick paving of this brewhouse, which, though frequently covered with wet and dirt, the unavoidable consequence of the operations carried on here, is kept clean and dry by the use of this broom. In some parts of Kent and Sussex, are extensive woods of birch; and the consumption of brooms of this kind in London is so great, that one nobleman has estates upon which brooms are grown and made to the amount of thirteen thousand pounds a year.

“ Some adroitness is requisite in tying up a

bundle of twigs so tightly. It is done by the help of a lever, which compresses the bundle while the bandage is put round it. The handle, pointed sharp for the purpose, being then forced in, compresses the bundle still more, and the whole becomes a very suitable and useful besom for rough work."

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### THE STUDY.

Whether the foregoing conversations, or lectures, took place in the exact order in which they are related, does not immediately appear, neither is it requisite that we stop to inquire. Suffice it to observe, that the young folks next found their attention drawn to several objects in the room where they were more accustomed to receive lessons, than in the apartments which they last quitted. They had not been long in the study, before a question arose as to the nature of

#### PAPER.

"Is it a natural produce, or is it a manufactured article?"

"Paper is a manufactured article, of modern invention; previous to which, various substances were used for writing upon, as stone and lead, for inscriptions of a monumental nature; and for more familiar and private use, the leaves of trees, as is even now the case in Ceylon; parchment, rolls of linen, and smooth sheets formed of the inner bark of the rush *papyrus*. The two latter were in use among the ancient Egyptians, some of whose inscriptions upon

linen, taken from mummies, are now to be seen in the British Museum; and though perhaps more than two thousand years old, the characters are still in a state of preservation. To the same people, we are also indebted for the term *paper*, derived from their *papyrus*. Paper made from this plant was in use till about the tenth century of the Christian æra, when paper was first made by beating cotton into a pulp, and then spreading it out in thin sheets to dry.

“ Who it was that first applied linen to the making of paper, is not now known; but in the thirteenth century, such paper began to be in use, and still continues so.

“ The material of which paper is now made, comprises rags and shreds of worn-out linen. These rags, which were formerly thrown away, or burned, are now bought up by people, who travel all over the country, collecting them in small quantities. They then pass into the warehouse of the rag merchant, who is a large dealer, and also imports rags from foreign parts; and he sells them to the paper-maker.

“ The first process is that of sorting the rags, according to their coarseness or fineness; after which they are washed from all impurities in hot water, by means of a mill. They are next to be cut; a process performed by a large roller covered with knives closely set, and turning round in a trough, the bottom of which is also set with similar blades turned upwards, and so contrived that the two sets of blades may slide easily by the side of each other, so as to form a kind of scissors. Into this trough the rags

are put, with a proper quantity of water, and the roller is set in motion. As it turns with great rapidity, it cuts the rags very small, and in a few minutes reduces them to a coarse kind of pulp, called *half stuff*.

“ Frequently, in this stage of the process, the half stuff is bleached, to take out all stains and colour, so as to leave it perfectly white, by exposing it to the action of sulphuric gas, which quickly discharges all colour; and immediately afterwards the stuff is well washed, lest the gas should destroy the substance as well as the colour.

“ The stuff, or pulp, being now thoroughly comminuted and bleached, is put into a cistern, or vat, with such a quantity of water as will give to the mixture the consistency of thin paste; and it is then ready for the next process, called *couching*, or forming it into sheets, by means of a mould.

“ The mould is a kind of square sieve, somewhat larger than the intended sheet of paper, about an inch deep, with a bottom of brass wires placed very closely together. This mould, being dipped into the vat, becomes filled with pulp, from which, as the mould is brought out, the water drains away through the interstices of the wires, leaving a flat thin layer of pulp, which is indeed a sheet of paper in its earliest state. Being carefully taken out of the mould, it is placed on a square of felt, or coarse cloth, and covered over with another such square. Upon this a second sheet is laid, and covered as before; and thus the workman proceeds, laying alternate sheets of paper and pieces of felt, or cloth, one upon another, till the heap contains one



hundred and forty-four sheets, or six quires, which is called a *post*. The weight of the heap, as it rises, presses the sheets a little; but when the post is made up, it is smartly pressed, so as to squeeze out most of the superfluous water. The sheets are then taken out of the felts, laid one upon another, pressed again, and then hung up to dry.

“The next operation is *sizing*, or saturating the sheets with a weak kind of glue mixed with alum, into which, as hot as the hand can bear, each sheet is dipped. This enables the paper to hold ink; otherwise, the ink would run, just as it does upon blotting paper, which is not sized. The sheets are again hung up to dry, after which they are well pressed. The damaged sheets are then taken out, to make outside quires, and the good are counted into quires of twenty-four sheets each. Twenty quires, including two outsides, make a ream; and these are tied up in wrappers of coarse paper, for sale.

“Such is the process of making fine paper, which is of various sizes, qualities, and degrees of fineness, according to the uses for which it is intended. Paper for printing has less size in it than writing paper. The coarser sorts, as whited brown, blue, and common brown paper, are made of coarser materials, even of old ropes and sacking.

“For the covers of magazines and pamphlets, papers are dyed of various colours, and some are beautifully marbled. The manner of making marbled paper is thus: a trough, of the size of the paper to be marbled, is filled with strong gum water, on the surface of which different colours are sprinkled, according to the taste of the operator, and as they

float on the surface are spread out in the intended pattern. The sheet of paper is then adroitly laid upon the flat surface, and it takes up all the colours spread there. It is then removed with a dexterous knack, acquired only by habit, hung up to dry, and afterwards polished with a rubber.

## PARCHMENT.

“The vellum binding upon that book reminds me that I have adverted to parchment, as a substance used for writing upon, before the invention of paper. It is said to have been invented, or first used, by Eumenes, King of Pergamos, about two hundred and fifty years before the Christian æra. From the place of its invention, Pergamos, its present name, *parchment*, is derived, or rather corrupted.

“Parchment is prepared from the skins of sheep, or of goats; it is begun by the skinner, and completed by the parchment-maker. After the skin has been deprived of its wool, or hair, in the usual manner in a lime-pit, the skinner stretches it on a frame, and with an iron instrument pares off the flesh. It is then moistened and spread over with powdered chalk, after which it is well rubbed with pumice stone, to scour off any remaining flesh. After this operation has been several times repeated, the hair or wool side is subjected to a similar operation, to eradicate the roots of the hair. The skin is then left to dry; after which, it goes into the hands of the parchment-maker, who pares it with a sharper instrument than was used by the skinner, and takes away about half its thickness; and then being smoothed with pumice stone, the parchment becomes fit for use.

“ Vellum is prepared, much in the same manner, from the skins of very young calves. It has a much finer grain, and is smoother than parchment.”

#### BLACK-LEAD PENCILS.

“ That Jew pedlar, at the street door, is offering black-lead pencils for sale. They are useful articles; but you must be cautious how you purchase of such dealers. Sometimes you may get a good one; but very often they have not above an inch of lead in them; and, more frequently, an article, called *black pot*, is substituted for the lead, and is good for nothing in a pencil.

“ Black-lead, or plumbago, is a mineral substance, known to modern chemists by the name of *carburet of iron*. It is found in England, France, Spain, Germany, America, and at the Cape of Good Hope, in Africa; but the best sort, and the fittest for making pencils, is obtained near Borrowdale, in Cumberland, where it abounds so much, that not only the whole island of Great Britain, but the entire continent of Europe, may be said to be supplied thence. This mine is deemed so valuable, that it is opened only once in seven years; and when a sufficient quantity of the mineral has been taken out, it is carefully closed again.

“ One principal use of black-lead is for making drawing pencils, which have the advantage of marking paper very distinctly, though their traces may be afterwards rubbed out by soft bread, or elastic gum. To form the pencils, the lead is cut with a saw into thin parallelopipeds, and put into grooves cut in sticks of cypress or red cedar wood. Slips of

the same kind of wood are glued over the grooves, and the sticks are then worked into small cylinders, like quills.

“An inferior sort of pencils is made by working up the powder of black-lead with sulphur and some mucilaginous substance; but these answer only for very coarse purposes.

“Black-lead is used in various other ways. The powder serves to make razor-straps; and it gives to cast iron work, as stoves, &c. an elegant gloss. It is likewise used to smooth the surface of wooden work that is subjected to great friction, as wooden screws, packers' presses, &c.; and a mixture of one part of black-lead with three parts of clay, and some cows' hair added, form crucibles for the refiner. The latter mixture is the black pot, to which I have alluded.

“As good black-lead is very valuable, on account of its scarcity, some pencils are made of an inferior kind, as you will discover from their grittiness. Others are made with the mineral molybdena, which gives a pale silvery mark, very different from the clear dark colour of genuine black-lead.

#### INDIAN RUBBER.

“I have just remarked,” continued Mr. Pater-son, “that elastic gum is used for obliterating pencil marks; and a short account of it seems to be a necessary appendage to our dissertation upon black-lead.

“The Indian name of this gum, or resin, is *Caoutchouc*, but it is more generally known by the familiar title of *Indian rubber*, from its use in rubbing out marks and soils from paper, silk, leather,

and other substances. Till very lately, it was almost limited to that and some surgical purposes: but it is now applied, in various forms, to articles of dress, and enters pretty largely into many of our manufactures.

“ The tree from which this gum is obtained is a native of Cayenne and other parts of South America; and the gum, or resin, oozes out, in the form of a vegetable milk, from incisions made in the stem. It is gathered chiefly in time of rain, because it then flows more abundantly than in dry weather. The liquor thus obtained, thickens and hardens gradually by exposure to the air; and as soon as it acquires a solid consistency, manifests an extraordinary degree of flexibility and elasticity. The Indians, who are its manufacturers, and who make a mystery of the method of preparing it, fabricate boots of it, which water cannot penetrate, and which, when smoked, have all the appearance of leather. These and the bottles and other forms in which we receive Indian rubber, are made upon clay moulds of the required shape, over which the juice obtained from the tree is spread, whilst in its liquid state. When the first coating has acquired a sufficient degree of firmness, a second is spread upon it; and successive coats are applied, in like manner, till the article is of a proper thickness. It is then hung over a strong smoke of burning vegetables, by which it is hardened into the appearance and consistency of leather. Before it is quite finished, and whilst still soft, it is capable of receiving any impression on the outside, which it retains indelibly. When quite dry, it is thrown into water, which

softens the clay, and the core, or moulding, is taken out.

“For many years, elastic resin was limited to such uses as it could be applied to in the state in which it is brought to us, because no adequate solvent was known, by which it might be reduced to a condition fit for the workman. But within a very short time, that desirable end has been attained, and we have now a great variety of articles of dress, from the shoes to the hat, together with objects of fancy and domestic use, manufactured from caoutchouc. The agent principally employed for the solution of this substance is a kind of spirit, or an oil, obtained by the distillation of coal-tar; and when thus liquified, it yields to the ingenuity of the operator, and is sent into the market in the forms of varnish, waterproof clothes, hats, shoes, braces, and other articles, which are daily produced and advertised for sale.”

## CLOCKS.

An announcement that the clock-maker had brought home a clock, which he had taken to clean, almost unavoidably excited a desire in the young inquirers to know something about clocks.

Mr. Paterson was not long in gratifying this desire. “The first method of measuring time, that we read of, was by observing the shadow projected by the sun in his daily course. Then, about one hundred and fifty years before the Christian æra, the Romans had their *clepsydræ*, which were tall narrow phials, filled with water, with a cork floating on the top. A small hole at the bottom of the phial al-

lowed the water to escape gradually and regularly ; as it ran out, the cork descended, and shewed, by marks on the outside of the phial, how many hours had elapsed since the water began to flow. To this instrument, perhaps, the hour and minute glasses of later ages owe their origin ; only these have sand in them instead of water ; and when all the sand has run from the upper into the lower glass, they must be turned upside down, and then the sand recommences its running.

“ But the measuring of time by wheel-work is a comparatively modern invention ; though the inventor is not known. The first clock set up in England was in the year 1288, at Westminster. The art is now brought to great perfection in many points, which you cannot as yet understand ; but the general principle is easily comprehended, as the examination of a clock in motion, out of its case, will render it quite familiar.

“ There, the clock is uncased ; the first thing you should observe is the weight, which has a tendency to go down. In its descent, it draws the line by which it is suspended ; and the line, passing over a pulley, turns the wheel to which the pulley is attached. That wheel turns other wheels, which you may trace till you come to one at the top, in which the pendulum plays. Now, if we take off the pendulum, you will observe how fast the wheels go round, to what they did while the pendulum was on, and how soon the weight runs down. So you see, the weight pulls the wheels round, but the pendulum prevents them from going round too fast. Put on the pendulum again, and watch it. At

every beat, that is, every time the pendulum swings wide out on this side, the two small arms which move with it at the top, allow one tooth of the wheel in which they work to pass forward, and no more. Again, when the pendulum swings wide out on the other side, another tooth of the same wheel escapes; and this, you will observe, is repeated as long as the pendulum continues to beat, and the weight continues to drag the wheel round; the latter giving the impulse of motion, and the former regulating it.

“ You see several wheels between that which the weight draws round, and that which the arms of the pendulum work in; these prevent the weight from going down too fast, so that the clock may not want winding up so often as it would without them. Now observe; the large wheels have smaller wheels, called *pinions*, working into them. The teeth of these pinions are denominated *leaves*; now, if a pinion have six leaves, and the wheel it works in have sixty teeth, the pinion must go round ten times before the wheel can turn round once. If this wheel have also on its arbor (that is, the axle on which it turns) a pinion of six leaves, working into another of sixty, this latter wheel will go round but once for every hundred turns of the first pinion. And by such means the motion is brought slower and slower to the degree required.

“ The first wheel in a clock of this kind goes round once in a minute, and moves a hand which shows seconds, or moments of time. The wheel, to which I next direct your attention, moves sixty times slower, and occupies a whole hour in going once



round; the hand upon it shewing minutes. The next wheel is so retarded that it takes twelve hours in making one revolution, and it moves the hour hand.

“ Clocks have generally an apparatus for striking the hour, consisting of a distinct weight and set of wheels. You may here observe that the weight, after it has been drawn up, is prevented from running down beyond what is requisite by a small pin, which drops into a notch in the striking wheel: but when the hour wheel comes round exactly, it raises the pin, and then the weight, being relieved, draws round the striking wheel, which raises the hammer, and a stroke on the bell announces that it is one o'clock; the pin then drops into the wheel at the next notch, and keeps the weight from acting upon it till the hour wheel again lifts it up. To make the hammer strike two or more times, the wheel is provided with notches in parcels; first, one notch, then two together, then three, and so on to twelve. The pin is raised as many times as there are notches in the wheel, and the hammer strikes as often.”

#### WATCHES.

“ But watches,” observed Richard, “ have no pendulums, nor any weights; how then is their motion produced?”

“ True; watches have neither pendulums nor weights, but they have springs, and what are called *balance wheels*, which answer all the purposes. I have in my secretaire an old watch, which I will take to pieces, to explain myself.—Observe this brass box, called the *barrel*; it contains a spring, coiled

up like a piece of tape ; and, on opening the barrel, we perceive that the interior end of the spring is hooked to the immoveable axis about which the barrel turns ; and the exterior end is fixed to the inside of the barrel. Now you see, when the barrel is turned upon its axis, the spring becomes compressed together ; that is, it is wound up ; but the spring has a tendency to unwind itself ; therefore, on taking away the superior force which had contracted it, an expansion follows ; and as the spring is fastened to the barrel, this is carried round as long as there is any room for the dilation of the spring. This gives an impulse, and answers to the weight of a clock. In the watch, the barrel is wound up by means of a conical-shaped wheel, called the *fusee*, the axis of which projects through the key-hole, to receive the key. A fine chain, of admirable workmanship, is attached by one end to the fusee, and by the other to the barrel. It is coiled round the barrel when the spring is at its full stretch ; or, as we should say, when the watch is down. On turning the fusee with the key, the chain is brought to it from the barrel, which it at the same time turns round, and thereby draws or winds up the spring. Were it not for the counteraction produced by other parts, which I am about to explain, the spring would immediately unwind itself, and carry the hands of the watch round with great rapidity.— There, I have removed the balance wheel and verge ; observe how rapidly the hands move ! You also see, that as the chain is drawn away from the fusee, the fusee itself turns round, and gives motion to all the other wheels.

“ The wheel-work in a watch is in principle simi-

lar to that in a clock ; that is, its motion is retarded by the intervention of pinions, as, upon a slight examination, you will perceive. This motion is regulated by the balance, which you see, through this piece of ornamental open work, beating backward and forward. Connected with it, beneath, is a very fine hair spring. The balance in going one way, as impelled by the main spring in the barrel, contracts this hair spring, which in recovering itself, throws the balance back again ; in the mean while, one tooth in that upright wheel, called the *balance wheel*, with jagged teeth, slipped by, when the balance was at the farthest part of its vibration ; and, by a repetition of the movement, it acts as a pendulum. A certain size and weight of the balance will beat so many times in a minute ; any irregularity being corrected by the length and strength of the hair spring, which can be lengthened or shortened at pleasure, by means of that small dial, called the *regulator*.

“ The manufacture of watches is very extensive in England, and affords employment to a vast number of artisans, of both sexes, as well as children. The greater portion is for exportation ; for, although watches are made in foreign countries, none can be depended on so much as those of our native island.

#### JAPANNING.

“ I took notice, Louisa, while I was describing the nature and movements of the clock, that your attention was attracted by the beautifully japanned clock-case.”

“ Ah ! papa, I was indeed admiring the case ; but

I was not aware that it was called *japan*. I thought tea-trays, waiters, and such sort of things, were made of japan; and I recollect that uncle said his snuff-box was of japan ware."

"The first pieces of this kind of ware came from Japan, in the early part of our intercourse with the East Indies; and hence the name. Indeed, the best sort is still brought from Japan and China; and this very clock-case presents to us a specimen. But the French and English, especially the latter, imitate it so well, that at present there is no need to be at the expense of fetching it from such a distance, except now and then to gratify very curious persons.

"It is not the substance, which may be various, as wood, paper, leather, iron, tin, and other articles, that constitutes the japan, but the varnish, or glossy paint, with which these articles are coated. The articles of this kind, which come from the East Indies, are usually formed very neatly of wood. The varnish, which is there applied to give them colour, body, and polish, is not well ascertained; but with us the substance of it is lac, a sort of resinous gum, exuding from a tree in the East Indies, and brought hither in considerable quantities for our manufactures. It is used in painting, in making sealing-wax, in dyeing, and in the composition of varnishes.

"The first part of the process in japanning is the priming, or laying on a thin coat of whiting and size; or, sometimes, two or three coats of thin varnish are laid on; then the proper japan ground is laid, made of shell lac and varnish, mixed with such colours as are required. The work may then be painted with figures, landscapes, &c. in colours mixed with oil or

varnish, at the discretion of the workman ; but varnish is the best.

“ Then comes the most important part, the varnishing. The best varnish is made with seed lac, dissolved in spirits of wine ; and this is laid over the work very thinly, but five or six times repeated. The varnishing must be done in a very hot room ; and the pieces to be varnished must be heated as much as they will bear ; otherwise, the varnishing will not dry sufficiently hard to bear a polish.

“ After the varnish is thoroughly dried, it is polished by rubbing it with rags dipped in tripoli, a kind of earth, very serviceable in many of the arts ; and it is finally cleansed with a little oil.”

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## THE STORE-ROOM.

“ The purpose of our visit to this room is not to examine the pickles and preserves, which we may find, nor to describe how they are prepared, though that might be very interesting to some of my auditors : this belongs to the art of cookery, and will be better studied at another time, by such of you as are more directly concerned in it. Our object, at present, is to notice a few articles of extensive importance to the manufactures and commerce of our country.

### OIL.

“ That flask contains, I suppose, olive oil for salads and other uses in the preparation of food : and yonder tin can is marked ‘ Spermaceti oil ;’ which is used for the lamp in the hall, and for the Grecian

light which stands on our table in the evening. The first is a vegetable oil, expressed from olives: the latter is an animal oil, obtained from the whale.— This slight notice, I perceive, excites your curiosity to know something more about oils.

“ I shall begin with vegetable oils, which are obtained in three several ways,—by expression, by infusion, or by distillation. Expressed oils are obtained from the seed, fruit, and some barks or rinds of plants and fruits. The article, after being coarsely pounded, is put into a press, where, being violently squeezed, it gives out its oil. Thus olives, almonds, linseed, mustard seed, rape seed, and nuts of various kinds, yield their oils very copiously; and the zest or oil of the peels of oranges, lemons, citrons, &c. may be obtained in a similar manner.

“ Oils procured by infusion, or decoction, are such as those of roses, chamomile, lavender, hypericum, alder, &c. in which the virtues of the herb, or flower, are drawn out, either by pouring boiling water upon them, or by boiling them in water, till the oil swims upon the surface.

“ Distilled or essential oils are procured by the application of heat by means of an alembic, so that the oil is thrown off in the way of steam, and caught in a cool receiver, where it is condensed. This process is applicable to flowers, leaves, barks, roots, woods, gums, and balsams, as rosemary, mint, rue, wormwood, sage, thyme, juniper berries, cloves, nutmegs, mace, &c.

“ Some oils, for the use of the perfumer, are of a compound nature: thus, if the flowers of jessamine, honeysuckles, sweetbrier, damask roses, lilies, musk,

&c. be infused in fine nut oil, their subtile odorous matter will pass into the oil, and richly impregnate it with their flavour. These oils are more properly called *essences*.

“ But to return to the flask: oil is the most valuable produce of the olive tree. Its quality depends much on the nature of the soil where the tree grows, the kind of olive from which it is expressed, the care taken in gathering and pressing the fruit, and the separation of the part to be extracted. Unripe olives impart a nauseous bitterness to the oil; while such as are over ripe give it a flavour of unguent, or salve. Some species of olives yield fine oil; others, bearing a greater quantity of fruit, produce oil only fit for the chandler and soap-maker. The olives are gathered about November or December; and for the best oil they are immediately put into bags of wool, or hair, and pressed. But it is more common to let them lie in heaps for some time, to ferment before they are pressed, because they then yield a greater quantity of oil, though of inferior quality; hence fine oil is very scarce.

“ Olive oil is of no use in painting, because it never dries thoroughly: but linseed oil, nut oil, and some of the other kinds, are used by both painters and varnish-makers, because they harden by exposure to the air.

“ Most of the oils I have enumerated are of our own manufacture, except olive oil, which we import from Italy, France, and Spain, in such quantities as to render it of importance to the commercial world, and to the government, which derives a revenue from it.

“ We come now to speak of animal oils, which may be obtained by boiling and pressing, from all animal substances, of which they constitute the fatty parts.

“ Of these the most important, in a commercial point of view, is *whale oil*; because the procuring of it gives employment to a great number of ships, manned with hardy sailors. These go out to catch whales in the Frozen Ocean, whence they bring home the fat, or *blubber*, as it is called, of the fish they have caught; and the blubber, when boiled, yields train or lamp oil. The oil in the can there is obtained from a particular kind of whale called the *Spermaceti Whale*.

## WHALE FISHERY.

“ Whales are wonderful creatures; for in several particulars they contradict the notions we should form of fish destined to exist in the coldest regions. Though they live in the sea, they nourish their young with milk, like land animals: though fond of sporting in the creeks and openings of the polar ice, their blood is not warmer than that of some land animals, which inhabit only the hottest regions of the torrid zone. Indeed, they have been said not to be fishes, but quadrupeds, with their hinder parts lengthened out into a tail, and their front feet adapted for swimming, retaining, nevertheless, some of the uses of arms; for the female clasps her young with her fins, and carries them off on the approach of danger; and the bones of the fin differ very little from those of the human arm and hand.

“ The whale tribe comprises several species, of



which the great Greenland whale is the most valuable, on account of its size, and the great quantity of fat, or blubber, which it affords. It is also the tamest, and most easy to be caught ; yet, when irritated, it becomes a terrible enemy ; for by a single blow of its only weapon, the tail, a large whale could strike dead a dozen of the most powerful of land animals ; and instances have occurred of its beating large boats below the surface of the water, or of throwing them out of it many feet into the air. This whale has no back fin : its head forms one third of its whole bulk ; its black eyes, with white irides, are very small in proportion to the animal's size, being not larger than those of an ox ; they lie deep, and are placed above the junction of both lips. Its hearing is very acute ; although the opening of the ears, which are very small, are covered with a thin membrane, to keep out the water ; internally, however, the organ is large. On the top of the head are two holes, shaped like the letter S, or more like the sound-holes of a violin : through these the animal receives air, and also discharges such water as it has taken into the mouth with its food : the water is forced upwards in large quantities, and to a considerable height, with a roaring noise, like the sound of a hollow wind, which may be heard, it is said, at a distance of three miles. When wounded, the whale blows through these holes with greater violence, and the water it throws up is frequently mixed with blood. The throat, or gullet, of the whale is remarkably small, not exceeding an inch and a half in width ; but this is quite large enough for an animal which feeds only on sea snails, worms, or the blub-

ber that floats on the ocean in large quantities. But if the throat be small, the tongue is equally remarkable for its enormous size; being full eighteen feet in length, and, in a whale measuring fifty-six or sixty feet, ten feet broad: it is composed of a soft spongy fat, is very fibrous, weighs from six to eight hundred pounds, yet floats on the water when separated from the body, and yields from four to six barrels of oil.

“ This species has no teeth, as it does not prey upon other fishes, but catches its food by means of a kind of network formed in its mouth, and consisting of horny plates, covered on the inner surface with fine fibres of the same substance, resembling coarse horse-hair. These plates are what we call whale-bone, an article of extensive use, as well in ladies’ dresses as in several of the mechanical arts.

Some of these whales are from a hundred to a hundred and fifty feet in length: such, however, are now very rarely met with; for we do not give them time to grow to their full size: but they are frequently caught from fifty to ninety feet long. When they swim in the sea, a part of the head and back is seen, and they appear like huge logs of wood floating in the water.

“ The skin of the whale, which is not covered with scales, is an inch thick, with a layer of fat or blubber beneath, almost half a yard in thickness; and in so large a creature this affords a great quantity of oil.

“ Such is the Greenland whale, which exists only in cold climates. Other species, with teeth, are found as well in warm as in cold regions; and are sometimes larger than those I have described.

“ Whales are valuable to those who catch them ; a full-grown one being worth a thousand pounds. All the species furnish oil ; the toothless kind also furnish whalebone, while the toothed sort yield spermaceti, or *stearine*, the real nature of which was long unknown ; but it is now agreed to be the brain of the whale, some tons of which are obtained from a single fish.

“ The whales which furnish the spermaceti are found chiefly in the tropical seas, and in the southern hemisphere. They are numerous about the shores of Australia, or New Holland. The fishing for these is more adventurous, and requires a longer voyage than that for common whales. It is called the *Southern Fishery*, in contradistinction to the *Greenland Fishery*, which is carried on near Spitzbergen, to the north of Europe, and in Davis's Strait, between Greenland and North America.

“ The principal place in this country for ships in the whale fishery, and for making train oil, is Hull, a large and populous town of Yorkshire, and ranking as the fourth seaport in the kingdom. It lies very conveniently for trading to the northern parts of Europe, by the Baltic, or by the Northern Sea, to Norway and Greenland. From this port, thirty or forty sail are usually fitted out, and manned with from two to three thousand sailors ; so that almost every body in Hull, rich or poor, is interested in the trade.

“ It costs several thousand pounds to build a ship fit for those stormy seas, and strong enough to bear the shocks of the immense floats of ice which they are sure to meet with : then, it costs several



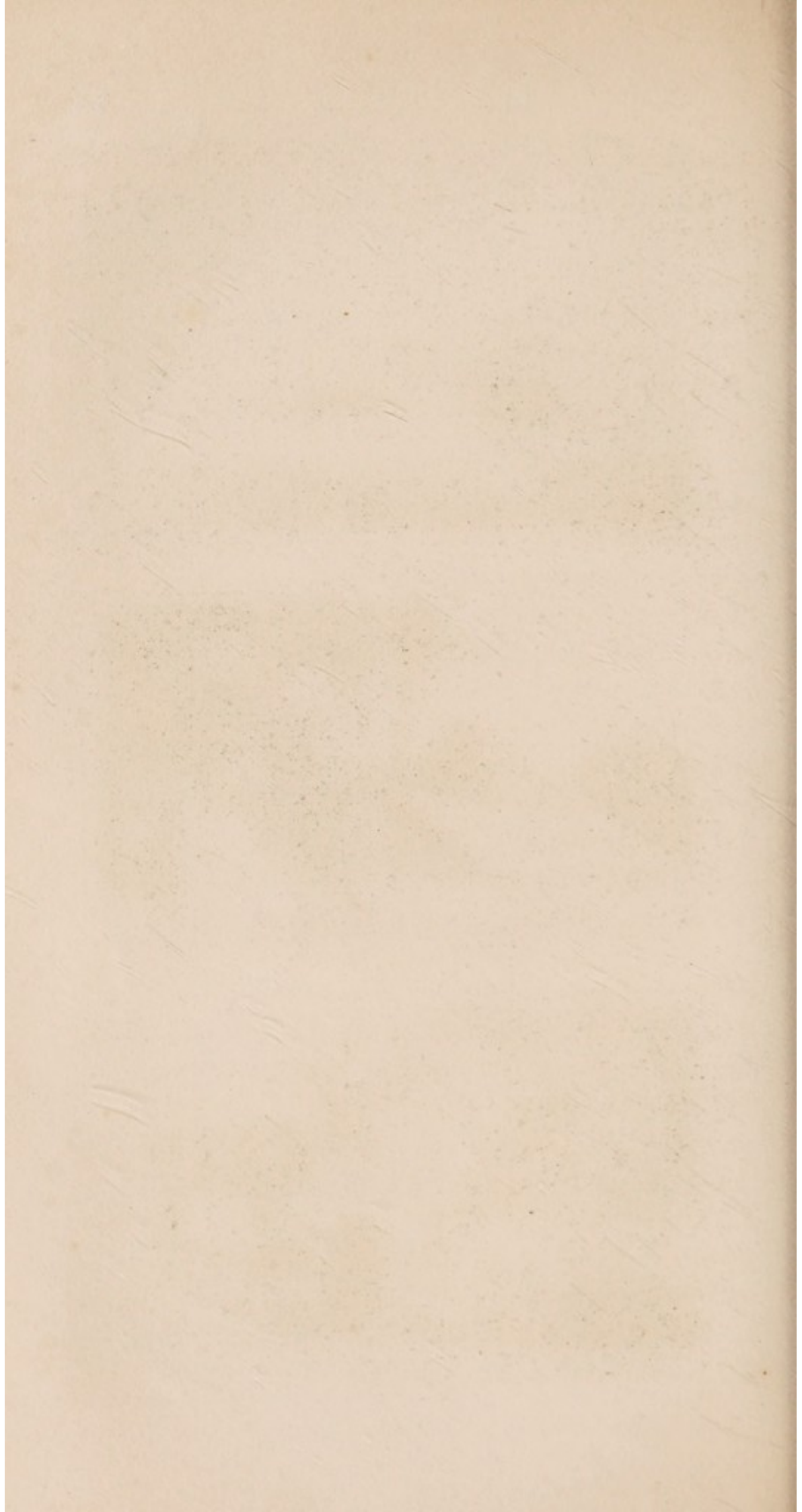
*Page 83.*



*Page 85.*



*Page 317.*



thousands more to fit out the ship with all its tackling, instruments, casks, stores, &c. proper for the voyage.

“ Every whale ship has six boats, with hands enough to put a harpooner and six men into each. On its arrival in a part of the sea where fish may be expected, two boats are put on the watch, and the others are kept in readiness for action, if required. When the crew of one of the watch boats descry a whale, they and their companions in the other watch boat immediately row after it. The harpooner who first comes near enough darts his harpoon into it with all his force; an oar is then set upright as a signal; and immediately all the other boats row up to assist in taking the prize.

“ The harpoon is a weapon made of the best iron that can be obtained. It must bear a fine edge, and yet allow of being twisted or bent in any direction without breaking. The point is barbed on each side, much like the ancient arrows or darts; and each barb is also furnished with a small return barb. A strong iron ring is fastened above the head, to which is attached a long line, so coiled up as to run out without hinderance; for should the line get entangled with the boat, as the wounded fish swims off, the boat would be instantly dragged under water. Above the ring is a socket, to receive the staff, by which the harpoon is thrown.

“ The whale, when struck with the harpoon, dives to a great depth; but the weight of the water above forces it quickly to reascend. As soon as it appears on the surface, the boats row towards the place: a second harpoon is darted into its body; and it makes

a second descent, but of shorter duration than the former. On its re-appearance, it is generally so much weakened as to be unable to make a third plunge ; or, if it do, it is only momentary ; and then the boats gather round, and the men kill it with their long lances.

“ The whale, thus killed, is towed to the ship, and fastened by ropes to the side, where the men, standing upon it in shoes furnished with spikes in the soles, cut off the fat, or blubber, in large lumps, and with hatchets remove the whalebone from the upper jaw.

“ The return of the whale ships is a season of very great anxiety to the people of Hull. The ships do not come in together as a fleet, but one at a time, during the months of August and September. The sailors set up the jawbones against the main-mast to drain ; so that when a ship can be seen in the distance with a telescope, the success she has met with can be pretty well known.

#### COD FISHERY.

“ Next to whale catching, the taking and curing of cod is prominent in our British fisheries, and may as well be mentioned now, as I see in that corner a jar of dried cod's sounds, from the Newfoundland fishing bank, which supplies us with a vast quantity of food, in the form of salt fish.

“ The great Newfoundland bank, situate on the east side of the island so called, is about sixty miles from the land at its nearest point ; stretches three hundred miles from north to south, and is about seventy or eighty miles in breadth. A second

bank, westward of the former, is about two hundred and forty miles long, and one hundred and twenty miles broad. Besides these, there are several smaller banks, all abounding in fish ; as, indeed, do all the little bays on the neighbouring coast.

“ Six or seven hundred vessels, varying in size from one hundred to one hundred and fifty tons’ burden, may be seen at a time engaged in this work. As they usually succeed in taking thirty or forty thousand fish each ; the whole number almost exceeds calculation.

“ As the fish are caught, the master, after cutting off the heads, opens the bodies and salts them. They are then stowed in the hold, to drain ; after which they are stripped, salted, and drained again.

“ When several vessels arrive together on the fishing station, the one which first touches ground becomes a kind of commodore, or admiral, to the rest, and has first choice of station and of the wood to be cut on the island. The crews of the several vessels raise tents on the shore, with large scaffoldings of fir-trees covered with their respective sails ; for the vessels are unrigged during the operations of fishing.

“ Such of the cod as are to be dried are daily brought on shore to the tents, where they are salted, laid out on stages, and turned several times a day, till the sun and air have dried them. They are then laid in heaps and salted again, till properly prepared ; after which they are packed in barrels, and are ready for use.

“ The principal markets for salted and dried cod are the West Indies ; and, in Europe, Spain, Portugal, and Italy ; the Roman Catholic countries,



where, during the season of Lent, the people eat only fish.

“ Besides the flesh, four important articles are obtained from cod fish : as the *sounds*, or air bladders, which are salted at the same time with the fish, but packed in barrels separately ; the *tongues*, which are similarly treated ; both these, you are aware, are niceties for the table. Then the *roes* are also salted and barrelled by themselves, chiefly for use as baits in the pilchard fishery. Lastly, the *oil*, which is used in leather-dressing.

#### CANDLES.

“ So! this basket of candles comes in opportunely, before we quit the store-room. They are made of tallow, with a cotton wick, or burner. Tallow, you are aware, is the solid fat of animals, as oil is the liquid fat ; the latter is mostly obtained from fish, the former from land animals. We have most of our tallow from Russia, where the fat is melted, and poured into casks for exportation. The cotton wick is a vegetable product of the West Indies, America, and some parts of the Old World.

“ The process of candle-making is nearly as follows :—The wick, made of loosely spun cotton, is composed of several threads, cut to a proper length, and hung on a smooth stick, called a *broach*, about a yard in length. The candle-maker can hold three broaches at a time with his hands applied at each end, while with his fingers he keeps them at a distance sufficient to prevent them from touching each other. Sometimes, he has a frame which will support six, eight, or more broaches. The wicks, thus arranged,

are gently lowered, or dipped, into a vat, or vessel, filled with melted tallow, which adheres to the wicks as they are withdrawn. The process is repeated several times, till the candles are of a proper size and weight.

“ These are called *store candles*: *mould candles* are made in moulds, as their name implies. A number of pewter moulds, of the size of the intended candles, are fixed in a wooden frame, the top of which forms a shallow trough. The bottom of each mould has a taper neck, with a hole in the centre, just sufficient to admit the wick to pass through it from the top, where it is confined by a wire so as to keep it exactly in the middle of the mould. Very fine melted tallow is then poured into the trough at the top, from which it runs into the moulds, and forms candles.

“ *Watch lights* or, *night candles*, are dipped, like store candles, but a rush is substituted for the cotton wick. The rush is partially peeled for this purpose, and as the tallow rises slowly through it, the candle will last many hours, and rarely needs snuffing.

“ Candles are also made of spermaceti and of wax. Both of these have cotton wicks, and are cast in moulds.

“ In burning, a candle, of whatever materials it is made, becomes a kind of lamp. The flame of the wick melts the tallow about it, leaving a small ridge round the outer edge, so as to form a little cup, in which the melted tallow rests to supply the wick, like oil.

## SOAP.

“ This article is so closely connected with tallow and oil, that even if we did not find a drawer for it

here, we should be unavoidably called upon to notice it.

“ By a mixture of tallow, or oil, with a vegetable salt, consisting of the ashes of certain plants, which, when burned, receive the name of *alkali*,—or, in the absence of that, with quick lime,—that hard substance, called soap, is obtained; which, hard as it is when kept dry, will nevertheless dissolve in water.

“ We have various sorts of soap, which are stronger or milder, in proportion to the quantity of alkali contained in them. The most common soap, used in washing clothes, is made of whale oil and an alkali called *barilla*, which is imported from Russia. Next to this is a soap composed of tallow and *barilla*; of different degrees of sharpness. Soft soap, the strongest that is made, consists of oil and alkali; or of train oil and quick lime. White soap is composed of olive oil and soda; and the best soap is made of olive oil, mixed with Alicant saltwort and quick lime.”

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## THE DINNER.

An invitation to dine at a friend's, upon some festive occasion, where the dinner was served up in a style superior to the every-day meal at home, furnished our young inquirers with fresh queries for their indulgent parent to solve. They had been previously admonished not to ask questions during the time of dinner, but rather to lay up in their minds and to ruminate upon whatever might present itself

of a novel description ; to be the subject of inquiry, or of conversation, at the next family meeting.

From the lecture in *THE PANTRY* (p. 43) the young folks were possessed of a tolerable knowledge of what related to butcher's meat and poultry ; nor were they without a superficial acquaintance with fish ; perhaps, they knew as much about it as most people know ; that it is bred in the waters, caught by persons called fishermen, sold in the market, served as a first course at table, and forming a very delicate portion of the repast. On this occasion, however, the fish seemed to have peculiar attractions, precisely because they knew least about it ; and, after a short conference among themselves, they determined to make it the next subject of inquiry.

## FISH FOR THE TABLE.

At the next meeting for instruction, Emma, on behalf of herself, her sister, and two brothers, addressed her father in terms to the following effect : “ As our first course, yesterday, was fish, and we find ourselves deficient in the knowledge of certain matters connected with it, we shall feel obliged, dear papa, if you will inform us of the mode of obtaining fish, the places whence they are brought, and such other particulars as you may be pleased to relate.”

“ Ay ! do, father,” exclaimed Richard ; “ let us know something about that fine turbot which we partook of. Where did it come from ? ” — “ It was a famous large one,” said James. — “ And so nice ! ” added the little Louisa.

“ Well then,” said Mr. Paterson, “ we will begin with the turbot ; and afterwards we may extend our

observations to such of the finny tribe as are most common in our markets, or most in esteem for their flavour, as salmon, cod, soles ; to which we may add lobsters, crabs, oysters, anchovies, and some others, that are used for sauces and relishes.

“ The **TURBOT** is a flat fish, inhabiting the bottom of the sea ; not indeed in the deepest parts, but usually on some bank, that is always covered with water. In the North Sea, on the coasts of Holland and of Britain, are many spots, known to fishermen, which might not inaptly be called towns or villages of the turbot, for there it abounds, as all along the Dogger Bank, and in other places. For turbot fishing, three men go in a boat called a *coble* ; each man has three lines ; and each line is furnished with nearly three hundred hooks, attached to it with horse-hairs. These hooks, in number about two thousand five hundred, are baited ; and the nine lines, joined together, extend nearly three miles. To keep the lines steady, every line has an anchor at each end ; and a buoy is fixed to each anchor, to denote where it lies, so that the fishermen may get it up again. The lines are always laid across the stream, and so remain about six hours, that is till the turn of the tide. During this interval, two of the men sleep, wrapped up in the sail, while the third man keeps watch.

“ When the lines are taken up, fish are found upon many of the hooks ; not, indeed, all turbot, but ling, cod, and others. Sometimes it happens, that in lieu of fish, only bones, or the skeletons of fish, are found : for a glutton, called the *hag*, a species of worm or small eel, about eight inches long,



page 91.

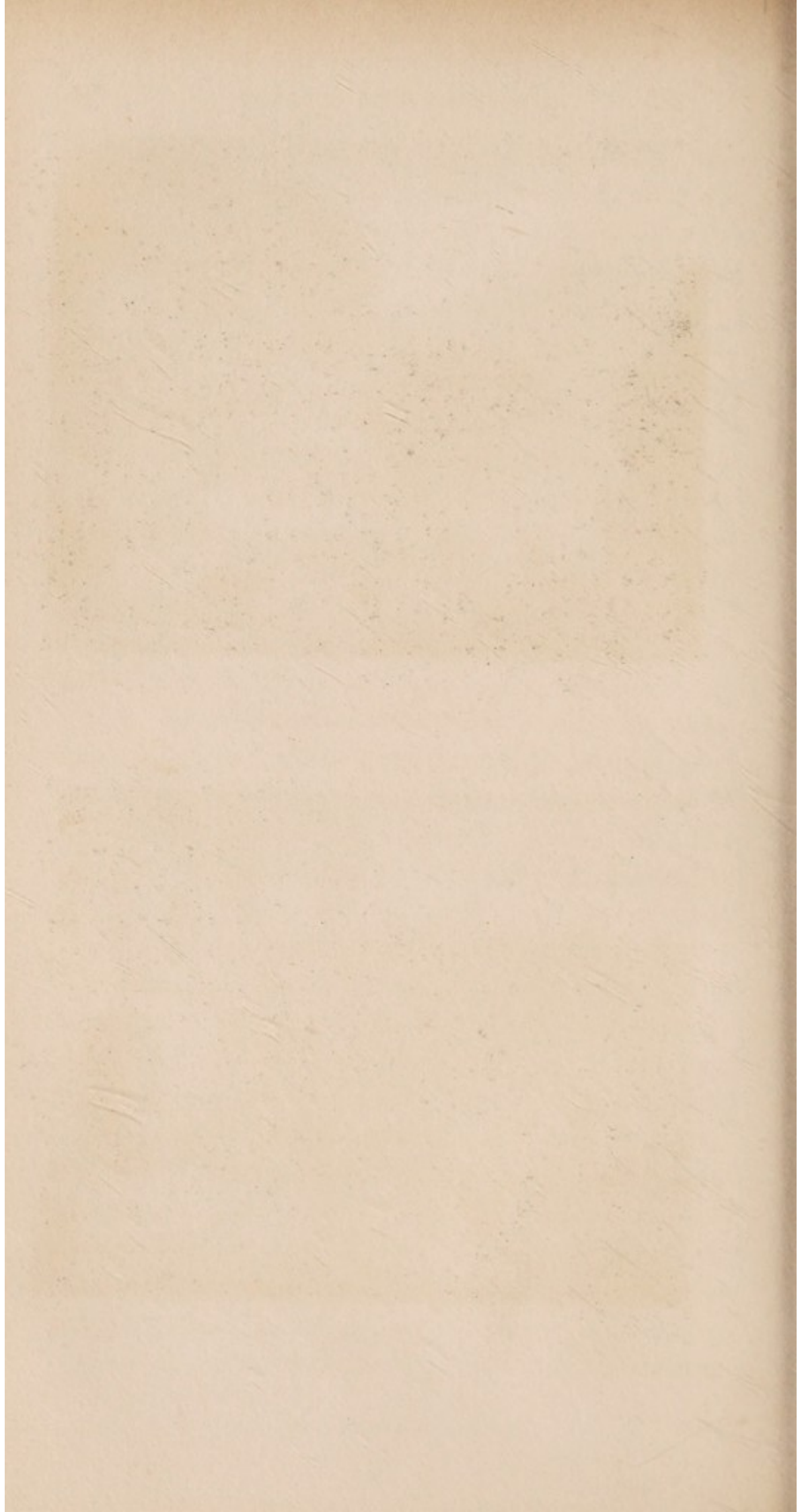
*Salmon Leap.*



page 40.

*Smithfield.*

*Pub<sup>d</sup> June 1. 1839 by John Harris, St Pauls Church Yard.*



has entered the mouths of the fish while on the hooks, and devoured all but the bones and skin.

“ The baits used in turbot fishing are pieces of fresh herring ; but if the herring have been out of water for a few hours, the turbot is too dainty to bite at it. Haddock, lampreys, and some other fish, are also good baits.

“ The Dutch are very expert at catching turbot, which they carry to London, as their best market, where the price varies with the supply.”

“ To our turbot we had lobster sauce,” said Richard ;—“ where are lobsters principally caught ?”

“ The best LOBSTERS come from Norway ; but many are found of inferior quality, on the eastern and southern coasts of Britain. When alive, their shells are black ; when boiled, they become red.

“ You will probably like to know something about that fine salmon which you saw yesterday at the fishmonger’s, and which some of you wished for in preference to the turbot. SALMON, though a salt-water fish, swims up our rivers to spawn, and is there caught by the fishermen. In Europe, salmon mostly frequent the northern rivers, and in summer are very numerous. They are frequently caught in what are called *wears*, or gratings, built across the stream, up which they ascend. Sometimes they are taken with a spear, which is darted into them, when swimming near the surface. The latter is easily done at night, if a light be placed on the edge of the river, as the fish always make towards it, and give the sportsmen good opportunity for a strike with the spear, or for the sudden jerk of a net previously spread beneath.

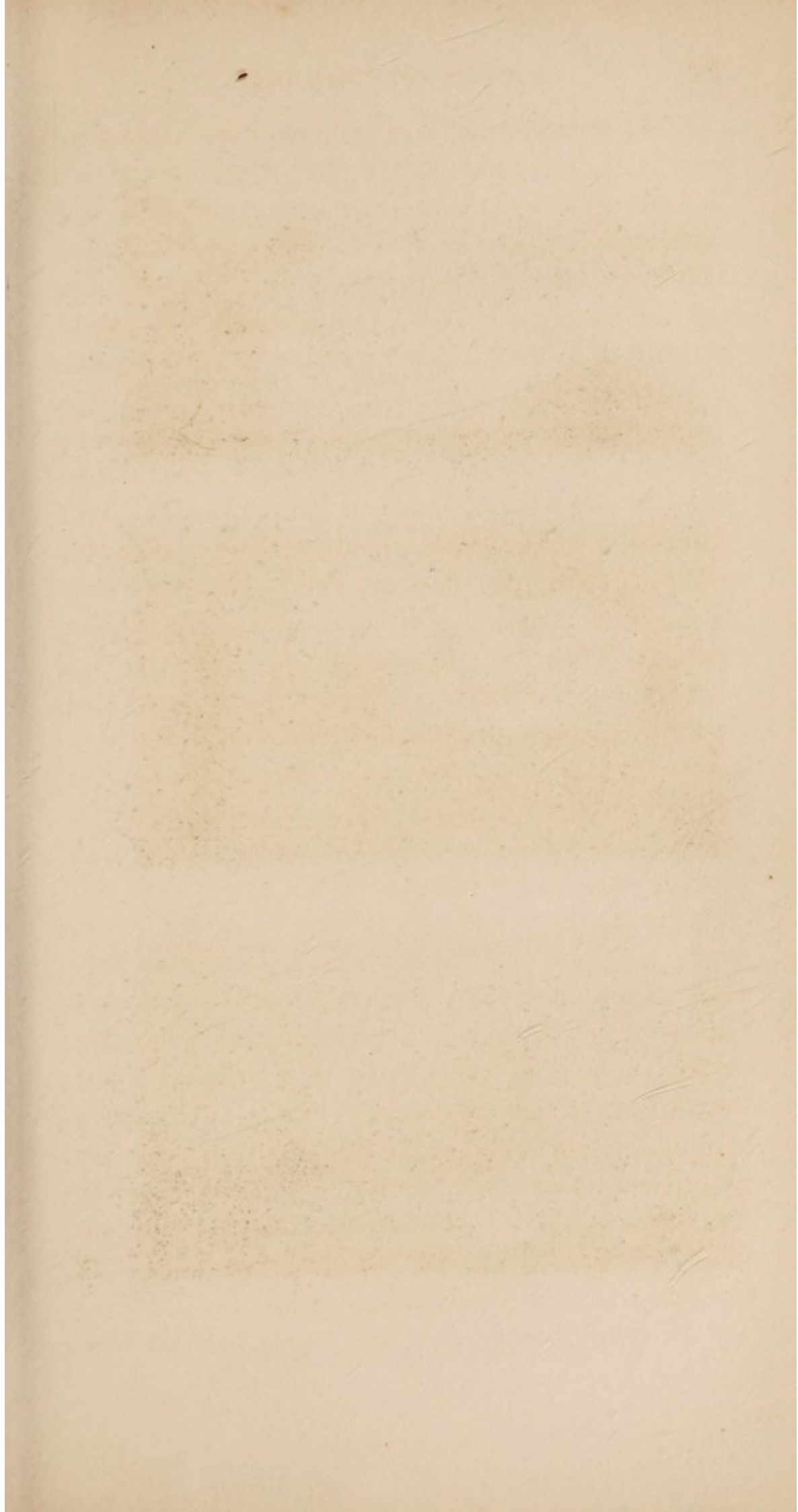


“ As shrimp sauce is a very common accompaniment to salmon, the little animal which furnishes it deserves some attention. SHRIMPS are small crustaceous insects, partaking of the natures of both fish and worm, and inhabiting banks and shallows near the mouths of rivers during warm weather, but retiring into deeper water as the season becomes colder. For as water retains the heat or cold imparted to it longer than air, it remains warm in its deeper parts long after the approach of winter has cooled its surface ; thither the shrimps retire when the shoal water begins to be chilled, and there they remain till returning spring has given a superior degree of heat to the surface, when they reappear in the shallow water.

“ Shrimps are often caught in the summer time by *trolling* ; so called from the *troll*, or square net, which the fisherman pushes before him, close to the ground, as he walks in the water up to, or above, his knees. They are also taken in deeper water with a net, formed like a round basket.

“ Shrimps are variously named, from the places where they are caught ; thus, in London, we have Lynn shrimps, Boston shrimps, Chatham shrimps, Gravesend shrimps, &c. But the most important distinction is into *red shrimps*, *white shrimps*, and *buntings*, or *grey shrimps*, of which the last are most esteemed for their flavour. The red and white are formed very much like prawns, which also belong to the family ; but the bunting has not the saw-like snout, which the others are furnished with, and it has two joints more in the tail.

“ In the spring of the year, myriads of shrimps





*Page 92.*



*Page 94.*



*Page 98.*

appear on the sands at the mouth of the Thames ; during their stay there, they become a prey to the swallows, who, about the same time, make their appearance in this country. After two or three days, they move forward in two distinct bodies : the red sort go up the Medway, while the grey proceed up the Thames. And it is a singular fact, that the grey shrimp, or bunting, is never found in the Medway, nor the red shrimp in the Thames. The white shrimp, which is formed in most respects like the red, associates with both sorts, and is called in London the *Chatham* shrimp.

“ While salmon is in season, COD is not in request ; but in the winter time, it is in great estimation, and is, indeed, much more wholesome food. It consists of many varieties ; but the sorts best known in the markets are the white cod and the red. The former are mostly found upon banks, where the water, from local circumstances, is nearly or quite stagnant ; the red cod, which is smaller, but firmer than the white, is found in rocky places.

“ The grand cod fishery, is, as formerly noticed, on the banks of Newfoundland ; but, if we want a fine fresh fish, with flesh firm, flaky, and delicately white, we must have it nearer home. Such cod is found in great plenty in all the northern seas. It abounds among the Hebrides, or Western Islands of Scotland ; and shoals of them are also caught in the seas between Great Britain and Holland. The best for the table are such as are of middle size, and plump towards the tail.

“ Oyster sauce is an excellent addition to fresh cod, serving to give it an agreeable flavour.

“ OYSTERS are also a delicacy when eaten alone ; and the trade in them is very considerable.

“ Though oysters are procured from the sea, they are bred up with much care. In certain parts of the ocean, they breed naturally, as on several parts of our own shores, and on the coast of France : but these oysters are not so good as such as are bred in beds, or layers, prepared for the purpose, where the tide visits them twice a day. These beds are numerous about the mouth of the Thames, up the Medway, and along the shores of Essex, as far as Colchester. The fishermen, who, when engaged in this employment, are called *dredgers*, cover the places where the oysters naturally breed with sticks, stones, and weeds, altogether called *cultch*, to which the young oysters, or *spat*, as they are called in this early stage of their existence, adhere. When they have grown to a proper size, the dredgers take them off with knives, and bring them home to the artificial beds, where they grow and fatten till fit for the table, which requires two or three years. The cultch, after the largest spat have been taken off, is replaced in the original bed, having still on it many smaller oysters, to afford shelter for subsequent broods. Milton Royal, and Whitstable, in Kent, and Colchester, in Essex, are celebrated for their fine breeds of oysters ; and it is said that the Dutch sometimes load a hundred large hoys with oysters in a year, from the creeks of Kent only.

“ Pearls are occasionally found in our oysters ; but the true pearl oyster breeds in the Indian Sea : the fish of this kind is not worth eating ; but men dive to obtain them, with great labour and suffering, for the sake of their valuable pearls.

“ Another delicacy from the sea is the **SOLE**. It is a flat fish, but fleshy ; much larger than the flounder, longer in proportion to its breadth, and covered with very rough scales. This fish inhabits the northern seas and the Mediterranean, and is also found on some of the American shores. On the western coast of England, soles grow to a large size ; but they are not so fine in flavour as those which are caught about Wivenhoe, in Essex. The number caught and consumed is very great ; and as the sole usually fetches a good price, the fishery for it is very profitable.

“ The fish which I have now spoken of are such as are in most general request for the tables of the rich ; but they constitute only a small portion of the finny tribe, which, varying in size, quality, numbers, and seasons, are brought to market ; such as skate, herrings, mackerel, whittings, sprats, and some others.

“ The **SKATE** is of the ray-fish family, which comprises many species, as the thornback, the maid, the torpedo, or cramp-fish, the shagreen fish, the dog-fish, and many others. It is a flat broad fish, with a long tail, and cartilaginous or gristly bones ; in season from November till May, and in the highest perfection in the latter month.

“ **THORNBACKS** and **MAIDS** are in most respects similar to skate, but smaller. They come in season at the same time as the skate, and continue so to a later period.

“ **HERRINGS** are found in all the northern seas in great abundance, but rarely more southerly than the coast of Normandy. Their great rendezvous appears

to be within the polar circle, whence, every spring, immense shoals diverge towards the south. In April and May, they begin to appear off the Shetland Isles; but these are only forerunners of the grand shoal, which follows in June. The breadth and depth of this shoal is such as to alter the appearance of the very ocean: it is divided into distinct columns, five or six miles in length, and three or four in breadth, dividing the water before them with a kind of rippling. Sometimes they sink, for the space of ten or fifteen minutes, then rise again to the surface; and, in fine weather, reflect a variety of splendid colours, like a field of precious stones. The Shetland Isles divide the shoal into two wings, one of which passes to the eastern, the other to the western shores of Britain, filling every bay and creek with their numbers. Some pass on towards Yarmouth, the great and ancient mart for herrings; thence they make way through the British Channel, after which they disappear. Those that take towards the west, offer themselves to the Hebrides, where is the great stationary fishery; then they proceed to Ireland, and, after surrounding it on both sides, are lost in the Atlantic. The shoals are so immense, that sometimes, when the wind drives them against the shore, they are left in layers two or three feet thick for several miles along the beach.

“ The vessels employed in the herring fishery are called *busses*: these remain at anchor, and, a little before sunset, send out their boats, which continue out till daylight, casting and drawing their nets ten or a dozen times in a night; so that not less than eighty barrels of herrings are sometimes taken in one night by the boats of a single buss.

“ Herrings are very nutritious food, of fine flavour, and are used either fresh, or pickled, or dried in smoke: in the latter state, they are called *red herrings*. The Dutch have a method of pickling herrings, which gives them a very high flavour.

“ MACKEREL is a summer fish of passage, and visits our shores in shoals scarcely less extensive than those of the herrings. It is, however, much less useful, being very tender, and unfit for carriage, though it may be preserved by pickling and salting. Mackerel begin to appear on the coasts of Britain about April, and are in full season in May and June.

“ The WHITING has been called *the chicken of the sea*, from its want of flavour; but its flesh is wholesome. It is a species of the *gadus*, or cod family, and is caught freely with the line and hook. It does not grow to a large size, seldom exceeding twenty inches in length. Whitings appear in large shoals in the spring, but keep at a distance of nearly three miles from the shore.

“ SPRATS are of the herring tribe, but much smaller, and natives of European seas. They come into the Thames in the beginning of November, and leave it in March; during which season they prove a great relief to the poor of London. At Gravesend, in Kent, and at Yarmouth, in Norfolk, they are cured like red herrings, and make a very good relish for breakfast.

“ It is on the coasts of France, Spain, and Italy, that the ANCHOVY abounds. The season for fishing is in the months of May, June, and July; at which time it is found from the strait of Gibraltar, all



along the southern shores of Europe. It is there in perfection; but might be caught in great numbers on the western coasts of the British Islands.

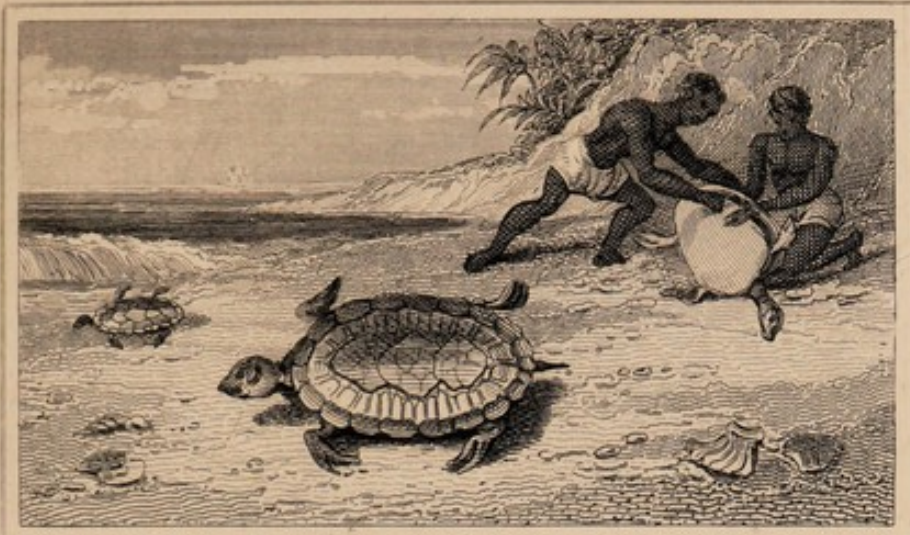
“Anchovy fishing has something in it curious and amusing. These little fish are caught chiefly by night: the custom of the fishermen being to carry a light at the stern of their boat, around which the anchovies are sure to crowd, and they are then easily caught in the nets. As soon as they are taken, the fishermen remove the heads and entrails, and salt the bodies. When sound and good, they will wholly melt in the sauce; which is not the case with pickled sprats, though they are frequently substituted for anchovies; and this test will easily detect an attempted imposition.”

The lecture on fish for the table seemed here to come to a close; but Emma reminded her Papa, that he had omitted one sort, which, as she had been told, was always in request at civic feasts.

“You mean TURTLE, I presume?” said Mr. Paterson. “Oh yes!” cried James, “let us hear something about turtles. I once saw one, at the door of a tavern, paddling in a tub of water; and I could hardly bring myself to believe it was a fish.”

“It is common, though not proper,” rejoined Mr. Paterson, “to give to every living creature in the sea, the title of *fish*. But that designation belongs exclusively to such as have back bones, cold red blood, and fins, without any shelly covering, and without feet. We shall see presently whether these characteristics belong to the turtle.

“Some inhabitants of the sea, as whales, dolphins, and seals, have warm blood, and in many respects



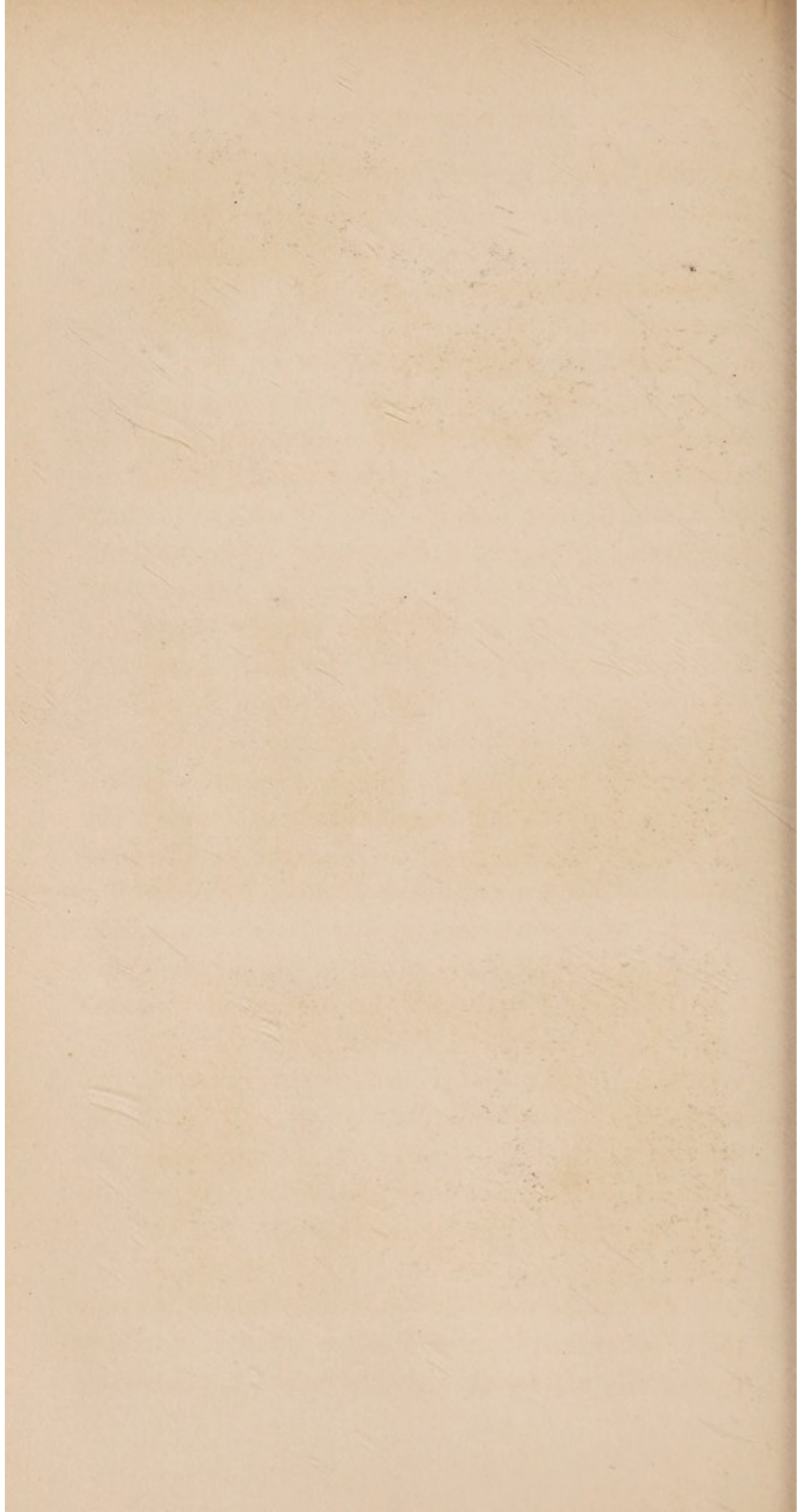
*Page 99.*



*Page 107.*



*Page 105.*



resemble land animals in their habits and manners : these, consequently, have little more than *half a claim* to the title of fish. Others, again, belong to the same class with newts, frogs, and serpents ; and therefore should be called *reptiles*, or *crawlers*. Of this class is the turtle, or great sea tortoise ; and it is the most remarkable, as well as the most celebrated of the whole. Tortoises comprise three distinct species ; as the *logger-headed turtle*, the *hawk's-bill turtle*, and the *green turtle* ; which last, in reference to Emma's observation, might be termed the epicure's delight ; and it was one of these which James saw at the tavern door. The names by which these species are distinguished, have been applied from some peculiarity of form or nature : thus, the *logger-headed turtle* has a clumsy formation of the head ; the *hawk's-bill turtle* has a fancied resemblance in its mouth to the bill of a hawk ; and the *green turtle* is so called from the colour of its fat.

“ All the species are found in rather warm seas ; yet, occasionally, a stray turtle, of the logger-headed tribe, has been found near the south-western shores of the British Islands.

“ The *logger-headed turtle* is very active and fierce, and, though destitute of teeth, bites desperately with its horny jaws. It is sometimes eaten by poor people, in countries bordering the Mediterranean ; but its flavour is not good ; and its shell, though tough, is very thin.

“ The *hawk's-bill turtle*, which is also very active, occurs in the tropical seas, in great numbers, particularly among the islands in the south-east of

Asia, and also in the Caribbean seas, in the West Indies. It is not used as food, but is hunted for its shell, which is the true tortoise-shell of commerce, and used for many purposes of ornamental mechanism.

“ The *green turtle*, as I have already hinted, is the one used at great entertainments. It abounds in the Atlantic, and in the Indian and Eastern seas, where it furnishes a considerable supply of food to the inhabitants of the coasts. In the markets of the West-India islands, the flesh of turtles is sold as regularly as is butchers' meat in England; and, being common and cheap, it is there hardly considered as a luxury. These turtles, which are of a brown colour, are sometimes very large, measuring five feet in length, and weighing five or six hundred pounds.

“ All the species lay eggs, and deposit them in holes in the sand, where they are hatched by the heat of the sun. In April, they generally go on shore, during the night, to make these deposits, and at that season they are watched by turtle-catchers, who turn them on their backs, from which position they are unable to recover themselves; and thus they are left for a convenient opportunity of carrying them away. Some of these turtles are so large as to require three men to turn them. But this mode of taking turtles can only be performed to any extent at one season of the year; another plan is therefore adopted, at which the natives of places where they abound are very expert; that is, by spearing them in the water, somewhat after the manner of harpooning whales. A sharp peg, furnished

with barbs, is stuck loosely into the end of a long pole, and tied to it with a cord of some length. With this instrument, the fishermen paddle in their canoes close by the turtle, and one of them strikes the peg into the animal, through the soft part of the shell. The peg is disengaged by the blow from the shaft, or handle, which, floating on the surface of the water, prevents the turtle from sinking; and the creature, from loss of blood, is speedily worn out and captured. The hawk's-bill turtle is generally taken in this method; his great activity preventing his being captured by turning."

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#### AFTER DINNER.

"It is an old practice to introduce wine and spirits at the conclusion of dinner, for the purpose, as is alleged, of promoting digestion; or, as I am afraid it might be better stated, of counteracting the ill effects of overloading the gastric functions. Such may be proper for downright gluttons, who eat more than nature requires, or for invalids, whose stomachs are too weak to receive even a proper quantity of food without afterwards experiencing uneasiness. But for you, my children, who enjoy good health, and are of temperate habits, such stimulants are unnecessary; indeed, in your cases they would be altogether injurious. It is nevertheless proper that you should know something of these articles; and the time when they are usually introduced may be more appropriate to the subject than any other.

## WINES.

“ Wines are of many sorts because there are many countries where vines grow ; and each has its peculiar flavour. Sometimes, the peculiarity is confined to a single hill ; sometimes, the admired quality extends over an extensive district, or over a whole country.

“ TOKAY WINE, for instance, if genuine, is the produce of a small district in Hungary ; the whole of which is, or should be, reserved for the emperor’s use. Yet Tokay wine, or something to which that name is applied, may be bought at all times in London, and in any quantity.

“ Again, there is at the Cape of Good Hope, in Southern Africa, a farm named CONSTANTIA, where an excellent wine is made, and which is highly esteemed both there and in England. But the true Constantia wine is very scarce ; although, like Tokay, it may at all times be found in the cellars of the London wine-merchants. Besides Constantia, a considerable quantity of wine is made in the British colony at the Cape of Good Hope, well known in London under the name of CAPE MADEIRA. It is made from the Madeira grape, which is cultivated in the colony ; but in other respects has no pretensions to the title of Madeira wine. The climate is unfavourable to the due ripening of the grapes ; the summer being too hot and dry, and the periodical rains too violent : the wine is, consequently, of inferior quality ; and it is rendered worse by the adulteration it undergoes, in order to render it to the public at low prices, very frequently under the denomination of *sherry*.

“ As the wine of MADEIRA stands high in re-

pute, a short account of the vineyards in that island, and the mode of cultivation, may be interesting. In every spot, where the soil is suitable, and a due exposure to the sun affords sufficient warmth, the vines are planted. Low stone walls enclose the several walks, which cross each other, from one side of the vineyard to the other. These walks have a kind of trellis-work of laths and bamboos, which almost meet at the top, and render them delightfully shady: and it is the ripening of the grapes in the shade which is said to give them their peculiar flavour. The vines are thus supported; and the keepers can easily clean the ground of weeds. Every vineyard has a plantation of bamboos adjoining, as the grapes will not prove excellent without such a screen. The external hedges, which defend the vineyards, are composed of the prickly pear, myrtles, brambles, and wild roses: so that the whole country has the appearance of a garden.

“ Besides what may be consumed at home, the islanders export sometimes forty thousand pipes of wine in a year; each worth from thirty to forty pounds sterling; one half of which is bought by the English. Some of our East-India ships take on board a great quantity in their outward voyage, and, after carrying it to India, bring it back to England. The voyage and the warmth ripen and improve the wine much. In its native state, as brought immediately from the island, Madeira wine is worth less.

“ At *Teneriffe*, one of the Canary Isles, great quantities of good wine are made, which may be obtained at less than half the price of Madeira; and to some palates it is more agreeable.”



In reply to a question, put by Emma, whether wine was made at Madeira in the same manner that currant and other wines are made in England, with the addition of sugar to the juice of the fruit, Mr. Paterson replied: "At Madeira, the grapes are gathered when ripe, and put into wooden vessels. Then, to press out the juice, the servants strip off their jackets and their shoes, and, getting into the vessels, work with their hands, feet, and elbows, to press out the juice till every grape is crushed. This done, the juice, is drawn clear off, and it presently ferments, without the addition of sugar, the grapes being so sufficiently ripe and sweet as not to require it. The sugary or saccharine substance contained in the grape, by fermenting, evolves a vinous spirit, and, after long standing, to ripen and clear it, produces the liquor which we call wine.

"The common red wine, which is generally used all over England, is called **PORT**, from the city of Oporto, in Portugal, where the greater part of it is shipped. The vines grow in the surrounding country; and the quantity annually exported is said to be eighty thousand pipes. It is a trade of considerable importance to the Portuguese; and is so much in favour in our country, that the English have agents and houses at Oporto, in order to buy up, and send home, the requisite store. Some of the merchants at Oporto have cellars capable of holding six or seven thousand pipes. This trade occasions so large a demand for casks, that a great number of the inhabitants of Oporto are coopers.

"The wine usually called **SHERRY**, comes, if genuine, from Xeres, in Spain, where forty thou-

sand pipes of it are made every year; and about a fifth part of that quantity is brought over to England. It is a wine of superior quality, but rarely to be obtained in its genuine state.

“Spain produces many other good wines. MOUNTAIN is made from the vines growing about Malaga. This is a white wine. In the same district is also made a red wine, called by the manufacturers *vino tinto*, that is, tinted or coloured wine, and by us, TINT. It is in much repute for its lusciousness. In the whole province of Malaga, are about fourteen thousand wine-presses; so that the produce must be immense: but it should be kept in mind, that wine is in Spain as beer in England; and a great deal of it is of very poor quality.

“The plains of Lombardy, in the centre of Upper Italy, are little else than one continued vineyard, where the vines grow with unusual luxuriance. Instead of being tied to stakes, and cut back so as to keep them low, they are suffered to grow with their native wildness, clambering up the tallest elms, and hanging in rich festoons from tree to tree. The sight is truly picturesque and gratifying, though the traveller's path is somewhat encumbered by the redundant foliage.

“The most extraordinary grapes, especially in respect of the size of the clusters, are those of Syria. They grow on the slopes of Mount Libanus, or Lebanon; and the bunches are sometimes so large as to be carried on a pole, between the shoulders of two persons. Of this description were the grapes which the Israelitish spies took to Moses, as a specimen of the fertility of Canaan.

“ France is a very superior wine country. In the south, the vineyard forms the farm, and the vintage constitutes the grand harvest: this is a joyous season, as well it may be, especially when the weather has been favourable to the abundance and ripening of the fruit.

“ CHAMPAGNE is a wine produced in the north-eastern part of France, in a province formerly called Champagne, but now distributed in several departments. The wine is of exquisite flavour, rich and racy: it is esteemed as a wholesome stomachic, and bears a considerable price. In our own country, an excellent imitation of Champagne wine is made, sometimes from grapes, sometimes from gooseberries; and when well managed, can scarcely be distinguished from the genuine foreign product.

“ BURGUNDY, another ancient province of France, lies to the south of Champagne, and gives its name to a fine wine, of beautiful colour and delicious flavour.

“ In the vicinity of Bordeaux, a city in the southwest of France, is made a light wine, of a pale red colour, and rather acid in its flavour, which is so volatile that the wine should never be decanted. From the place whence it is shipped, it is called *Bordeaux wine*; but the finer sort is called CLARET: the last is scarce, and very dear.

“ A journey through the wine districts of France, in the vintage season, is very joyous. In England, we have here and there a vine growing against a house, or a good wall; but we have no proper vineyards, our climate being, in general, too cold to ripen the fruit thoroughly; and too uncertain for any one to risk the expense of planting and rearing

a vineyard. But in France, especially in the eastern and southern districts, vines are seen in every direction, crowning the warmer slopes of the sunny hills, league after league. Here, neither house nor wall is wanted to assist the ripening of the grapes; the warmth of the atmosphere being of itself sufficient.

“The profession of a vine-grower is attended with great anxiety; for sometimes, indeed, I might say frequently, storms of thunder, rain, and hail, arise, and in a few minutes destroy all his hopes of a harvest for that year. The calamity is ruinous; the whole produce being cut off, nothing but poverty and suffering, through all the winter and the succeeding spring and summer, lies before him.

“When, however, the season is propitious, and the vintage sets in pleasantly, the whole country is on the alert. Old and young, of both sexes, unite their labours with the utmost jollity. The vines are stripped of their clusters, which are borne triumphantly home, in baskets, or in waggons, amid the singing, dancing, and revelling, of troops of villagers; exhibiting something like the Bacchanalian vagaries of heathen times: the girls dressed up with flowers; the lads with vine leaves; the waggons, fantastically decked with boughs, are drawn by oxen, and attended by the shouting multitude with all the music the village can afford; rendering the scene highly interesting and exhilarating.”

## SPIRITS.

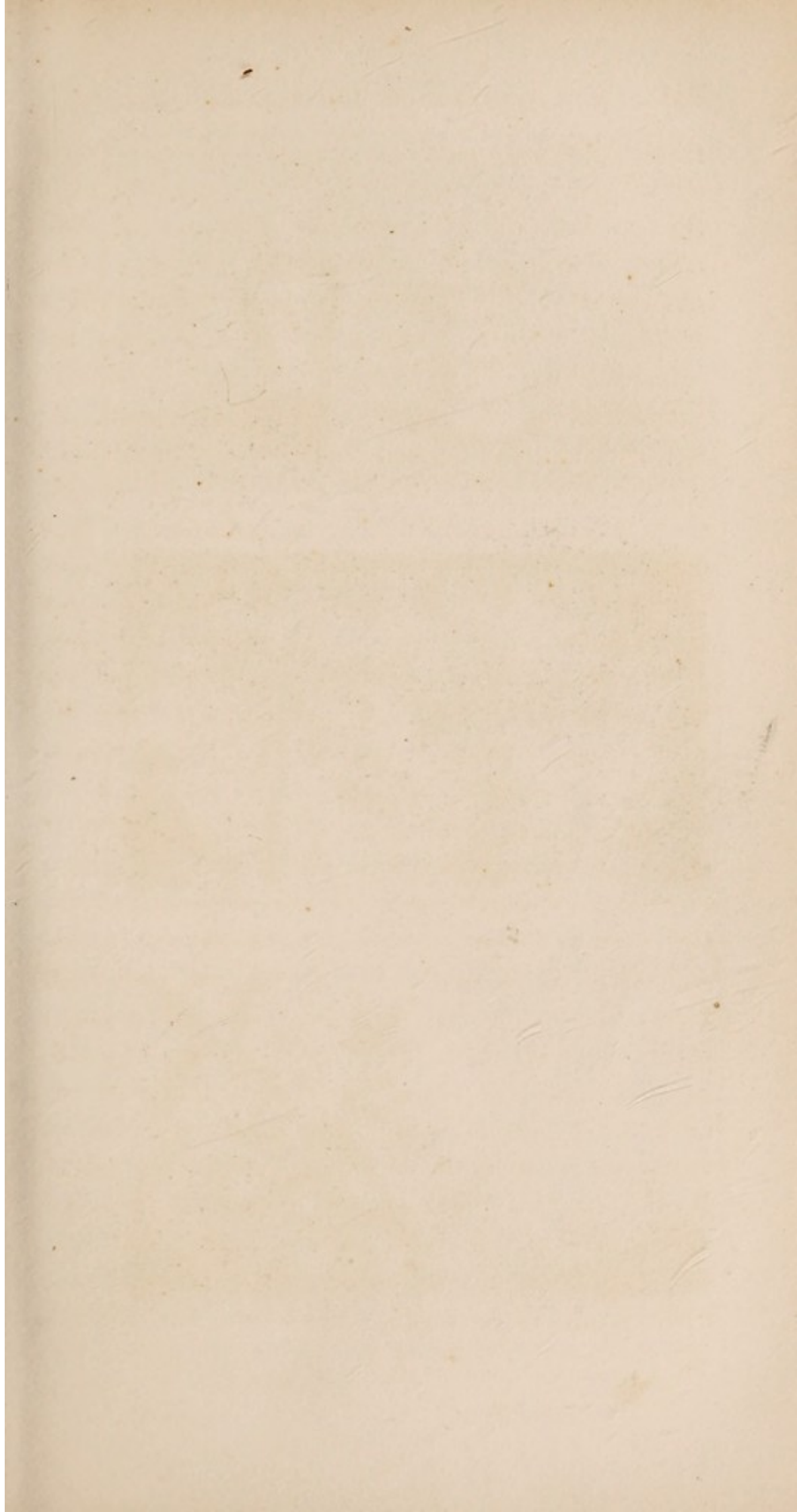
“From what has been said of the making of wine, as well as of beer, you understand that both are fer-

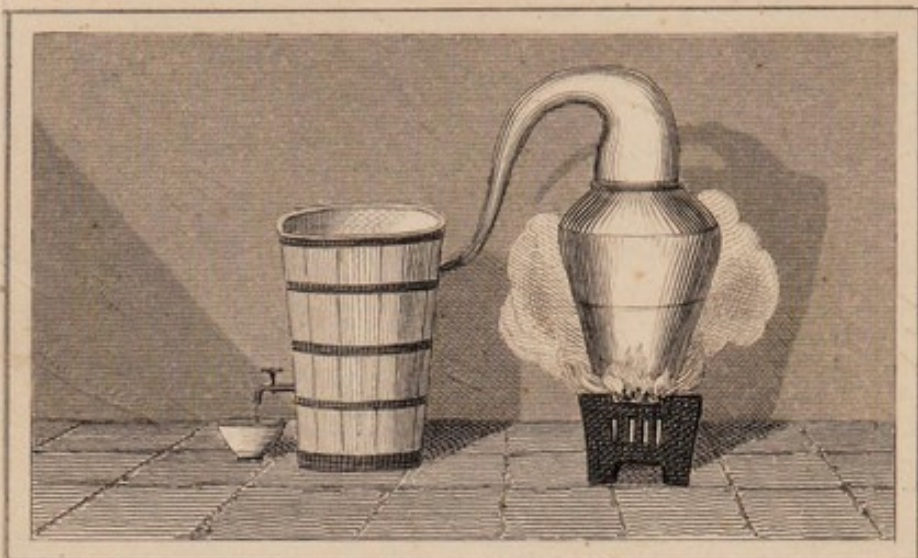
mented liquors, containing a pretty brisk spirit, mixed with a considerable portion of water. Now if wine, or beer, be subjected to the process of distillation, the spirit will be disengaged from the water, and appear in its proper character, such as we find it in brandy, rum, and such other liquids as we distinguish by the name of *ardent spirits*.

“ All kinds of wines contain more or less *spirit* ; but, as I have just remarked, they contain it mixed with a considerable quantity of water, flavoured by the peculiar properties of the grapes from which they are made. Sweet wines likewise contain a large portion of sugar, or *saccharine* matter, as a chemist might call it ; and tart wines contain vegetable salts, of which tartarite of potash is one of the most prevailing, especially in red port. It is that salt, chiefly, which forms the crust in port wine, when it has been long in bottle, or in the cask.

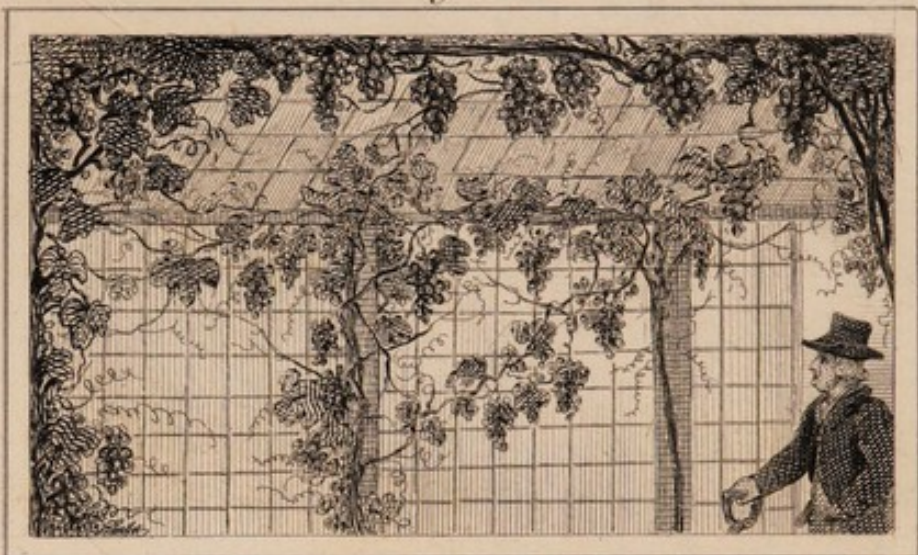
“ When the spirituous part of wine, or indeed of any liquor resembling wine, is obtained in perfect purity, it is colourless, nearly devoid of flavour, very light, hot, and even burning. In this state it is called **ALCOHOL**, or *spirit of wine*, even though made from barley or from turnips ; for in essence it is the same, whatever the substance from which it may be extracted.

“ The origin of alcohol is in fermentation ; and, by mingling itself through the whole substance of the liquor in which it is generated, it constitutes wine. From this diffusion of spirit, the wine acquires that pungency of flavour, which gratifies the palate, and that spirituous warmth, which, taken into the stomach, quickens the general circulation, and yields a cheering influence.





*Page 109.*



*Page 114.*



*Page 117.*

“ The purpose of distillation is to separate this spirit from its watery accompaniments, and thus to produce a liquor much more abounding in alcohol, or in which it is concentrated, and bears a much greater proportion to the bulk of the fluid. To effect this, the vinous liquor, which may be obtained from any saccharine substance, is put into a large boiler, of peculiar form, called *a still*, and subjected to considerable heat. The heat presently raises the spirituous part, or the alcohol, in vapour, or steam, which would be lost in the atmosphere, were not the apparatus connected with a head, or cover, so contrived as to retain and condense it. The head of the still, which is rather large and somewhat globular, has but one outlet; and there it is connected with a narrow tube, which is coiled up like a worm, in a large vessel full of cold water. The steam, as it rises from the boiling liquid, passes through this tube, and, being cooled by the water, is condensed into drops, which run out at the extremity, in a stream of spirituous liquor. This liquor is still mixed with some watery particles, which have escaped with it, as well as with a coarse nauseous oil, which must be got rid of, to make the spirit palatable: it is, therefore, subjected to a second or even a third distillation; till, at length, it becomes pure spirit, or alcohol; called in commerce *spirit of wine*.

“ As already hinted, distillation produces alcohol from all substances capable of yielding it, that is, from all that contain sugar, with little or no difference in regard to its properties. In England, the spirit is usually produced from malt. The specific flavour and colour are given by a subsequent process, called



*rectifying*, after the pure alcohol has been reduced in strength, by the addition of nearly its own quantity of water, to the degree called *proof spirit*.

“ FRENCH BRANDY is distilled from wines ; such as are beginning to get tart will do ; wines made from poor grapes are usually reserved for the purpose ; and even the grape-stalks, and other refuse of the vintage, will, by proper management, afford brandy. In the early periods of wine-making, that refuse was thrown away ; but now it is preserved and turned to good account. After the juice has been well squeezed from the stalks and husks, the whole refuse is lightly loosened, and put into vessels, with a certain proportion of water. It is then covered over with clay, to prevent any of the fermentation from escaping, and is kept in that confined state four or five weeks ; after which, it is put into the still, and yields a considerable portion of spirit.

“ The part of France, where brandy of the finest kind and best flavour is produced, is on the western border, about Nantes, in the ancient province of Britany ; and the town of Cognac, in the department of Charente, is so celebrated for it, that, in England, the name of *Cognac* is applied by venders of spirits to brandies of all kinds, as a lure to the unwary purchaser. When first made, brandy is colourless ; it is said to acquire its tint from the wood, by standing a year or two in the vessel ; but it is frequently coloured by a mixture of burned sugar. Long keeping tends, by a continued internal commotion, to ripen or soften the spirit ; and to take off much of that fiery quality which is observable in new brandy.

“ RUM, the next spirit for our consideration, is

the produce of the sugar-cane. After the juice has been forcibly pressed out, as I have explained in our lecture on Sugar, the mashed cane, with other refuse of the sugar-mill, is put into a still, and the produce is a very powerful spirit, called *rum*. This spirit is mixed with much of the oil of the sugar-cane, from which it receives its peculiar flavour; but it must be kept a long time, as new rum is very fiery, and the abundance of oil in it renders the flavour coarse. Sometimes, in distilling rum, a few pineapples are added, which impart an agreeable flavour to the spirit.

“GIN, or GENEVA, is a malt spirit, obtained partly, and sometimes altogether, from rye. It is flavoured with juniper berries, called by the French *genèvre*, whence the name of the spirit. This liquor was first made in Holland, where the only true geneva is still made. The common English gin has now nothing of juniper in it: the chemists told the distillers that oil of turpentine resembles the oil of juniper in flavour, and might be obtained at less than half the price; the distillers, believing them, tried the experiment, and the public did not detect the change; so, at present, gin is nothing more than malt spirit flavoured with turpentine.

“WHISKEY, a strong spirit, much in favour with both Scots and Irish, is distilled from barley. Whiskey of inferior description, reduced to the state of proof spirit, is also used in the manufacture of English gin.

“ARRACK, or, as it is commonly pronounced, *rack*, is an East-India liquor, procured from rice, in Batavia; and from the juice of the cocoa-tree, at Goa, and many other places, in Hindoostan.

## CORKS.

“ After so long a lecture on wines and spirits, we ought to notice, the bottles which contain, and the corks which secure them.

“ In ancient times, BOTTLES were made of leather, or skins, as they still are in Spain. With us, bottles are of glass; and we shall have an opportunity of noticing them, when the manufacture of glass generally shall come under consideration. At present, we will confine our attention to the corks.

“ CORK is the bark of a species of oak, which flourishes in Spain. It is also found in France; abounds in all the south of Europe; and on the side of Mount Etna, in Sicily, is a large wood of cork-trees.

“ The tree must be fifteen years old, before the bark is fit to be peeled; afterwards, it may be stripped at the end of every eight or ten years, according to the growth of the tree. The bark is cut lengthwise from the tree, by an incision made from top to bottom, at which places it is carried horizontally around the trunk. The tree does not die under the operation, as most other trees would, because a new bark beneath, which is continually in growth, would push off the external one, were it not thus stripped away. The sheets of bark are put under water, and made flat by heavy weights, laid upon them while soaking. When sufficiently flat, they are taken out of the water and dried for use.

“ Cork is brought to us in broad pieces, four or five feet in length, and from eighteen to twenty inches in width. In its native state, it is too soft for the uses to which we mostly apply it; and it is

subjected to a roasting, or scorching, by which the fibres are contracted, and the whole mass rendered firmer. It then passes into the hands of the cork-cutters, who, with very sharp knives, cut it into proper sizes, for bottle corks, or bungs, and round them for use. The best sort, which are tolerably free from veins and cracks, and soft and pliable, are called *velvet corks*."

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### THE DESSERT.

"Heyday! What a fine collection of fruits have we here! Surely we shall find gratification for the palate, as well as improvement of the mind, in this superb dessert!

"Fruits, when of a fine sort and good quality, are more relished by both young and old than most other articles of diet. In England, they are generally served after dinner; but in many countries, where fruits are more abundant, they form a considerable part of the meals of the peasantry. They have a proverb in Spain, to the effect that 'fruit is medicine in the morning, food at noon, and poison at night;' and if this be true, the English mode of using fruit may not be the best. The fruits of Britain are not equal to those of warmer climates, unless forced by artificial heat, the doing of which makes the produce too expensive for the mass of the people, who are obliged to put up with the natural produce of the country, subject to all its imperfections.

"Of dessert fruits, GRAPES are among the best. Such as grow in the open air, in England, are of

inferior quality, for want of ripening : we therefore either import them, or raise them in green-houses and hot-houses.

“ Imported grapes are from Hamburgh, Portugal, and Spain. They are plucked from the vines just before they get ripe, packed up in large jars, or boxes, and sent over to England.

“ In hot-houses, grapes grow much larger and finer than in any out-door situation ; but they are not equal in flavour to such as are ripened by the direct heat of the sun, in their natural soil. Foreign grapes are sold in London at about half the price of English hot-house grapes : but even these have not the same flavour that they have in their own country ; being gathered before they are quite ripe, and apt, if any of the berries be broken, to get musty in the jars.

“ The transition in our discourse from grapes to RAISINS is easy, for raisins are nothing more than dried grapes. They mostly come from Spain, Greece, and Turkey, where the vine grows naturally and luxuriantly ; but, owing to the great heat of the climate in certain parts, the grapes are not well adapted to making of wines, they are therefore dried, and in that state constitute the raisins of commerce.

“ The bunches gathered and dried in the sun keep their flavour best. In many cases, they are dried in ovens ; these do not taste so well, but as the process is more rapid, the larger quantity of raisins brought over to England are thus prepared. Commerce, dealing in quantities, must often take the quickest or the cheapest mode.

“ When raisins are dried in the sun, it is common to tie together two or three neighbouring bunches of grapes, while yet on the vine, and dip them into a hot ley of wood-ashes, with a little olive oil in it. The effect of the immersion is, that it slightly shrivels and hardens the skin of the grapes ; and a few days afterwards the bunches are cut off, and hung up to dry. *Raisins of the sun*, and *jar raisins*, are both managed in this manner. Some have a fine blue bloom upon them ; and some are almost candied over with their own sweetness.

“ *Malaga raisins* come from the province so called, in the south of Spain. *Smyrnas*, as the name intimates, from the city of Smyrna, in Asia Minor. These, though not esteemed in the dessert, are excellent for making wines, and for Christmas puddings.

“ ALMONDS, the usual accompaniments of raisins at the dessert, are very pleasant. It is best to peel them before they are eaten, because the skin, not very pleasant to the palate, is injurious to the stomach. The same observation may, indeed, be made of the rinds and skins of all fruits, for they are indigestible. The best almonds for the table are the *Jordan almonds*, which come from Syria. We have, however, a great many almonds in the shell, brought from Spain, Portugal, Italy, and other parts of southern Europe. Some are also brought from Barbary, which are chiefly used in medicine.

“ *Bitter almonds*, have a very high flavour ; but as that flavour arises from the prussic acid they contain, they are by no means wholesome.

“ *Oil of almonds*, is obtained from all kinds of almonds by powerful pressure.

“ The almond, as, I dare say, you have observed, is the kernel or seed of the almond-tree. It is enclosed in a shell, varying in thickness and strength in the different kinds; and that shell is enclosed in an outward covering, somewhat analogous to the external coat of a walnut. In its green state, this covering is pulpy, and resembles a young peach; but as the kernel ripens, the pulp shrinks, and finally dries away. The almond harvest, in the island of Majorca, is a very merry season.

“ **Figs** are natives of warm climates, where they grow in gardens, or rather in groves. They are much cultivated in the Greek Archipelago, and in part serve as bread to the inhabitants. These are called *Turkey figs* at the grocers', and, while fresh, are juicy and pleasant; but towards the end of the season they become dry and hard. We have figs also from Spain, Portugal, and Italy, of various degrees of goodness, but none equal to those of Turkey. I am now speaking of them in their dried state; but we have sometimes green figs upon the dessert table, procured from France, Jersey, Guernsey, and even from the southern counties of England. In the latter, they are grown against warm walls, or in hot-houses: some persons are fond of them in this state; but I think them too luscious when ripe; and, if unripe, they are good for nothing.

“ Like grapes, figs are sometimes dried in the sun, sometimes by fire. The former are what the grocers term *pulled figs*; both are covered with the candy of their own sweetness, and are full of a delicious seedy pulp.

“ PRUNES, another dried fruit, were originally plums, and are dried in ovens.

“ Some of the finer sort, neatly put up in small baskets, or boxes, are called *French plums*. We receive them chiefly from Bordeaux.

“ The ORANGE, one of the most delicious of fruits, is produced in great abundance, and can be carried farther than almost any other. The number annually imported into Britain alone, amounts to almost two hundred millions. Oranges are of two kinds, the sweet and the bitter; of the former, generally denominated *China oranges*, are several varieties; the latter are called *Seville oranges*. It is said by some, that the sweet oranges came originally from China, whence their name; this is strenuously denied by others; but we will not lose our time in inquiring which opinion is the right one. It is certain, however, that all the species of the orange tribe were originally from the East; but they are now cultivated in all warm countries. The bitter oranges are said to have been introduced into Spain by the Moors; they still abound in that country, and obtain their name from the city of Seville, the capital of the ancient Moorish kingdom.

“ From the countries along the northern shore of the Mediterranean, from the islands in the same sea, from Spain, from Portugal, from the Azores, especially the island of St. Michael, and from the south of France, we now receive that abundant supply of oranges, which furnishes our own markets. Those from St. Michael's are finest in flavour: and the Maltese, which are very large and red in the pulp, are next in order. The latter are artificially por-



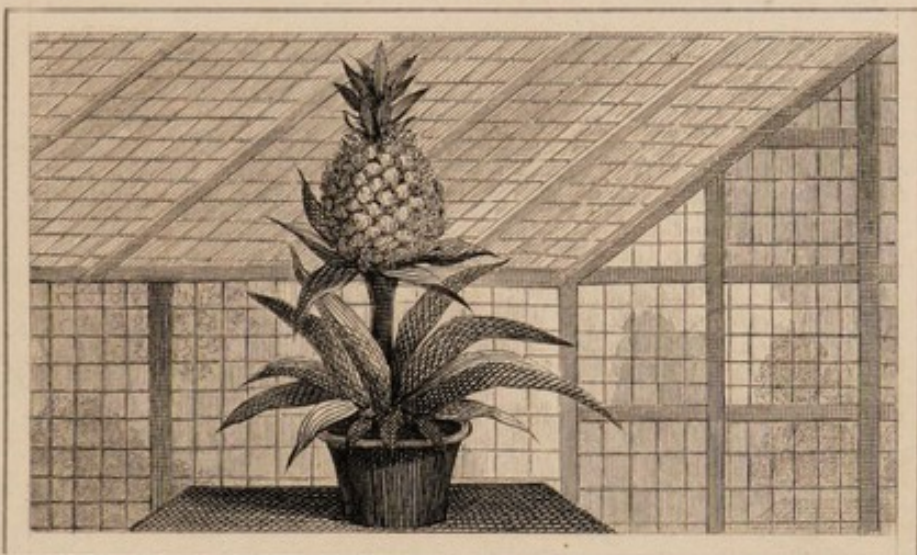
duced by grafting, or budding, a St. Michael's orange on a pomegranate stock.

“ The *forbidden fruit*, the *shaddock*, the *citron*, the *lemon*, and the *lime*, belong to the same genus of plants as the orange. The FORBIDDEN FRUIT is a native of China, and considerably larger than the orange; and, when ripe, far superior to the very best in flavour. The SHADDOCK, which derives its name from Captain Shaddock, who first carried it from China to the West Indies, is somewhat smaller than the forbidden fruit, but still larger than the orange, and has a flavour partaking of both orange and lemon. But, through the negligence of the planters, its culture is little attended to; and it is so difficult to obtain it in a ripe state, that few persons care for it. The CITRON and LEMON have each several varieties, among which are the sour-fruited and the sweet-fruited. Citrons mostly come from Genoa; very fine citrons are also met with in Tuscany, particularly in the fertile plains about Pisa and Leghorn. In no other places do they grow to equal perfection. The citron, as a fruit, is rarely used in this country, but its peel is candied, and forms a delicious sweetmeat for plum cakes, Christmas puddings, and mince pies. The rinds of oranges and lemons are also candied for similar purposes, and all three are excellent stomachics, capable of promoting digestion. The LIME is a small species of lemon, but more acid; and used for the same general purposes with that fruit.

“ That fine-looking MELON, which weighs between two and three pounds, is the fruit of a slender trailing plant, very much like a cucumber vine; in-



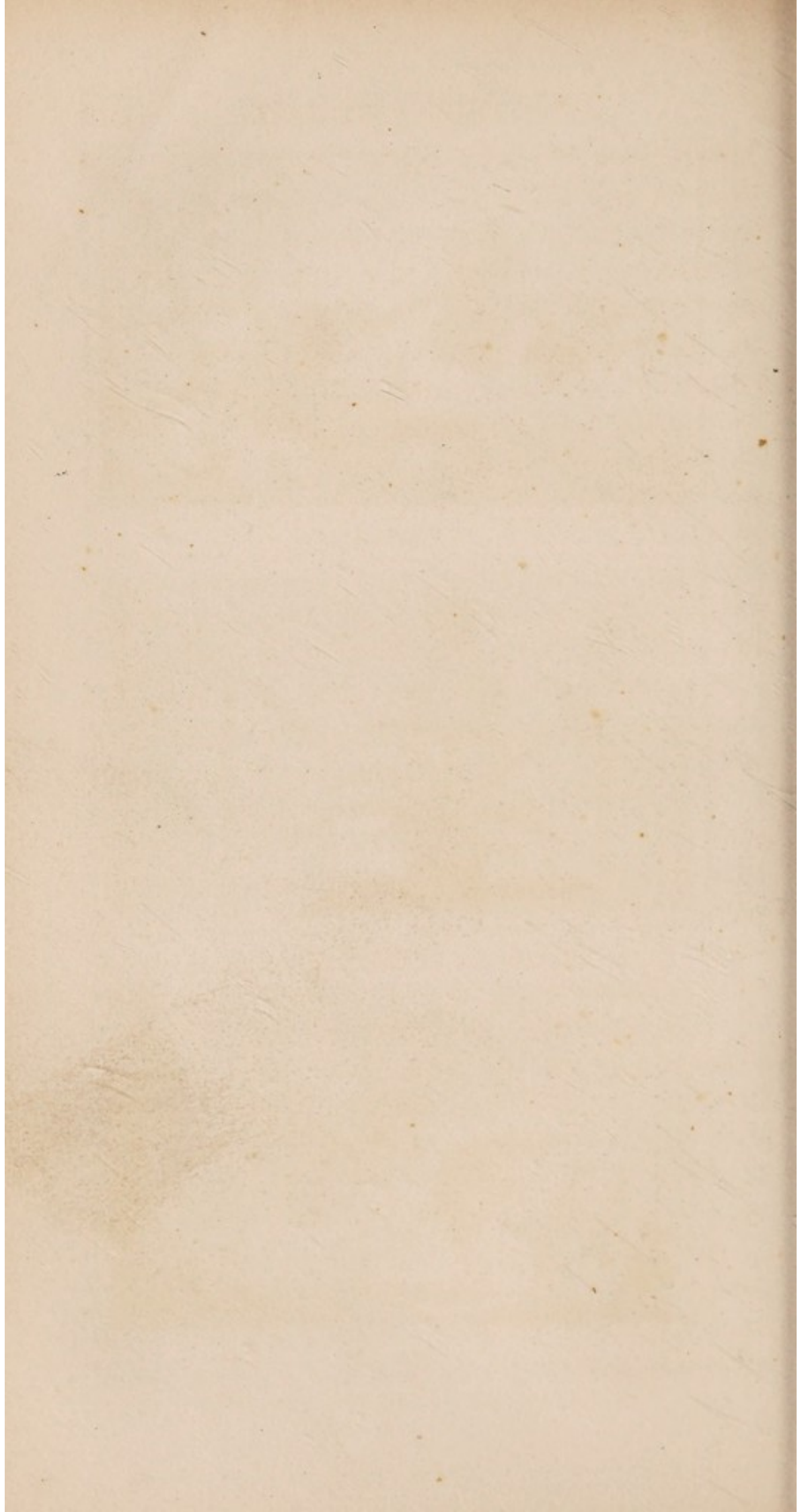
*Page 118.*



*Page 179.*



*Page 370.*



deed it is of the same family. The smell is very fragrant, and the flavour rich and tempting. But beware how you eat of it, lest its coldness bring on a fit of colic, or, perhaps, of cholera. In hot climates,—the native beds of this fruit,—the melon is refreshing and wholesome; but, in this country, where the summer's heat, assisted by art, is scarcely sufficient to ripen it, few constitutions can bear the chill it occasions. The melon is an annual plant, growing in the open air in warm climates, but, with us it requires a hot-bed, made of some fermentable substance, as tan, &c. The plants appear to have come originally from Persia, or Armenia; and the Egyptian gourd, call the *Queen of Cucumbers*, is of the same genus. Great varieties of this fruit are cultivated in different parts of the world, many of which are only valued for their size. Those most in favour in England are some of the Persian kinds, with very thin rinds. The *Cantaleupe melon*, so called from a place near Rome, where it has been long cultivated, and whither it was originally brought from Armenia, is in the greatest esteem among the curious in vegetable dainties.

“ The PINEAPPLE is a beautiful and delicious fruit, of comparatively recent introduction to our hot-houses, and thence to our desserts. In Mexico, and in the warm parts of Africa, it grows wild, and has been transplanted into the hottest parts of the West-India islands with advantage. In England, by careful management, it is brought to perfection in hot-houses. The plant itself is very handsome; rising from a tuft of long green leaves, with a stout stalk; the fruit is rich in its workmanship of knobs

and hollows, of a yellow colour, with a coronet of green leaves on the top. The cultivation of pine-apples is expensive, as they must be kept in a heat equal to that of their native climes; yet so skilfully is this managed, that they are said to be more finely flavoured in England, than even in the West Indies.

“ In that glass dish, swimming in liquid, are some OLIVES, of which you may partake, if you please, as they have the reputation of assisting digestion.— Well! Do not make wry faces; they are preserved in salt water; and after the powerful zest of that has gone off, you will find a fine flavour in the olives. Italy is the reputed native place of this fruit, and a large sort grows in Spain; but the olives of Provence, in the south of France, have the best flavour. When taken from the tree, they have an acrid and bitter taste, which is lost when they are pickled in a brine of aromatised sea salt, as you here find them. Although olives are consumed as fruit, in considerable quantities, their most valued quality is the oil they furnish. This oil is much used in the countries where olive-trees grow; and a great deal of it is imported into Great Britain, chiefly from Italy.”

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### THE DRAWING-ROOM.

“ After this long dissertation upon the delicacies of the table, the wine, the spirits, and the various fruits of the dessert, we will retire into the withdrawing-room, or, as it is more usually termed, the *draw-*

*ing-room*, to afford the servants opportunity to clear away the bottles, glasses, dishes, plates, and all the mementos of a good dinner and lengthened dessert. And while we enjoy a comfortable cup of tea, we will endeavour to extract amusement and instruction from the room and its furniture.

“ In houses where young people are to be found, the drawing-room may be made a cabinet of very general and useful, as well as very agreeable, information. The usual furniture of the plainest English drawing-room comes from many parts of the world, even when the whole is of home manufacture. Thus, the carpet may be of wool from Spain, or from Saxony; the tables and chairs of rosewood from Brazil, or of mahogany from the West Indies.

## MAHOGANY.

“ The first mahogany came from the island of Trinidad, and from Jamaica; it was remarkably hard and dark-coloured, but not so showy as that which has since been introduced.

“ The first notice we meet with of mahogany, is, that it was used by Sir Walter Raleigh, in the repair of some of his ships, at Trinidad, 1597. Its finely variegated tints were admired at the time; but it was thought no more of till about the beginning of the last century, when Dr. Gibbons, an eminent physician of London, received a few planks, as a present from his brother, who was a West-India captain. The Doctor was at that time building a house at Kensington, and handed over the planks to the joiner, to make doors; but the workmen rejected them, as being so hard as to spoil their tools. The Doctor then sent

them to his cabinet-maker, who, with some difficulty, and more murmuring, contrived to make a candle-box, or, as some accounts have it, a coal-box, out of them. But when the box was finished and polished, it so far outshone all the Doctor's other furniture, as to become an object of curiosity and general admiration. From that time, mahogany has been a prominent article for the best furniture, and a regular article of commerce.

“ The mahogany of Jamaica is now nearly exhausted, except such as grows among the mountains, in situations where it can be got at only with difficulty. It is, therefore, chiefly obtained from the Spanish island of Cuba, and from the countries on the shores of the Caribbean sea, about Honduras and Campeachy. It is likewise abundant in Hayti; but, since the blacks obtained the dominion in that island, the trade in mahogany is very much diminished. In the Bahamas, also, it was formerly abundant, growing on the rocks to a great height and bulk. The Spaniards, when first acquainted with this wood, used it for ship-building, for which it is admirably adapted, on account of its durability, as well as for its capability of resisting gun-shots, and burying the shots without splintering. But it is too costly for general use in this way.

“ The best mahogany is that of Jamaica, of which, as I have said, very little now reaches Europe; that which comes from Cuba and Hayti is next in quality, and known in the market by the name of *Spanish mahogany*. It is much harder and stronger than the *Honduras*, and takes a much finer polish by the ordinary methods. It can also be carved more neatly;

and hence the solid parts of good furniture are best made of this Spanish mahogany ; but the more usual practice is to cut it into thin leaves, called *veneers*, and glue them down upon a body of the Honduras sort, or upon oak, or even upon deal ; by which means a log of finely veined mahogany is made to go as far as ten or twenty times the quantity if used solid.

“ The mahogany is a graceful tree, growing straight to a great height, frequently as much as sixty feet from the ground, throwing out many branches, which form a beautiful head. The diameter of the trunk is usually about four feet : its whole appearance is noble and handsome ; and so far corresponds with the pine tribe, that it produces the best timber upon the coldest soils, and in the most exposed situations. Such as grows upon moist soils and warm lands, is soft, coarse, spongy, and full of sap-wood, into which some worms will eat. Of the latter kind is most of the Honduras mahogany, which, got from the most convenient situations, without regard to quality, is frequently straight in the grain, and so coarse as to be fit only for a ground on which to lay veneers of the finer sorts. Yet, some Honduras mahogany, brought from more favourable situations, is of good quality, and remarkable for the beautiful varieties of its colours, as well as for the clouded, curled, and spotted figures formed at the junction of the branches with the main stem ; and of these the choicest veneers are made.

“ The leaves of this beautiful tree bear some resemblance to those of the laurel ; the leaflets, arranged in pairs, opposite to each other, are about two



and a half inches in length ; and the whole leaf, comprising generally four pairs of leaflets, sometimes three, and rarely five pairs, is about eight inches long. The flowers, small and whitish, are in erect bunches, somewhat like those of the horse-chestnut. These are succeeded by large cones, each of which, splitting into five parts, discloses the seeds, which being winged, are dispersed on the surface of the ground, and, if not disturbed, in due time germinate and produce new trees. Sometimes, these seeds fall into the chinks of a rock, where they strike root ; then creeping out to the surface, they seek another chink, into which they also creep, and there swell to such a size, and with such strength, that at length the rock splits, and is forced to admit of the root penetrating deeper. With the trivial nutriment afforded by such a soil, the plant rapidly increases, and in a few years becomes a stupendous tree.

#### ROSEWOOD.

“ Next to mahogany, the wood most used by cabinet and chair-makers, is *rosewood*. You have a specimen in yonder card-table. A purple red forms the ground, which is streaked with a deep chocolate colour, almost approaching to black ; and the more distinct the dark parts are from the ground, the more valuable is the wood. The name is derived from its smell, when first cut open : and though long known to the cabinet-makers of France and Great Britain, we have no knowledge of the species of the tree. Indeed the same remark may be made of almost all the fancy woods used in cabinet-work, which are the produce of South America and Australasia. Rosewood is said to have been first introduced from Cy-

prus; but the great supply is now derived from Brazil. *Kingwood*, an ornamental wood, something like rosewood, but of less dimensions, comes from the same country. Both are usually cut into veneers for large articles, as tables; but used solid for legs of chairs, cabinets, &c.”

## GLASS.

“I have often wondered, papa,” said Louisa, “how it should be, that so many things which go by the name of *glass*, should be so very different in their appearance. Wine bottles are said to be glass; so are decanters; so are the panes in the windows, and the mirror, and those beautiful lustres on the chimney-piece. Can these all be made of one article? —What is glass?”

“Your curiosity, my love, is very natural, and shall be gratified,” replied Mr. Paterson. “Certainly, in external appearance, there is a great dissimilarity in the articles you have named; yet they are, nevertheless, all of glass; but of glass made in various ways, or of different materials.

“To your question, What is glass? I may answer, generally, that it is a composition, fabricated from two articles, altogether unlike glass. The one is called, an *alkali*, from the Arabic name of the plant *kali*, or *kelp*, which grows in sandy places, near the sea-shore, and from the ashes of which it was first obtained: the other article is called *silix*, or flint in the state of sand, and the more free it is from foreign admixture, the better. Now neither of these two articles, the one a mere weed, the other sand, bears, alone, the least analogy to glass; but

when combined under the action of a powerful fire, they jointly produce it : or, rather, the kelp acts as a *flux*, as metallurgists call it ; that is, it assists the melting of the crystalline sand, which in reality forms the glass. But though sand, thus melted, is converted into the substance which we call *glass*, it is only glass in its most simple state ; and other articles are added, as manganese, lead, and nitre, to render it clear and colourless. And, as such sand only is fit for glass-making as abounds in siliceous or flinty particles, it is now common to use clear flint, pounded and ground to powder, for fine work ; and also some stones found in our rivers and gravel pits ; but the white sand, obtained about Lynn, in Norfolk, and Maidstone, in Kent, is in greatest repute for most of our ordinary glass.

“ The period when the art of glass-making was discovered is quite uncertain. Some have supposed it was known to the antediluvians : the Egyptians pretend that it was taught them by Hermes ; but who this Hermes was, and at what period he flourished, are disputed points ; so that their tradition affords us no help. Other nations make pretensions to the discovery, and have each their stories of its manner ; but, even should these be all true in the particular instances, they cannot be so with regard to all places. Pliny relates that it was first discovered accidentally in Syria, at the mouth of the river Belus, by certain merchants, who were driven thither by a storm at sea ; and who, being obliged to continue there for a time, cooked their victuals by making a fire on the ground, where grew abundance of the herb kali. When their fire was extinguished,

to their great surprise, they discovered certain lumps of a semi-transparent substance, glittering, as he says, almost like precious stones. The people of Sidon, in that neighbourhood, hearing of this miracle, as it was then considered, tried to imitate it; and, after a few unsuccessful essays, they brought glass into use; from which period the art of glass-making has been continually improving. Whatever credit may be due to this story, it is certain that the first glass-houses were erected in Tyre and Sidon, where the only staple of the manufacture remained for many ages.

“The people of Tyre and Sidon, in their days of prosperity, were very commercial, and traversed most seas. This extensive range gave them ample opportunity of disseminating their glass manufacture, and, perhaps, the art of making it. Whether they brought the latter to Britain, is not determined; but we know that glass-houses had been erected in this island, as well as in Gaul, Spain, and Italy, prior to the conquest of Britain by the Romans. But the glass of that period seems to have consisted chiefly, if not altogether, of beads and other ornaments, and of rings, used as amulets, or charms, by the Druids and their disciples.

“Glass for windows first appeared in our country in the year 674, when the church and monastery of Weremouth were glazed by artificers brought over from the continent by the Abbot Benedict. But it was not till about 1180, that glass windows became common in dwelling-houses. Italy had them first; then France; whence they came to England.

“The Venetians were long pre-eminent in the art

of glass-making, both as to purity and magnitude. In the thirteenth century, they alone possessed the secret of making crystal mirrors of large sizes. All the European courts were obliged to buy of them, not only looking-glasses, but all the superior kinds of glass vessels, whether for use or ornament. This manufacture was too important, as well as profitable, to be suffered to remain with one nation, free from competition; and in 1557, it was begun in England; the finer sort of glass being made in Crutched Friars, London; and fine flint glass, little inferior to that of Venice, was first made in the Savoy, near the Strand. This manufacture was improved in 1635, by being carried on with pit coal, instead of wood, as before. Glass for coaches and mirrors was also made at Lambeth, whither the Duke of Buckingham, in 1673, invited workmen from Venice, in the reign of Charles II.; but it was not till the time of William III. that drinking-glasses were brought to perfection in our glass-houses.

“The French, in 1688, made a considerable improvement in the art of glass-making, by the invention of a method of casting very large plates, for looking-glasses; and for about a century they derived great advantage from it. In 1773, however, a manufactory of the same kind was set up in Lancashire, which has been followed by others in London, and elsewhere; so that we no longer depend upon foreign nations for our supply of this very important and useful article.

“Glass varies in its composition, according to the use for which it is intended; and may be transparent and almost colourless, or opaque, or of any required

colour. It may also have different degrees of lustre, so as to imitate all the precious stones, in every respect but hardness; the diamond only excepted, which cannot be well imitated in glass.

“ The materials of glass are melted in pots of baked clay, the best sort of which, in England, is found near Stourbridge, on the border of Worcestershire. The several sorts of glass are—bottle glass—common window glass—crown glass—flint glass—plate glass—and various kinds of coloured glass, to which the name of *paste* is given, and which was once much in fashion for imitative jewellery, and is still in great use with the French, as may be seen in the bracelets, brooches, rings, and other gaudy articles of French manufacture, exhibited for sale at the bazaars and other magazines of showy trinkets.

“ The furnace for glass bottles is built in the form of a cone, from sixty to a hundred feet in height, and from fifty to eighty feet in diameter at the base. The fire is in the centre, where a strong current of air, accelerated by the height of the furnace, rushes through an iron grating, and keeps it always at an intense heat. Within the furnace, and around the fire, are the pots, each about forty inches high, and the same in diameter, with an opening opposite to it, for the workmen to get at the fused metal.

“ The principal working tools of the glass-blower consist of a hollow iron tube, in shape somewhat like the tin horn of a coach-guard, a flat stone or iron plate, scissors, and shears.

“ For bottle-making, kelp and the coarsest sand are used; to which, in some cases, are added clinkers from forges. When these are sufficiently melted, the

workman dips the large end of the tube into it, and brings out as much metal as will make a bottle. He then applies his mouth to the other end, and blows into the tube; his breath is dilated by the heat of the metal, which swells out like a bladder when blown into; and the more it expands, the thinner it becomes. When he has got it to the required size, he shapes it by rolling it on the flat stone, or iron plate; indents the bottom, by which he sticks it on an iron rod; and, by touching the neck with a wet stick, disengages it from the tube with which he had blown it. Another workman then receives it, and having trimmed the mouth, by putting a small fillet of hot metal round it, carries it off to the annealing furnace, a kind of oven, where the glass cools very slowly; for without such precaution, the bottle would fall to pieces as it cooled. For some bottles, a mould is used, into which the glass is blown to the exact shape: but this method occupies more time than the usual mode of blowing, and is consequently more expensive.

“Common window glass is made of fine sand and alkali. The metal, as before, is taken out at the end of the tube, and blown into the form of a large globe, which is cut open, and whirled rapidly round till it becomes a circular plate of thin glass, with a knob, or lump, in the centre, where the iron tube held it. Sometimes, window glass is blown into the shape of a cylinder, which is cut open with the shears, and flattened on a table. Crown glass, which is a superior kind of window glass, is made in the same manner, but of better materials.

“Flint glass, of which our best cruets, wine-

glasses, goblets, chandeliers, looking-glasses, and mirrors are made, is composed of very fine white sand, a preparation of lead, the finest pearlash, or alkali, a little nitre, and a still smaller portion of manganese; to which, at some works, a portion of arsenic is added, to aid the flux, or melting of the other materials. It is called by us *flint glass*, because it was originally made with calcined flints; but since the use of white sand has been understood, no flints are used. By foreigners, it has the name of *crystal glass*. The greater the quantity of lead put into this mass, the more brilliant will be the glass; but, at the same time, it will be softer, and more brittle; and if the lead be in too great quantity, the glass will be covered with oxyde, or rust, on exposure to the air. The chimney-glass, in the parlour has this defect; when fresh wiped with a dry cloth, it is clear and beautiful; but in a few hours it is covered with minute particles of whitish matter, which are the oxyde of lead. We also frequently meet with drinking-glasses which cannot be kept clear, from the same cause. Wine-glasses, decanters, and most other articles made of this glass, are blown much in the same manner as I have already described: but plates for coach windows, looking-glasses, &c., are cast upon a flat table, and, while the composition is still soft, rolled out with a heavy metal roller. A smooth surface is afterwards given it by polishing. This is called *plate glass*.

“Glass is made transparent by fire; but it receives its lustre from the joint skill of the grinder and polisher. In grinding plate glass, it is laid flat upon a table of fine-grained freestone, on which it is



secured by a bed of plaster of Paris. Upon this plate is laid a smaller one, about half its size, cemented on its upper side to a plank of wood, which is covered with heavy weights. Water and coarse sand are then poured upon the lower plate, and the upper one is moved about in all directions, so as to produce a constant attrition; by which means, both glasses are ground to uniform surfaces. As yet, however, though freed from ridges and other inequalities acquired in the casting, the surfaces are rough: a finer sort of sand is therefore used; and, as the work advances, powder of smalt is substituted for sand. The plates are then turned with their other sides towards each other, and, by a repetition of the process, the glass is ground on both sides. It then passes to the polisher, who, with a felt rubber, and fine powder of tripoli stone, or emery, completes that beautiful lustre of which glass is capable.

“The GRINDING and POLISHING of such things as wine-glasses, decanters, drops for chandeliers, lustres, &c., is performed by two wheels, fixed on a spindle, which is turned by means of a treadle, like a turner's lathe, or a knife-grinder's stone. One of these wheels is of iron, the other of wood, covered with leather. When the wheels are in motion, the article to be ground is applied to the iron wheel, which works in a trough of water and sand, and as it moves round with great velocity, it cuts the glass, which the workman holds in his hand, to the given shape. Afterwards, he applies it to the other wheel, the leather of which is saturated with oil and fine emery, which gives the polish.

“The SILVERING of looking-glasses is little more

than fastening some tin foil upon the backs : and this is done by means of quicksilver, whence the term. Tin foil is pure native tin, beaten out into very thin leaves, as you have seen done with gold and silver. It readily combines with quicksilver, and forms what chemists call an *amalgam*, or an union of the tin with mercury. A thin blotting-paper is laid upon a stone table, and upon this are spread a sufficient number of the leaves for the size of the glass. Upon the leaves is poured a quantity of quicksilver, till they are covered in every part ; and in order to have it equally distributed, a hare's foot is drawn gently over it. The workman then lays the plate of glass flat upon the table, with one end upon the quicksilver, over which he pushes it forward, till the whole glass is upon it. He then lays weights upon the plate, to press out the superfluous quicksilver, and so leaves it for several days, by which time the foil, or amalgam, adheres closely to the glass, and imparts to it the power of reflecting images presented before it.

“The vase upon the sideboard, which Louisa, I see, has filled with some pretty flowers, you have generally taken for Chinaware, or porcelain ; but, in reality, it is glass. It is a specimen of a modern invention for imitating porcelain, and is now getting into favour as an ornamental article. Mons. De Reaumur, a celebrated French philosopher of the last century, was the first person who carried the attempt to any degree of perfection. His vessels, being first made of the best flint glass, were packed close in crucibles, with a mixture of fine white sand and plaster of Paris. In this state they were sub-

jected to the heat of a potter's furnace, and, after they had remained there the usual time for baking pottery, the crucible was taken out, and the vessels it contained were found to be no longer glass, but a beautiful white opaque porcelain, possessing almost all the properties of that of China. Since Mons. De Reaumur's time, a manufactory of this glass porcelain has been established near London, where the metal of the best flint glass is mixed with white arsenic, or with well calcined ivory, bone, or horn. These are melted together, and the articles are made of the composition, in the usual method of glass-blowing; which is much more expeditious, and answers full as well as the former process. This composition is also used as a white ground for enamel in dial-plates, snuff-boxes, &c.

“ Brittle as glass is when cold, when heated it is the most manageable of substances. Even in the strongest fire, it never becomes a liquid, like water, but retains so much of toughness and ductility, that it may be drawn into threads, spread into plates, or blown into tubes and vessels of every shape, without having its properties impaired. From glass we derive many conveniences, and more comforts: and, whoever were the inventors, they have conferred upon the civilized world a boon which we can hardly appreciate too highly.”

The children thanked their father for his account of glass, and the conversation was about turning to another subject, when James inquired if those ornaments on the mantel-piece, which he had heard somebody call *spars*, were not glass also?

## SPARS.

“Those ornaments called spars,” said Mr. Pater-son, “are not glass, though, indeed, some parts of them look very much like it: they are natural products, formed in the crevices of rocks, or in the sides of caverns. They may be said to be half crystal, half marble; and, in examining them, you seem to look within the very substance of the stone, and see all the odd shapes and eccentric combinations of its composition. In the deep caverns of the Peak, in Derbyshire, spars of this kind are found in great quantities: and they are shaped into such ornamental articles as you there see, by the skill of the workman, with a chisel and lathe. Spars are obtained from several places besides Derbyshire; and may, in general, be defined as mixed bodies, consisting of crystal, incorporated with mineral, stony, earthy, or metallic matter; and, in proportion as either of these preponderate, the composition, more or less, approaches to transparency; and some are altogether opaque.”

## CARPETS.

“Is this a Turkey carpet, papa?”

“No, Richard; this was made at Kidderminster.”

“How was it made?” inquired Louisa.

“The principle of carpet-weaving will be best explained by inspection of a piece of list carpet. Richard, you will find a small piece in my dressing-room; fetch it.”

“Oh, indeed!” said Louisa; “I can see, in this, how the tapes, or pieces of coloured cloth, pass over and under each other, regularly, till the narrow strips of list become a broad cloth, fit for a carpet.”

“ Most other carpets are formed upon a similar principle, but of a different material ; yarn being used instead of list. The yarn is of various colours ; and the colours are so managed, that they are thrown into view in the shapes of flowers, or other ornamental figures.

“ Carpets were first used in countries where the people sit, not upon chairs, as we do, but upon the floor ; and, while they add much to the warmth and neatness of an apartment, they are less expensive than the ornamented floors, which were used in fine houses before the introduction of carpets into Europe.

“ It is not a very long time since floors were strewed with rushes, instead of being covered with carpets ; and a still shorter period, since plain sand was used in lieu of either. Little more than half a century ago, a tradesman was satisfied if he could get a carpet for the centre of his best room, with some pieces, sewed together, for his bed-side : but now, he has all his rooms, and even stairs, covered with carpet ; and for his bed-room, handsome carpeting is purposely woven.

“ The coarsest description of carpets is the *Scottish*. They are woven with large worsted yarn, in the manner I have just described ; and as the yarn is crossed over and under, the pattern is the same on both sides ; only the colours are reversed ; the pattern, which is of one colour, say red, on one side, is of another, say green, on the other ; as you may perceive in that piece of list carpet. The two colours cross each other in the pattern ; and one appears in front, the other at the back. These carpets have scarcely substance sufficient for use ; they

are so light, that the least touch of the foot, or the slightest draught of wind, discomposes them.

“*Kidderminster* carpets are an improvement upon the Scottish. They are made upon the same principle ; but, besides having finer materials and better manufacture, they are made double, and are, consequently, heavier, so as to lie smooth upon the floor. These carpets may be said to consist of two pieces woven together, and fastened by the threads of one continually passing through to become threads of the other. In these, therefore, small patterns are most desirable, because the two carpets, or *webs*, as they are called, are united at the edges of every figure.

“ Carpets are woven in a loom, which is placed upright before the weaver. The *warp*, or parcel of threads which goes lengthwise, is wound upon a roller at the top, and fastened to another at the bottom ; by turning the last of which the workman can remove out of his way so much as he has woven, and bring down to a level with himself that portion of the warp on which he is working, so that he may shoot the *woof*, or cross thread, through it. Before him lies a pattern, exactly coloured, and so divided by squares, answering to every ten threads, that he may see what colour, and how many threads of each, he is to place on the spot he is working. He has spindles of coloured yarns, of every shade he can need, laid in order within his reach ; and taking up, alternately, such as he wants, he passes it under and over as many threads of the warp as his pattern indicates.

“ This is the general process for Scottish and *Kidderminster* carpets. The weaving of *Brussels*

carpetting is somewhat more laborious; the yarn being thrown over a wire; and when this is drawn out, a row of loops is left, which have a very neat appearance. *Wilton* carpets, so called from the town of *Wilton*, in *Wiltshire*, are also woven over a wire; but, before this is withdrawn, the loops are cut open at the top, so that the ends, called the *pile*, stand up in a shaggy manner. Both these sorts of carpetting are woven upon a sacking bottom; consequently, both sides are not alike, and the size of the figures has no effect upon their quality, which is close and durable.

“ *Turkey* and *Persian* carpets are in high repute, among those who can go to the expense, for they are very dear, on account of their admirable colours and texture. They are made somewhat after the manner of the *Wilton* and *Brussels* carpets, but wholly of wool, or of goat's hair. Great Britain so much excels now in the manufacture of carpets, that the importation of these foreign articles has of late received a great check.

“ The most beautiful carpets now in use are those made at *Axminster*, in *Devonshire*. They are woven in one piece, without seams, to any size; the colours and patterns are remarkably fine; and many of them are finished with a needle. The effect is delicate, brilliant, and varied; and their price is proportionably high.

“ The *hearth-rug* is a kind of small carpet, woven like the *Wilton*, but with the shag, or pile, much longer. They are warm to the feet, and comfortable in winter time.

#### CURTAINS.

“ The curtains, or draperies of a room, add much

to the neatness, and more to the comfort, of it. They are made of various substances, as silk, worsted, or cotton; and the fabrics have various names, according to their appearance, of which damask, moreen, and chintz, are the principal.

“*Damask*, so called because it originally came from Damascus, in Syria, should be a fabric of silk, either wholly or nearly so. Flowers and figured ornaments are so woven in it, that they seem to project above the surface, and afford a rich and stately appearance. This raising is, however, only in appearance, and is produced by reversing the twill of the texture, in the same manner that the figures are produced on table-cloths.

“*Moreen* is a stout sort of worsted fabric, artificially figured to look like damask. But the figures, instead of being woven in, as in that article, are produced by what is erroneously called *watering*, an effect obtained by passing the cloth over a hot brass cylinder, engraved in patterns, and pressing it between two wooden rollers, to cause the indentation. Its appearance is rich, and its durability keeps it in favour.

“*Chintz* curtains are made of calico, or cotton cloth, variously flowered and ornamented by the printer’s art. These are comparatively cheap; and, as they bear washing, are very cleanly, especially for bed furniture, in which form you will have opportunity of examining the article in some future lecture.”

## CHAIR BOTTOMS.

“What is this odd-looking black cloth, of which the chair bottoms are made?” inquired Louisa.



“ It is hair cloth, woven of threads which require no spinning ; being formed of the hair of horses’ tails, either naturally black, which is most durable, or dyed of that colour. It is a kind of satiny substance, smooth, strong, and easily kept clean ; though dust will pass through it into the cushions.

“ Some chairs have their seats made of split cane ; others of cushions covered with leather ; and for very common uses, of rushes ; of the latter sort, some are painted.”

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### THE CHINA CLOSET.

“ The three standard articles in an English china closet, are glass, porcelain, and potter’s ware : the latter is sometimes called *crockery*, from the Dutch word *cruick*, a cup or vessel, made of earthenware ; and at one time it was also denominated *delft*, because the first ware of that kind used in Europe was made at Delft, in Holland.

“ The manufacture of glass, and the method of cutting and polishing it, has already passed under our review, in the drawing-room. We have, therefore, only to behold and admire what is now before us. Glass vessels, when of the finest kind, and tastily cut and polished, are remarkably handsome. Those decanters, with the wine-glasses and goblets to match, are very splendid as the sun shines upon them ; the numerous brilliant points catch the rays, and, dividing them into their component parts, dart a sort of rainbow radiance into every part of the closet.

“ In large establishments, glass belongs to the

butler's pantry, because it is chiefly used for holding liquids: yet it is also introduced on sideboards, for ornament, and produces a fine effect. The labour required in polishing, makes it indeed expensive; and its brittleness adds to that expense: for the brighter and more beautiful it is, the more is its brittleness increased. A common green glass bottle is stronger than one of flint glass, of the same thickness; and glass, with its natural surface, is much stronger than when it has been cut and polished.

## PORCELAIN.

“Next to cut glass, porcelain, or Chinaware, is the most beautiful of all substances used at table; and very rich ornaments for chimney-pieces, and other purposes, are made of it. The component parts of porcelain are a flinty sand, and a nearly pure clay; the former, if unmixed with the clay, would become glass in the heat of the furnace, or oven, in which porcelain is baked; and the latter, if alone, would form a white and rather brittle brick: the two, together, constitute the substance called *porcelain*, which may be considered as a combination of glass and pottery ware.

“Porcelain is an invention of the Chinese, by whom it has been made from time immemorial. The name, however, is not Chinese, but comes to us from the Portuguese, who first brought this beautiful ware to Europe, and with whom the word *porcellana* means a cup. In China, it is called *tse-ki*. In Japan, also, porcelain is made, which is said to be superior to the Chinese, but we know very little of it.

“Not many years have elapsed, since all the porcelain used in Europe was brought from China, and

formed a very extensive article of commerce; particularly while the trade of the East was in the hands of the Dutch. But now, scarcely any porcelain comes from China, except as mere matter of curiosity; on the other hand, so great has been the change, a large quantity of porcelain, manufactured in Great Britain, is annually exported to China, and there meets a ready sale, at a price below the native article, although it has been carried upwards of twenty thousand miles to the market.

“ The Portuguese, as I have just hinted, first brought porcelain to Europe; but at what time is not exactly known. Botticher, a German chemist, who died in 1719, was the *inventor* of European porcelain; for the art was not learned from the Chinese. He made many of his experiments while in prison, into which he was cast, on the absurd charge that he possessed the secret of what has been called the *Philosopher's Stone*, or the art of transmuting metals into gold. A few years afterwards, the celebrated Reaumur considered porcelain scientifically, and submitted the result of his investigations to the French Academy of Sciences, in 1727 and 1729. Since that period, after repeated trials, and not a few failures, the manufacture of this delicate ware has been brought to great perfection in almost all states of Europe. Saxony led the way; and Dresden porcelain is still in high repute.

“ England is in no wise behind the continental manufacturers of porcelain. At Worcester, Derby, and Lane-End, in Staffordshire, are extensive works, where very beautiful articles are made. The taste of their decorations, and the brilliancy of their gilding,

will always procure them admiration at home and abroad.

“ In figures and ornaments, which could not preserve all the delicacy of their workmanship if covered with glazing, the porcelain, when baked, is left unglazed, and is then called *biscuit*. It is delicately white, almost like alabaster, but its surface does not shine.

“ Such articles as can be formed with the wheel, are so produced : those which are not round in shape, are formed by pressing the prepared clay into moulds with the hands. Figures are cast in moulds of plaster of Paris, the clay being rendered liquid by an addition of water. When poured into the mould, the plaster imbibes the liquid, and leaves the figure perfect and firm. Sometimes, the different parts, as the head, arms, &c. are cast in separate moulds, and luted together afterwards with some liquid clay, which is smoothed down at the joinings before the figure is baked.

## POTTERY.

“ From the making of glass and porcelain, our observations naturally turn to the kindred art of pottery, which, though less splendid in its produce, is less fragile, and more generally in use. It is not indeed destitute of elegance, as you may perceive in those vases and ornamental pieces of Wedgwood ware. The artificial beauty of these gives them great value as articles of taste, though their mercantile price is comparatively small.

“ Pottery, or the art of making vessels of earth for the use of man, is very ancient. The Egyptians were celebrated for such wares : from them, the

Greeks learned the art ; from the Greeks it passed into Italy, to Etruria, in Tuscany, and to Rome itself.

“ The Hindoos also make a great deal of pottery, or vessels of baked clay ; but they are very coarse.

“ In England, we find a progressive improvement in articles of this description. The wooden bowl and platter, (the first hollowed out of a block of timber, the latter little else than a square or circular piece of board,) long constituted the basin and plate of the labourer, and even of many in the middle class of society. These gradually gave way to vessels of pewter, which is a composition of tin, lead, and copper. Both are sufficiently durable, but they are with difficulty kept clean ; no wonder, therefore, that they should be superseded by an article, which is at once cleanly, cheap, and comparatively durable. Such is earthenware, or pottery, which, once invented, was rapidly improved by taste and skill, so as to furnish vessels at once useful, elegant in shape, and beautiful in ornament.

“ Though clay is the basis of pottery, it requires an admixture of some other article, to make it work thin enough for drinking vessels, plates, &c. ; without which it cracks in the baking. The substance found to answer best is flint, calcined and reduced to powder. This gives strength to the clay ; and the composition, when baked, becomes earthenware, of different names, according to the proportions in which the ingredients are mixed, and the care taken to have each pure and finely comminuted. With the latter view, the clay is dissolved in water, and

well stirred about ; after a little time has been allowed for the grit, sand, and other foreign articles, to settle ; the mixture of clay and water is drawn off, and the clay sinks to the bottom, while the water runs away. This clay is now well beaten, to give it a kind of tough pliancy, as well as to mix the different sorts, if more than one kind of clay be used, as is frequently the case. The fine dust of the pounded flints is then added in such proportions as best suit for the ware intended to be made, and the whole is reduced to a tough paste, yet sufficiently soft to be easily wrought into shape.

“ The mode of shaping the vessel, is either by pressing the compound of clay and flint-dust into moulds, or working it on a wheel. Round dishes, plates, basins, ewers, cups, saucers, &c. are wrought in the latter way. A round flat board is affixed on the head of an upright spindle, which is turned round with considerable velocity, either by the workman’s foot, if the article be small ; or by a large wheel, if it be bulky. A lump of clay is thrown upon the centre of this board, and the thumb and finger of the workman, placed in the middle of the lump, produces, as the wheel turns round, a hollow, while the thumb and finger of his other hand are employed in forming the outside. The whole hand is then inserted within, and pressed against the clay, so as to force it out to a wider hollow ; the hand outside, at the same time, forcing the clay back into a narrower compass ; and so, between the two, a pitcher is made broad in the middle and narrow at top.

“ Mouldings, or ornaments, which run regularly round the vessel, are formed by holding a tool, pro-

perly shaped, against the part as it whirls round ; but handles and feet are formed separately, and stuck on before the clay is baked. If any figures are to be added, they are formed in moulds, and stuck on also.

“ When quite formed, the various articles are first dried with a gentle heat, and then thoroughly baked by a more violent fire, by which they are almost vitrified ; that is, they are no longer dried clay, but almost glass. This vitrification is more or less perfect, according to the fineness or coarseness of the material used, and the intended quality of the vessels. Before they are placed in the kiln to be baked, each article is put into a case made of clay, of its own shape, that it may not be warped by the intensity of heat.

“ When the articles come out of the kiln, they have a dull appearance, and are called *biscuits*, till they receive the glazing. Common stone wares are glazed by a very simple process : they are taken out of the cases in which they were baked, and put into an oven ; a handful of salt then thrown upon the fire, instantly rises in vapour, which settles on the biscuit, in a glassy polish. But for finer articles, such as queen's ware, a mixture is made of water, white lead, ground flint, and pounded glass. Into this, each piece is dipped, previously to its going into the kiln ; the fierceness of the fire fuses, or melts, the several ingredients, and the mass settles as a glass coating upon the surface of each piece, which at the same time becomes thoroughly baked. The glazing not only gives the vessel a beautiful gloss, but also makes it capable of holding liquids, which the mere biscuit could not do, being too porous. What is called

*Delft ware*, is coated with a kind of enamel, which requires a much stronger fire to bring it into fusion.

“ For two centuries and upwards, a considerable manufacture of stoneware has existed at Burslem, in Staffordshire ; but, for many years, it produced only coarse red, yellow, black, and mottled articles. The substance of these was clay, of different colours, found in the neighbourhood ; and the glazing consisted of powdered lead ore, sprinkled on the pieces before they were put into the oven, with the addition of a little manganese, for particular colours. About the year 1690, two ingenious Germans settled in the same place, and produced a glazing without lead, (which is very pernicious) merely by casting salt into the fire, as I have already explained.

“ But the white kind, more generally known as stoneware, was invented by the shrewd improvement of an accident, which many would have suffered to pass unnoticed. A potter, travelling to London on horseback, found his horse’s eyes diseased, and an ostler cured it by means of powder of flint, which he procured by burning a bit of common flint in the fire. This powder was white, and it struck the potter, that powdered flint might make a good addition to the clay in common use. Indeed, to perfect his ware, he had previously introduced tobacco-pipe clay, which is of itself quite white : and this, with the addition of the flint powder, produced a ware of considerable hardness, whiteness, and beauty, far surpassing what was before known ; and this kind of stoneware still continues in mugs and pitchers.

“ About the year 1760, a ware of this description, but much superior, began to be imported, in great



quantities, from France, and seemed to threaten the ruin of our own potteries; but, about three years afterwards, Mr. Josiah Wedgwood, who had previously introduced several improvements into the art, invented a species of earthenware, quite new in its appearance, and covered with a rich and brilliant glazing. This new article obtained, by royal favour, the name of *queen's ware*. Clay from Devonshire, and flints from Kent, are now carried, at a great expense, into Staffordshire, for its formation. Mr. Wedgwood founded a village, (or rather a series of villages,) which he called *Etruria*, and which is supposed to contain four or five hundred houses, calculated to employ, on an average, twenty hands each, or from eight to ten thousand in the whole. From these works, vast quantities of earthenware and British porcelain are exported to all the nations on the continent of Europe, as well as to the East Indies and to America.

“Delft ware is made of clay, mixed with a little sand, or marl, and covered with a thick coat of enamel within and without, to hide the clay. The vessels are first slightly baked, then the enamel is laid on them; when this is dry, they are painted with colours similar to those used for porcelain; after which, they are put into the furnace, and exposed to a very strong heat, which fuses both enamel and colours, and thoroughly bakes the ware. It is very brittle, and now but little used.

“Common *brown ware* is made in many places; a very superior sort is manufactured at Nottingham. What is called *Welsh ware*, is chiefly made at Sunderland; it is strong, and bears the oven well.

“Of late, a *blue and white ware* has come into general use, as in some degree resembling porcelain; and though its cheapness shews its inferiority to that article, it is still a valuable improvement in the art, if not an addition to the comforts of persons in the middle rank of life.

“Some articles of pottery are painted, though in a less superb style than porcelain, the article being much inferior. But, in general, the cheaper method of printing is resorted to. The designs are engraved on copper, and impressions on paper are taken from them, as in common copper-plate printing; but the surface of the paper is previously rubbed over with soft soap. The colouring, of whatever tint, is ground up with linseed oil, till its consistence, when laid on the plate, is about that of soft paste. The paper, prepared as I have just stated, with a thin coat of soft soap, is then laid on the plate, and passed through the rolling press. As soon as it comes out, it is applied, face downwards, to the biscuit, which immediately absorbs the colouring matter, by its porousness. The paper is then removed, and the pattern remains, distinct and regular, on the surface of the pottery. The colour is generally made of the oxyde of cobalt, which gives the figures a bluish hue, and causes the white of the pottery to seem more pure and beautiful than it really is. Pottery of this kind is denominated *blue and white ware*; and it constitutes an important branch of the Staffordshire manufacture. Besides blue, other colours are sometimes formed of different metallic preparations, as pink, purple, brown, green, in various shades.

“The appearance of metal is sometimes given to pottery; which is done by fixing platina, or Dutch gold, upon the enamel. The first of these metals gives a dull silvery, or rather steel-like colour; and the other affords something like the colour of copper.”

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### THE SICK CHAMBER.

An interruption to these domestic dissertations, of some weeks' continuance, had taken place, in consequence of an illness, with which Mrs. Paterson was attacked, and which confined her to her room,—indeed, to her bed. The whole house was filled with anxiety, and no topic could be attended to by the children but the state of their dear mamma's health.

At length the disease gave way; a period of convalescence ensued, and two of the children were admitted into her chamber. They remained but a short time, lest they should fatigue their mamma, who was evidently very weak. During this interval, short as it was, and earnestly as they regarded their beloved parent, they noticed several things, to them uncommon, for an explanation of which they applied to their father on the first opportunity.

SAGO.

They had observed the nurse prepare something that looked almost like soup, which, after she had put into it some sugar and a little port wine, she handed to her mistress, who took it leisurely, but seemed to relish it much. As they were leaving the

room, they asked nurse in a whisper, what that was which mamma was taking, and were told it was *sago*. The name was new to them, and nurse could tell them no more, for the name was all she knew about it, except the mode of cooking.

“Pray, papa,” inquired Richard, “is sago physic?”

“No,” replied Mr. Paterson, “it is better than physic for your mamma, just now: it is food, and food of a very nourishing kind, produced from a tree that grows in the East Indies.”

“Oh, then it is a fruit, I suppose,” said James, in his usual decided tone.

“Not quite so fast, James: though produced from a tree, it is not necessarily the fruit; it may be the bark, or the root, or a preparation of the leaves: but it is neither of these; it is made from the pith of the tree.

“Sago is obtained from most species of those beautiful trees, called *palms*, which abound in warm climates. Those that yield it in the greatest abundance are the sago palm and the small date, which are found in greatest plenty in the Spice Islands, whence sago is brought to us. It is also obtained from the broad-leaved cycas, a native of the East, particularly on the coast of Malabar, and which very much resembles the palm. The trunks of these trees are not solid timber, but consist of remarkably hard fibres, with a pulpy matter between them. To obtain the sago, the trees are cut down, divided into short lengths, and split into pieces. These pieces are laid in troughs of water, and pounded, till the pulpy matter is loosened from them; then the fibrous

part is withdrawn, and when the pulp has subsided, the water is strained off. The pulp, or meal as it must now be called, thus becomes a kind of paste, which may be eaten immediately, or preserved for several years. When wanted for use, it is diluted with water, and baked or boiled, according to the fancy of the eater. But for exportation, as it comes to us, the paste is moistened and rubbed through a sieve into an iron pan, with a fire beneath it, which partially hardens each drop as it falls; and in this state it will keep a long time, if well defended from the air; otherwise it is liable to turn sour.

“ Three or four hundred weight of sago is frequently obtained from a single tree. The tree grows to a great size, and is seven years growing before it is fit for cutting. Its ripeness is shewn by a whitish powder appearing upon the leaves. From the old root, or stool, as gardeners would call it, young suckers arise, which, in seven years more, become themselves ripe, and fit to be cut for sago. When raised from seed, the first appearance of the tree is only that of a thorny shrub.

#### TAPIOCA.

“ There is another article for convalescent patients, very much like sago in its qualities, called *tapioca*, obtained from the cassada plant, a native of Brazil, and other warm parts of South America. The cassada is of two kinds, the sweet and the bitter; and grows up as a shrub to the height of ten or twelve feet: but the root only is used in making tapioca; and you may be deterred from tasting it, on being told that the bitter cassada is naturally a rank

poison : it is however as much used as the sweet in the manufacture of this very useful and nutritious article. The poison resides in the juice, and when this has been well squeezed out, the bitter cassada comes as wholesome as the sweet, and both are used indifferently, or together. The roots, after being washed and scraped clean, are grated into a trough of water ; then they are put into a hair cloth, or bag, and strongly pressed, to expel the juice. What remains in the cloth is washed and strained, so as to separate the meal from all fibrous particles. This process is repeated two or three times ; after which the meal, or farina, is dried in stone basins over a fire, and made into cakes, or puddings, which are a substitute for bread with many of the natives of South America. The Brazilians dry it in small lumps, which they export under the name of *tapioca*. With us, though much used as food for invalids, it frequently becomes part of our culinary preparations, in the form of pudding ; as, I believe, most of you can testify.

## ARROW-ROOT.

“ Another nutritious substance for sick people is made from the root of a South American reed, the resemblance of which to an arrow in form, has procured it, with us, the name of *arrow-root* ; but its proper name is *arundinacea* ; and it is sometimes called *starch plant*, from the resemblance of its meal to starch. The roots, being first well washed, are beaten to a pulp in wooden mortars. The pulp is then put into a vessel of clean water, in which it is stirred and squeezed with the hands, till the fibres are separated from the farinaceous particles. The

fibres are thrown away, and the liquor, which has acquired the appearance of thick milk, or cream, is passed through a hair cloth; and when it has settled, the clear water is drained off: at the bottom of the vessel a white mass remains, which, after another washing, is dried on sheets in the sun, and is pure starch, or the powder which we call *arrow-root*. It is said, that the roots of some British reeds and rushes might be converted into a substance having similar properties."

#### TAMARINDS.

The children, during their short visit to the sick chamber, had received from mamma a taste of some very nice stuff, which she called *tamarinds*, and they were now desirous to know what it was, for they understood the doctor had sent it; and they could hardly believe that the doctor could make anything but very nasty stuff.

"The doctor," said the father, "does not *make* that *nice* stuff; nor, indeed, has he much to do in making the *nasty* stuff, as you call the medicines which he sends: he mixes up the latter from various ingredients ready prepared, either by nature or the chemist. The nice stuff, or tamarind, is a fruit, preserved by the art of the confectioner, who, it seems, is a greater favourite with you than either doctor or chemist.

"Tamarinds are the fruit, or seed, of a tree growing in the East and West Indies, as well as in Arabia, Egypt, and the warmer parts of America. The tree grows to the height of thirty or forty feet, and has some resemblance to the laburnum; that is, its blossoms are of the pea kind, and the fruit is con-

tained in long narrow pods. It is, however, in one respect so dissimilar, that while the fruit of the tamarind is wholesome, that of the laburnum is poisonous. The tamarind seeds, or stones, as they are frequently called, are very hard, and unfit to eat; but they are enveloped in a dark-coloured pulpy matter, which, on account of its acidity, is useful for abating thirst and heat in various inflammatory complaints, and disorders of a bilious kind. The fruit grows in clusters, like a number of bean-pods tied together, and about as long; and the pulp, with the seeds connected together by numerous tough strings, or fibres, are brought to Europe, freed from their outward shells, and usually preserved in syrups. It is this acid pulp, mingled with sweet syrup, which you have found to be so nice."

## CAMPHOR.

"Well! tamarinds are very nice," said Louisa; "but, I am sure, I would rather never taste them, if I must also take that nasty camphor julep, as poor mamma does!"

"Pray, papa, what is camphor?" inquired Emma.

"Camphor, my love," replied Mr. Paterson, "is procured by distillation from a species of laurel, which grows in the East Indies, chiefly in the islands of Ceylon and Borneo. It is of a resinous nature; has a very bitter taste; and will not dissolve in water, but only in alcohol, or spirits of wine. The Eastern princes burn it, as it is very inflammable, gives a brilliant light, and yields a considerable degree of fragrance. Great quantities are also used in medicine: it affords ease in some cases of spasm; is a preservative against fevers, and other contagious



disorders ; and if put into a wardrobe, or drawer, with woollen garments, proves a defence against those destructive insects moths.

“ The root of the cinnamon tree yields something of a similar nature ; and attempts have been made, it is said with success, to extract camphor from peppermint, lavender, rosemary, and other fragrant plants and shrubs of our own climate.

“ The camphor julep, to which Louisa has taken such a dislike, is made by grinding camphor with sugar, just moistened with brandy, and then pouring boiling water upon it.”

#### USE OF MEDICINES.

A question by the little Louisa excited a laugh from her brother James ; and even the rest of the party could not but smile at its simplicity. She wanted to know, if the contents of a row of phials, which she had seen in the sick chamber, were to do her mamma good, why she might not also have some to do her good ?

It was, however, easier for James to laugh at this question, than to answer it properly. He only supposed, that as his sister was not sick, she could not want medicines.

Mr. Paterson, after reminding his son of his breach of good manners, undertook a short explanation of the matter. “ The health of the human body is intimately connected with the course or circulation of the blood from the heart through all the veins and arteries of the system. So long as this goes on with regularity, we are in health ; but if the blood run too fast, it produces fever, and such medicines are given as tend to restrain its too rapid

progress. On the other hand, if the blood flow too slowly, we become languid, dull, and melancholy ; and recourse is had to medicines of a stimulating nature, to quicken the circulation. You see, therefore, the impropriety of taking either class of medicines, while you are in health—that is, while your blood circulates in a proper manner. For, if you take such as are given in cases of fever, you will so reduce the circulation as to become heavy, dull, and what is frequently, though absurdly, called nervous. Or, if you were to take the stimulants, they would presently bring on a dangerous fever. Therefore, be advised, never to take any medicine except you are really ill, nor any that is not expressly calculated to suit your disorder. I have known persons older, but full as ignorant on this point as our little Louisa, who have taken physic designed for others, and thereby injured their health materially. It is also requisite, in addition to the suitability of the medicine, to know the proper quantity, or dose, to be taken : for if you take too much even of what might otherwise do you good, you will, in all probability, do yourself much harm. Many medicines are so potent, that if more than a few drops be taken, they become absolute poison, and persons have been killed by taking physic at a guess. An intimate friend of my early years, being slightly indisposed, received from an apothecary two doses of physic, which he was to take with an interval of one or two days between them. Being impatient to get better, he thought the shortest way would be to take both at once ; he did so, and was immediately seized with sickness, and other symptoms so violent, that his

life was endangered; he was confined a full month to his bed and chamber, and then was ordered into the country for another month, to recover his strength. Patience, under affliction, is requisite at all times; more especially under that which arises from indisposition of body. Nature is slowly progressive in her operations; and any attempt to hurry her, is sure to produce painful, if not, destructive results."

"I am sure," said Richard, "if such be the case, I shall not want to taste other people's physic."

"You will do right to avoid it," replied the father; "children who are for tasting every thing they come near, especially if it looks nice, are in great danger of doing themselves mischief, if they do not kill themselves outright."

#### MINERAL WATERS.

"There is scarcely any article," continued Mr. Paterson, "by which persons, old as well as young, are in greater danger of injuring themselves, than mineral waters: an injudicious use of them has laid the foundation of numerous complaints, under which the parties have laboured for years, and at length have died long before the natural term of life. In some cases, under proper management, they are highly beneficial; and so long as they were left to the use of the invalid, who resorted to them by advice of persons who had studied their qualities and their adaptation to particular cases of disease, they were in great repute. But since the places where they are found have become the resort of fashion and gaiety, the qualities of the waters, and the necessity

of taking them, are unattended to ; it is fashionable to drink them, and down they are swallowed, at whatever risk.

“ Mineral waters are found in most parts of the world ; and in England among the rest. They vary in almost every place ; but, generally speaking, are impregnated with either iron or sulphur, in different proportions, and in combination with numerous mixtures from earths, salts, and ores of divers qualities ; they also contain a large portion of fixed air, by which some are rendered more useful in some sorts of diseases, while others suit complaints of a quite contrary origin.

“ These waters, flowing through mines of certain substances, seem to dissolve small particles of each, and occasion them to combine chemically, so as to have powerful effects on the human frame, whether taken internally, or used externally in bathing. They are, in general, more or less chalybeate ; that is, they are impregnated with iron, as may be proved by letting them stand for some time to settle, when a yellowish sediment is found deposited, which is, in fact, the rust, or, as a chemist would call it, the *carbonate* of iron. This in itself is very tonic, or bracing ; and when persons are much debilitated—that is, rendered very feeble and languid, either by disease or natural weakness—if they take, in a proper manner, some chalybeate water, the iron in it not only gives strength and energy to the muscular system, but also affects the fluids, and quickens the pulse ; that is, it stimulates the circulation of the blood : therefore, though chalybeate water is good in cases of weakness and languor, it is very detri-

mental to persons of a feverish habit, whose pulse is already too quick. The patient, after taking this water, feels cheerful and active; and a course of drinking it for several weeks, will frequently recover his health.

“ In some places, the water passes through, and over, beds of pyrites, which consist of iron in combination with sulphur, and often lie in large masses. In some circumstances, these mixtures generate heat; and hence those hot springs, which are frequently more beneficial on account of their warmth. Thus, the Bath water is hot; and, applied to paralytic limbs, becomes very efficacious. It is also good, taken internally, for weakness of digestion; but great caution is here required, to have the system duly prepared by cooling medicine and regimen. At Bristol, or rather Clifton, the spring, though called *hot*, is not more than milk warm, or scarcely so much; indeed, in summer-time, its warmth is not perceptible. This water is highly beneficial for internal weakness, and especially for consumptions and other complaints of the lungs, if resorted to in time, and persevered in. The misfortune is, that people rarely go thither, till the doctor has given them over, and so they fail of the benefit they might have derived in an early stage of their complaint. Buxton, in Derbyshire, is a delightful spot, and celebrated for the efficacy of its hot waters, whether taken inwardly, or used externally in bathing. They are of much the same quality with the Bath waters. At Matlock, about a dozen miles from Buxton, are also hot springs, baths, walks, rides, and accommodations of a similar nature. At Harrowgate, near Knares-

borough, in Yorkshire, the springs are strongly impregnated with sulphur; and the taste of their waters is so little inviting, that it has been compared to a mixture of rotten eggs and gunpowder.

“ The water most in fashion at the present day—for fashion has great influence even in medicine—is that of Cheltenham; a town beautifully situate in the vale of Gloucester, about ten miles from that city. For many years, the water of this spring oozed out, and was lost in a muddy morass, in which it deposited its saline particles. At last, some pigeons were observed to be fond of it; and also, when every other spring was frozen in the winter, it was remarked that this was free from ice. Some poor people resorted to the spring, and having drunk the water, found benefit: this was soon noised abroad, and miraculous effects were attributed to the water: the ground was opened and drained; the spring was enclosed; buildings were erected for the accommodation of visitors; trees were planted, and walks laid out, for their recreation; and Cheltenham, from an inconsiderable village, quickly became one of the most fashionable watering-places in the kingdom. Some eminent physicians and chemists analysed the water, and pronounced it to contain a large portion of Epsom salt, some chalybeate, and fixed air. In the summer of 1788, King George III. with his royal consort, the princesses, and a considerable retinue of nobility, visited this spa, which seemed to raise and fix its reputation; and it has been much in vogue ever since. About the year 1815, a spring of a similar nature was discovered close to the city of Gloucester; a pump-room was in

consequence built, and grounds were laid out, to invite visitors; but it has not yet become fashionable, and is therefore neglected.

#### SEA-BATHING.

“The places I have named, with several others, were, till within these few years, places of resort, not only for invalids, but also for the gay and idle. Of late, however, they have been mostly deserted, and fashion has taken her principal abode at the sea-side, whither persons of all descriptions, who can possibly raise the means, repair, during the summer, to inhale the pure breeze, and to refresh their limbs by a plunge in the briny waves. Some of these places, as Hastings, Brighton, Southampton, Weymouth, &c. are approached by land carriage; others, as Southend, in Essex, Herne Bay, Margate, Ramsgate, and Dover, in Kent, with several on the eastern coast of England, afford a pleasant excursion from London by means of steam-boats, and are much frequented for the sake of the little sea voyage which the excursion affords.

“Sea-bathing, judiciously used, is very beneficial and invigorating. Persons recovering from a fit of sickness, or whose general pursuits are of a sedentary kind, can scarcely fail of deriving benefit from a visit to the sea-side, where the air is of the purest quality, and the temperature, especially in spring and autumn, is of a tonic quality. The scenery, also, is so diversified, (at some places, of course, more than at others,) that the mind is at once delighted and invigorated. Among other attractions, which nature here presents, are the sublime though placid scene

of the sun rising as from the bosom of the ocean, and the grand but terrific view of the same ocean agitated by a tempestuous wind, raising its waves to a great height, and dashing them against each other and upon the shore, with tremendous fury. As change of scenery, and pure air, are powerfully conducive to the invigoration of the system, no place is so beneficial as the sea-coast.

“Bathing early in the morning is preferable to the middle of the day; it induces a habit of early rising, and as the water is then most cool, it has a more tonic effect. Bathing should not be daily practised; neither should the bather remain in the sea for the purpose of swimming; both practices tend to weaken, rather than to invigorate, the body. Twice, or at most thrice in a week, is amply sufficient; and the first plunge is all that can be attended with utility. A previous immersion in a warm or tepid bath, prepares the body for the plunge in the sea, and is very conducive to its efficacy. After bathing, some moderate exercise should be taken, so as to promote that pleasing glow which succeeds, or ought to succeed, the dip, and without which it should not be repeated. If the bather find himself chilly, or affected with headache, on coming out of the water, he may conclude that it is improper in his state of health. As to valetudinarians, they should never either drink mineral waters, nor bathe in the sea, without the previous advice of some skilful physician, resident on or near the spot.”



## THE BED-ROOM.

By the time the conversations arising from the Sick Chamber were finished, Mrs. Paterson had so far recovered as to be able to receive the visits of her children in her room. And, agreeably to the plan pursued in other matters, the visit led to some valuable discourses on the bed-room and its furniture.

“Nothing,” observed Mr. Paterson, “contributes so much to health as well-aired and clean sleeping apartments. When the body is actively employed in the daytime, it can resist many infectious and offensive things, which would injure it very much during the inactive hours of sleep.

“The poor often suffer for want of sufficient covering, while they sleep; and it is possible, indeed almost certain, that some of the rich suffer more, especially in their youth, from too much covering, and too closely confined sleeping rooms.

“Bed-rooms should be as high in the roof of the house, and as large in dimensions, as possible. The windows should not be lower than the stock of the bedstead, that the supply of air may not come in too low. Fires in bed-rooms are unwholesome; and should never be resorted to, except in cases of absolute necessity, as sickness, or to carry off damps; but a chimney, or some means of ventilation near the roof, will contribute greatly to the health of the sleeper.

“The proper furniture of the bedchamber, considered merely as such, consists of the bedstead, the pailasse, the mattress, the bed, the curtains, or fur-

niture, as they are technically denominated, the linen, or sheeting, the blankets, and the counterpane. The quality, and even the number of these articles, varies with the taste and wealth of the owner.

## BEDSTEADS.

“ Bedsteads are made of various materials. In England, they are generally of timber, sometimes of iron, and very rarely of ivory. For the richer sort of bedsteads, mahogany, or other fine timber, is used; for inferior kinds, beech, or the black birch of America. The former are usually carved, and otherwise richly ornamented; the latter are stained with a kind of dye. Sometimes, those of beech are painted and varnished, to resemble the finer woods, or cane.

“ Very costly bedsteads have been made of ivory; and the northern nations have very beautiful bedposts made of the horns of the narwhal, which are straight, finely tapered, twisted somewhat like a rope, and of the colour of ivory.

“ We read of the iron bedstead of Og, king of Bashan, so long ago as the days of Moses: it was nine cubits in length, which, upon the most moderate calculation, would be long enough for two tall men of the present day. From that time, till within these last few years, we hear nothing of iron bedsteads; but they are now common for barracks, hospitals, workhouses, and even in private houses, for servants, as they are good preservatives from vermin, and very durable.

“ Bedsteads get different names, according to their form. A *four-post bedstead* consists of four pillars, united to the frame, and supporting a canopy,

in the drapery of which are concealed the rods for the curtains to run upon. Two of these pillars, or posts, are hidden by the drapery at the head of the bed; the other two, at the foot, are exposed, and generally ornamented with carving. The handsomest beds are usually of this description; and instead of sacking, for the support of the mattress and bed, they have stout wooden rails passing from side to side, which keep the bed level when the sleeper is in it, and render it more wholesome.

“*Tent bedsteads* have four posts; but they are shorter than those just described; and the roof, or tester, is raised in the middle. A slight variation in the form of the head, changes the tent into a *camp bedstead*. These also, frequently, have rails in lieu of sacking.

“*Half-tester bedsteads* have posts, sometimes two, sometimes four, at the head, supporting a tester much shorter than the length of the bedstead. They have also a joint, which admits of the lower part being turned up, when not in use; which is very convenient in small rooms.

“*French bedsteads* are destitute of pillars; and, without their drapery, are denominated *stump bedsteads*. By means, however, of a pole fixed in the wall, against which the bedstead stands, a drapery is thrown over it, which makes it very warm; but though much in vogue just now, it is not so airy, nor consequently so wholesome, as the others.

“*Truckle bedsteads* are not now much used. They are sufficiently low to allow of being run under a higher bedstead when not wanted. They were formerly used for young children; being drawn out

at night, and put back in the morning. *Cots*, and other contrivances for infants, have put them out of request.

“*Press bedsteads* are also now out of fashion. They served the purpose of sleeping upon by night; and by day were turned up into their cases, which were imitations of clothes-presses, or wardrobes: some of which, made of the best materials, were very handsome pieces of furniture. These are especially used by persons who want the bed-rooms for other purposes in the daytime.

“For the convenience of moving them about, bedsteads are placed on casters, or small wheels, which have a twofold motion, so as to move in any direction; as you must have observed is the case with tables and other large furniture.

## PAILLASSES AND MATTRESSES.

“The first thing laid upon the bedstead, on which we repose, is the *PAILLASSE*, or straw bed, as its name, borrowed from our French neighbours, implies. It is made very thick, and enclosed in a ticken or cranky case: the former being finer than the latter. Both these articles are best when made of flax, or hemp; but much of both is made of cotton. These are sometimes called *straw mattresses*, but rather improperly.

“The *MATRESS*, which lies between the *paille* and the bed, was originally a thick quilting; as, indeed, it may still be considered, though its thickness is so much increased, that it bears a stronger resemblance to a bed. It consists of a ticken case, stuffed with hair, wool, or flock, and sometimes with

moss, or sea-weed ; some mattresses are also made of the scrapings of whalebone. After the case is filled with any of these materials, it is quilted ; that is, sewed through, at intervals of about three or four inches, to keep the stuffing in its place. Mattresses made of hair are the best among those I have enumerated, as they are most elastic and most durable ; as well as more wholesome for sleeping upon. Wool is less elastic than hair, and liable to felt, or work into lumps. Flocks, which are the refuse of wool and dressings of woollen cloth, are still worse. Perhaps the best of all mattresses are those, of recent invention, which consist of a perfectly tight case of cloth, filled with air. The cloth, in this case, is coated with a solution of India-rubber, or some other elastic substance of the gum kind, which renders it impervious to both air and water.

#### FEATHER BEDS.

“Next to paillasses and mattresses, BEDS naturally fall under consideration. They are usually of feathers, down, or flocks, enclosed in a case of strong linen or cotton cloth, woven in a peculiar manner, and called *tick*, or *ticken*. *Goose feathers* are the best for this purpose, as being most elastic ; and, as I remarked the other day, in our lecture upon the dinner, large flocks of geese are kept in the fenny parts of Lincolnshire, from which a very considerable supply of feathers is obtained, in a way that made you shudder at the recital. Other places, in the British dominions, supply goose feathers ; those of Somersetshire are the best, while those of Ireland are the worst. *Duck feathers*, being weaker than

those of the goose, are inferior to them ; and *turkey's feathers* are worse than any. *Cock and hen feathers*, or feathers of the common poultry, are much used for bedding ; but they are neither so soft, nor by any means so elastic, as goose feathers : they are also apt to roll into lumps, and render the bed uneven. Great quantities of these are imported from Dantzic ; and the London poulterers deal largely in them, as well as in those of ducks and turkeys. From Hudson's Bay, we also receive considerable supplies of fine feathers, supposed to be of the goose kind.

“ When the feathers have been plucked from the poor geese and other birds, they are spread in a room with an exposure to the sun. When fully dry, they are put into bags and beaten with poles, to clear them of dust ; after which they are ready for use.”

## DOWN BEDS.

Richard remarked, that he had once slept upon a DOWN BED, at his grandpapa's ; and thought it wondrous nice at first,—it was so soft ! But he soon found himself so overheated by it, that he wished for morning, that he might get from it.

“ Down beds,” replied Mr. Paterson, “ are certainly unhealthy, especially in warm weather. In summer, I think, a mattress much more wholesome ; and in winter, the goose feathers are soft enough and warm enough for me.”

“ But what is down ?” asked Louisa.

“ Down consists of the very fine feathers which cover the breasts of certain birds, for the most part of the duck kind. That of the eider duck is most

esteemed, and is imported from Hudson's Bay, Greenland, Spitzbergen, Iceland, Lapland, and Norway. Our own Hebrides and Orkneys also breed numbers of these birds, which afford a profitable branch of trade to the poor inhabitants. They breed in the north of Scotland; but are rarely seen in England, so far southward as Durham. Down from the swan is likewise brought to us from Dantzic, but is less in request than that of the *eider duck*.

“ This down, which is so much valued, is plucked by the parent bird from her breast, to line her nest, and to protect her young from the cold. The quantity found in a single nest is said to be sufficient to fill a man's hat; yet so light as to weigh not more than three quarters of an ounce. Three pounds of this down may be compressed into a ball scarcely larger than one's fist; yet so elastic and dilatible as to fill a quilt five feet square.

“ In the countries I have just enumerated, the eider ducks associate in vast flocks, having favourite breeding-places, usually on small isles near the shore; and their nests are sometimes so close together, that a man can hardly walk among them without treading on the eggs. The inhabitants watch their laying, the season for which continues about two months, and take some of their first eggs for food. About once a week, they also seize a great part of the down with which these fond creatures line their nests; gaining about half a pound of down from each nest in the course of the season. When the natives visit a nest, they carefully remove the sitting duck, and take away what they deem the superfluous down, and eggs. Then they replace the parent bird,

which begins to lay afresh, covering the eggs, as before, with down from her breast. When she is incapable of affording more, the drake comes to her assistance, and covers the eggs with his down, which is white. When the young have left the nest, it is again plundered.

“The best down, and most eggs, are obtained during the first three weeks of laying; and it has been observed that the ducks lay the greatest number of eggs in rainy weather. The down found in the nest is most valued, and termed *live down*: it is much more elastic than what is plucked from the dead bird, which is little esteemed in Iceland. It is extremely soft and warm; and the natives have not only beds of it beneath them, but coverlets, or thin beds, into which it is quilted, to cover them, instead of blankets.

“Some of the rocks, inhabited by these and other sea-fowls, are more than two thousand feet in height: yet the bird-catchers, suspended by ropes, range over their perpendicular surface, and plunder nests in places to all appearance inaccessible.

## BLANKETS.

“Having described the bedstead and bed, you are naturally enough led to inquire relative to their appurtenances, which contribute so largely to our comforts: I mean the blankets, sheeting, counterpane, and furniture. We will begin with BLANKETS.

“These very useful coverings are made of wool, very loosely spun, and as loosely woven; the object being to obtain them as warm as possible, without being heavy. The best are manufactured at Wit-



ney, in Oxfordshire; and these excel all others in their delicate softness, thickness, and warmth. With the exception of a small coloured edging, blankets are left white, as being the warmest colour. Good blankets have the wool drawn up till it hides the threads on both sides; those of inferior quality have it drawn up on one side only.

#### LINEN.

“ I need hardly explain that the term *bed linen* includes the sheeting and covering of the pillows. These are usually made of linen; but occasionally of cotton, which some people prefer, as being warmer than linen, and, as they believe, less liable to retain damps. I shall not stop to controvert the latter notion; suffice it to say, that in travelling, I have had to sleep in cotton sheets, and found them very uncomfortable. Our business, therefore, shall be with linen, properly so called.

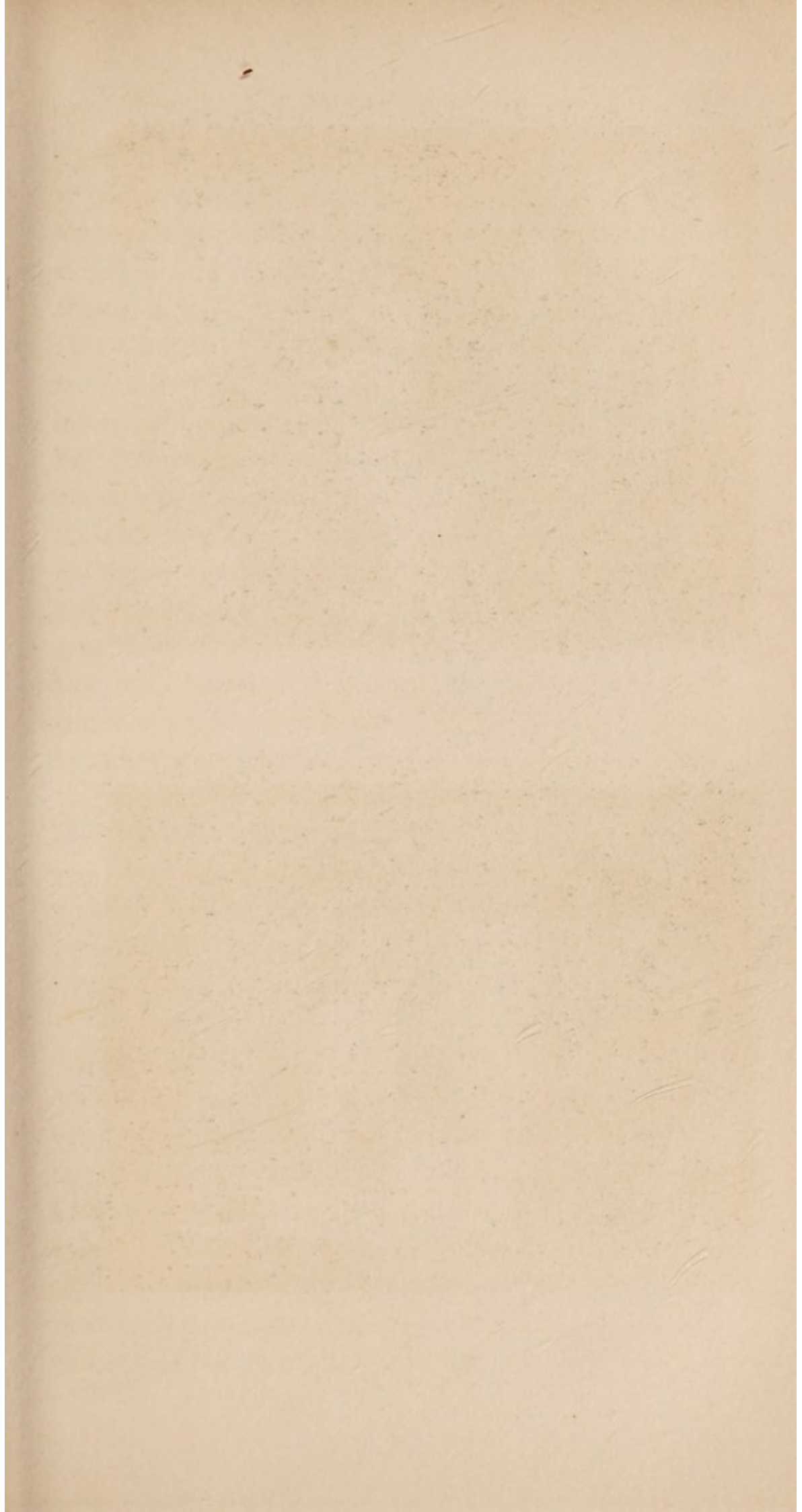
“ Linen is a vegetable product, derived from flax or from hemp, according to the quality of the cloth. The flax plant, which is also called *lin*, from the Latin *linum*, whence the term *linen*, thrives best in a strong soil, under rather a cold climate. The hemp plant, though a native of India, grows well in cool countries. Both are cultivated in Britain, Ireland, and other parts of Europe; but Russia is the principal country for their growth.

“ Flax, when growing, is rather a handsome plant, with blue bell-shaped flowers. The seeds, which are contained in a dry berry, or capsule, yield, on pressure, a large quantity of oil, well known to painters under the denomination of *linseed oil*.

“ The seeds of flax are sowed every year. The plant grows upright, and rather straight, with a smooth round stem, full of leaves. This stem is called the *boon*, and the more slender it is, the better the flax. In order to procure the boon of this slender quality, the seed is usually sowed very thickly. When the blue flower of the plant begins to turn brown, or rather before, the plant is pulled up, dried, and threshed, to get out the seeds. The latter are allowed to ripen fully only in quantities sufficient for the next year's sowing, for if the whole crop be suffered to stand till the seeds are quite ripe, the flax becomes dry and of inferior quality. After threshing, the plants are steeped in water, for the purpose of loosening the fibrous skin, or rind. It communicates a black tint and very offensive flavour to the water; and if steeped in a running stream, it poisons the fish. It is sufficiently steeped, as soon as the boon will snap asunder when dried. The flax is then taken out of the water, and spread on the ground to bleach; and though it injures the water in which it was steeped, it improves the grass upon which it is laid to dry. In the course of drying, a great part of the coloured skin falls off, and then the boon is broken, by being passed between the grooved rollers of a mill. It is now ready for the flax-dresser, who reduces it to the proper degree of fineness by drawing it through a hackle, which consists of a number of sharp steel needles fixed upright in a block. Of late, some manufacturers dispense with the steeping and drying, and pass the flax at once through the rollers, and then hackle it. But this practice is not general.

“ The flax is now reduced to *tow*, in which state it goes to the spinner. If intended for cloth, it is loosely spun into *yarn*; but if for sewing and similar purposes, it is spun more tightly, and becomes *thread*. In ancient times, the only instrument for spinning was the distaff, which was merely a stick, with some flax twisted about one end, and held at the other uprightly in the arm, or between the knees, while the spinner, with her fingers, drew out and twisted the thread. In later times, it was, and, in some places, still is, done with a spinning-wheel, which turns round very rapidly, and twists the yarn as fast as the woman’s fingers can draw out the flax in fine threads. The dexterity of the spinner consists in drawing out the thread fine and even, and giving it an equal twist throughout. In most places of Great Britain, these wheels have been superseded by mills, which, spinning many threads at once, in very little time, have greatly reduced the price of linen yarn, and produce a much finer article. If you examine the threads of which cambric, or some of the finer laces are made, you will admire the delicacy and fineness with which a yarn may be drawn out from the flax or lin plant.

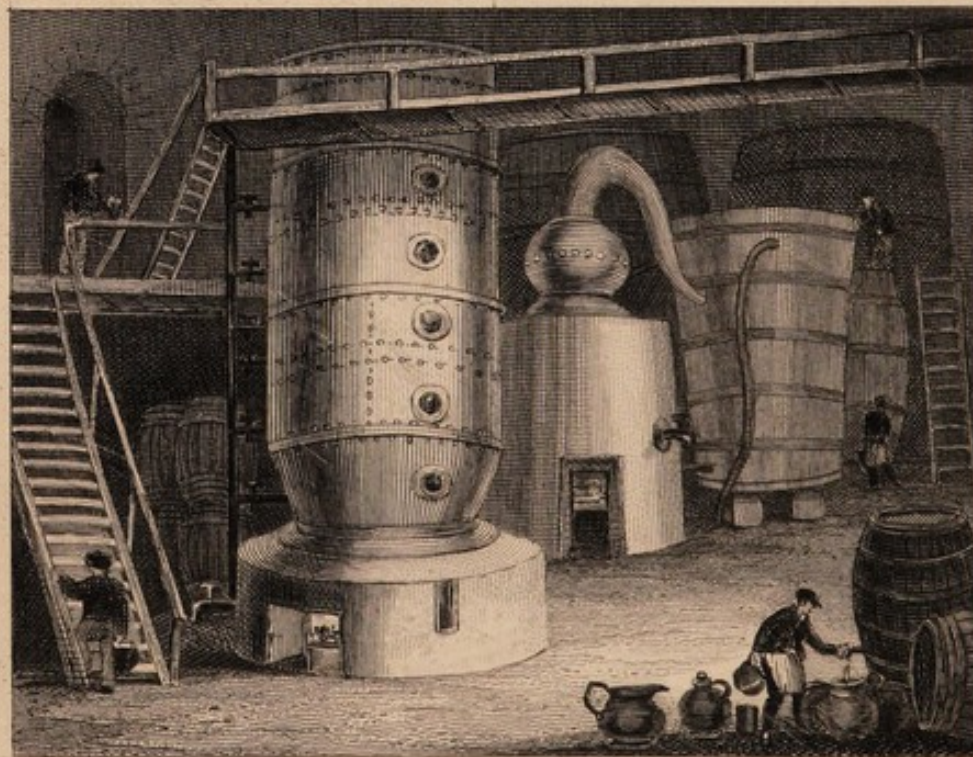
“ Hemp is coarser and stronger than flax; and linen made of it is in great esteem for its durability. The hemp plant belongs to the nettle family, and grows very tall. The seed is sowed in April, and the plants are fit for gathering soon after the wheat harvest. They are plucked up by the roots, made into small bundles, and left to dry upon the field. When sufficiently dry, they are threshed with a flail, as well to get out the ripe seeds, as to loosen the





page 174.

*Flax Spinning.*



page 109.

*Distillery.*

*Pub<sup>d</sup> June 1. 1839 by John Harris. S<sup>t</sup> Pauls Church Yard.*

rind. The outer husk, being of no use, is cleaned off; then the plants are laid in water to soak till the proper bark begins to separate from the stem. They are then cut into suitable lengths, and dried; during which the fibrous bark becomes a parcel of strings. To reduce these into tow, the hackler, or comber, takes them in hand, and subjects them to a process similar to that which I have spoken of with regard to flax. One end of a handful of fibres is thrown upon the hackle and drawn out quickly, then the other end. This is repeated upon hackles of different degrees of fineness, till the whole mass of fibres is brought into very fine threads; in which state it is called *tow*.

“The tow is then spun into threads, which are finer or coarser, according to the work for which it is intended. If for finer work, as sheeting, shirting, &c. the operation is much the same as with flax. But hemp is much more extensively used, as for twine, cordage, ropes, cables, canvass for sails, netting, and many other articles, requiring strength and durability. The spinning, in this case, is performed by a man, who winds a wisp of tow around his waist, so that the two ends may meet before him. With the fingers of his left hand, he unites a few of these ends together, which, with the thumb and finger of his right hand, he draws out into a rude kind of thread, and slightly twists it. This beginning of a thread he fastens upon a hook, which by means of a wheel turned by a boy, is made to revolve with considerable rapidity, and strongly twists the thread as he draws out more tow. As the thread lengthens, he walks backward, spinning as he goes, till he gets

to the end of the spinning-walk. The end is then removed from the hook to a reel upon which it is wound up, and he begins another length. Being longer and stouter than flax, the tow of hemp does not answer so well for mill spinning.

“Hemp is of various qualities: that of India, called *sunn hemp*, is very long; as is also the hemp grown in Italy. This is reckoned best for bow-strings.

“After spinning, the thread, whether of flax or hemp, passes to the weaver. But as we have already spoken of weaving, in the discourse upon carpets, and shall have occasion to advert to it again, I shall not at present detain you with a detail of the process, the main principle of which is the same for all articles. Long threads, called the *warp*, are drawn out in the direction of the length of the intended cloth; and these are intersected by the *woof*, or threads in the direction of the breadth, which are thrown in by means of a shuttle.

“The linen, when it comes from the weaver’s hands, is of a light brown colour, which is got rid of by BLEACHING. First, the linen is steeped in water, to loosen the threads; and to facilitate this process, bran is added to the water, to soften it, and give it a slightly dissolving power. The linen is then well washed, and spread on the grass to dry. The next operation is that of *bucking*, or soaking it in a strong ley, made of wood-ashes and water; after which it is again washed and spread out to dry. This washing and drying must be often repeated; for if any salts of the ley remain in the linen, it will become rotten, and drop into holes. Carelessness in this

respect is as detrimental to the cloth as bleaching it with a chemical acid: and it sometimes happens that a piece of linen truly warranted to be grass-bleached, is much worse than another that has been bleached with muriatic acid. After bucking, the cloth must be soured, that is, steeped in sour milk, or butter-milk, mixed with an infusion of rye meal, to enhance the acidity. This causes a kind of fermentation; after which, the linen must be well rinsed, and frequently washed with soap and water, to get out all the oily colouring matter, which made it look brown, and which has been loosened by the previous operations; so that at length the linen becomes delicately white.

“ Bed linen is generally made of flax; yet the stoutest and most durable is of hemp. The Suffolk hemp is particularly in esteem for sheeting, as it is said to outlast every other material, when once made up.

“ In England, the manufacture of linen is not on an extensive scale; Leeds, in Yorkshire, and a few other places, have large linen establishments; and Chester was formerly a mart for linen, especially at its two fairs. In general, however, the woollen manufacture takes more of our attention, as being of superior importance. In the eastern districts of Scotland, several towns are engaged in weaving linens of various descriptions, and in spinning thread for sewing. Glasgow, Paisley, and their vicinities, are eminent for these articles.

“ The finer linens are made in the north of Ireland, where the soil and climate are favourable to the growth of flax; and here it is that our linen



manufacture, as a national concern, appears to the best advantage. IRISH LINENS are very various in their degrees of fineness; but all are of excellent quality. The town and district of Coleraine are celebrated for the superiority of the linen there manufactured. The exportation of linen, from Ireland to England, is very great; and the value of the trade is said to be beyond calculation. Belfast, Carrickfergus, and Londonderry, are each central points for the linen trade of the adjacent parts. At Lergan, a great market is held for the sale of linen. At an early hour in the day, the finer fabrics, distinguished by the name of *cambrics*, are sold; at eleven o'clock in the forenoon, the drapers in attendance mount upon stone standing-places, and around them assemble the weavers, each with the piece he has finished. When the price is agreed on, the drapers write their names upon the pieces they have respectively purchased; and the sellers carry them to their warehouses. At twelve, the market closes; but an additional hour is allowed for measuring the pieces, and paying for them. About 3000 pieces are thus disposed of every week. At Dublin, is a public linen hall, for the sale of this important fabric.

“The names of the different kinds of linen are all Dutch or German, with the exception of *cambric*, which is derived from Cambray, in France.

“Notwithstanding the quantity of linen manufactured in England, Scotland, and Ireland, our commerce is largely indebted to foreign supplies of this article.

“Russia exports great quantities of a coarse, but very durable kind, made from hemp. Russia sheet-

ing, as the good housewives say, lasts for ever; and her towelling is accounted the best.

“Several countries of Germany have extensive manufactures of linen, very fine in texture, and brilliant in the figures woven in them.

“France boasts of the delicacy of her linens; and Cambray has furnished *cambric*, well known for its great beauty; being thin, even, and splendidly white. It must be admitted that the Scots have emulated the French in the manufacture of this article with great success.

“Holland furnishes a linen which is in high esteem for its beauty, and the fineness of its texture. The province of Zealand, lying low, grows flax of the best kind; yet the thread is mostly spun in Germany, where labour is cheaper; the Dutch only whiten and weave it.”

## COTTON.

Louisa, fixing her eyes upon the beautiful Marseilles quilt, which covered the bed, wished to know if that were included under the general head of linen, and to what country we were indebted for so elegant an article. For she supposed, she said, “it must come from a great way off, because it was so handsome.”

“The country which furnishes that article, is our own,” said Mr. Paterson. “It is not linen, but cotton, a vegetable production, which of late years has superseded linen in numerous respects.

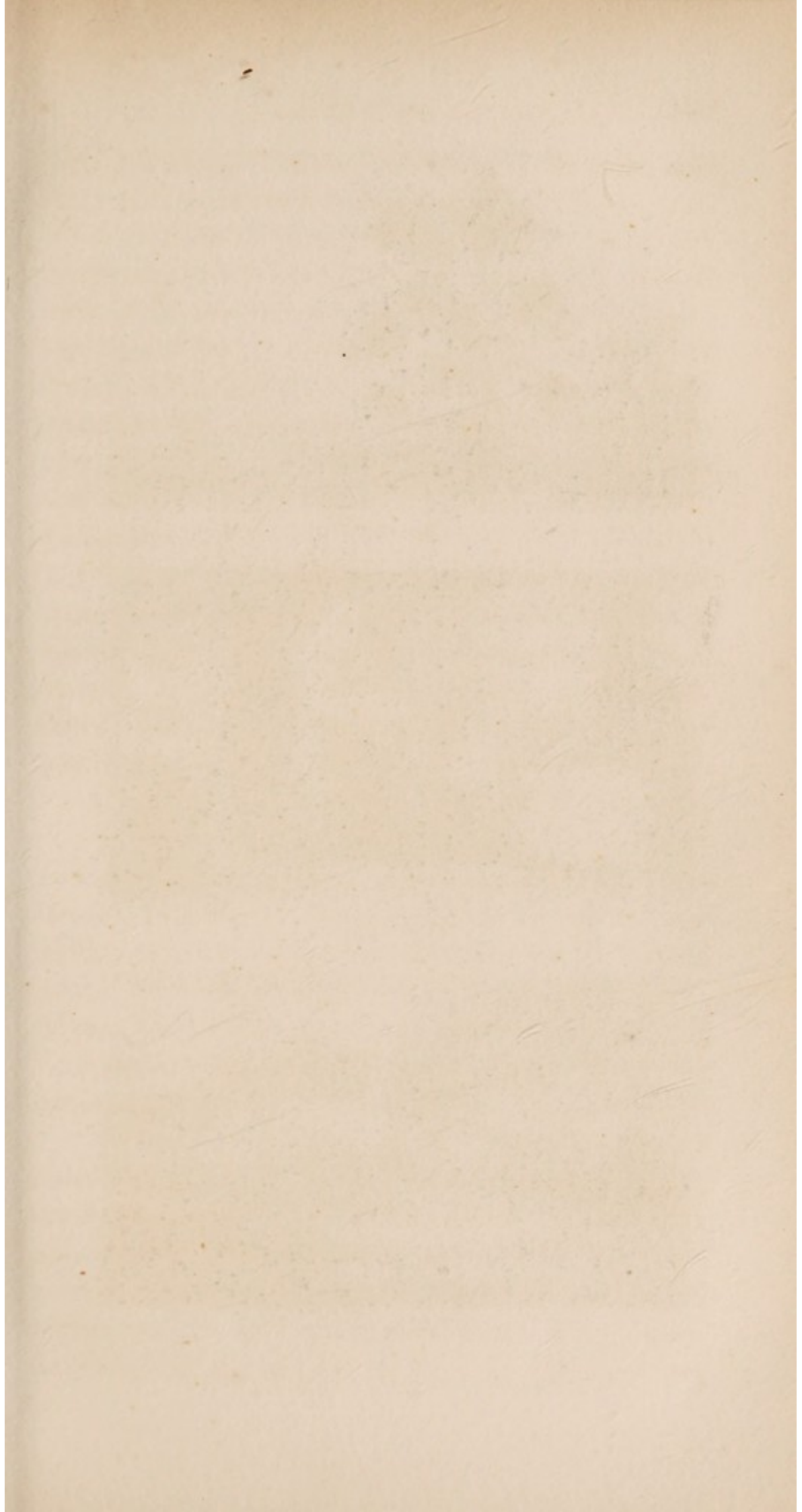
“The cotton plant grows in all the warm climates, whether in the Old or New Worlds. The plantations are laid out with regularity; and as the plants

grow, they are pruned, as well to expedite the production of fruit, as to prevent the plants from running wild. In March, or April, the fruit is ripe for gathering. It consists of a brown pod, containing a seed, enveloped in down, which down is the cotton of commerce. The seeds and their husks are separated from the down, by a mill; and the cotton, packed closely together in large bales, is preserved for sale.

“ Cotton is much cultivated in all the countries of the Levant, or eastern part of the Mediterranean; as the Morea, Candia, and Cyprus, as well as in the islands of Sicily, Malta, &c. also in the country about Jerusalem and Damascus. From these places we receive some simply in the wool, and some, called *bazas*, spun into very fine thread. It is also grown in many parts of America, and in the West-India islands.

“ A great difference exists in the quality of the cottons of different places: for the finer purposes, the best are from Hindoostan, Sea Island (North America), Pernambuco, in Brazil, Demerara, Berbice, and Surinam; for common purposes, cotton from the West Indies, Georgia, and some parts of the East Indies, is good enough. The largest importations of Great Britain are from Hindoostan and America.

“ The packing of cotton is worth an observation. A large bag, two or three yards in length, and above a yard in width, with its mouth held open by two cross pieces of timber, is supported, in an upright position, by posts, strong and high. The packer gets into this bag, and while an assistant throws in





*Page 180.*



*Page 213.*



*Page 248.*

small parcels of cotton, he treads them down, and forces them in every direction of the bag, into the smallest compass he can; so that the bag, when filled, will contain from three to four hundred weight. This is the ordinary method of packing; but as the commodity is very elastic, it is capable of much greater compression; to effect which, the aid of powerful machinery is called in, and thirty or more packages are brought into the compass of one. In this state, it lies so close as to be little less than solid, and enables a ship to take a larger quantity, so as to render her voyage more profitable. On its arrival in England, the cotton, when unpacked and pulled out, recovers its original springy lightness.

“In Hindoostan, the manufacture of cotton is simple; and the superiority of the Indian fabrics may be attributed entirely to the fingers of the natives, which are far more delicate in form and touch, and, consequently, better adapted for nice work, than those of any other people. The Hindoo females spin from the distaff, of which I have before given you some general idea; or, now and then, they have a wheel of the most simple construction. They work the thread with their fingers, and moisten it with their saliva; and, although it costs much more than what is manufactured in this country, it is far more durable. In consequence of this superiority of the thread, the fine Indian muslins are free from that woolly surface, which appears upon those of British manufacture, and which is frequently got rid of by singeing them over a tube of red-hot iron, a process that unavoidably deteriorates the quality of the muslin.

“ In England, the first process with the cotton, after the bale has been opened, is loosening it by beating. It is then carded, or torn asunder, by means of small steel hooks set in leather, and nailed upon a board. In this the flakey cotton is first entangled, and then forced from it by another instrument of the like kind, which, being drawn over it with the teeth in a reverse direction, tears open the matted substance, lays all the fibres one way, and brings it to the flocky state of fine wool.

“ The process of carding is now effected by very ingenious machinery, which expedites the work in an astonishing degree, and also performs it with greater regularity than could be possibly obtained from the old method of hand carding.

“ But little progress could be made in a day, or even in a week, in the spinning of cotton, one thread at a time, by one pair of hands. The thread, also, being formed by the finger and thumb, was liable to great unevenness. Yet, in the year 1767, all cotton spinning was thus conducted. Some unsuccessful attempts had indeed been made to save labour, by the use of machinery. In the year I have mentioned, a plain but ingenious man, named Hargrave, of Blackburn, in Lancashire, invented for himself a machine, which he named *Jenny*, by which he could spin eight threads at a time. It was, however, better adapted to what is called the *woof* in cloth than for any other purpose. His invention was quickly imitated, and so far improved as to spin twelve and even sixteen threads at once. The work-people became alarmed at the success of this invention, and fearing it would supersede the necessity

for their labour, they rose in a tumultuous manner, and destroyed the machines wherever they could find them. At Nottingham, however, Mr. Hargrave was supported, and he erected machines there capable of spinning from twenty to eighty threads. Soon afterwards, Mr. Arkwright (subsequently Sir Richard Arkwright), a native of Lancashire, invented another machine for spinning cotton, and obtained a patent for it in 1769; he followed this invention by other improvements, until he had succeeded, in 1775, by a combination of machinery, to carry the cotton through its various processes, and make it ready for the weaver or the sempstress, with the utmost exactness and equality, and with surprising celerity. From a humble station in life, he raised himself, by dint of persevering ingenuity, to wealth and fame; and at last, while serving the office of high sheriff for the county of Derby, received the honour of knighthood.

“ That the pliant fingers of man or woman should be superseded, or even excelled, by a pair of rollers, whirled round with incredible velocity by a steam or water engine, is certainly an astonishing effort of human art. But so it is; and a thread much finer, more even, and stronger, is the result. The great object seems to have been to invent a substitute for thumbs and fingers: for this purpose, two cylinders were placed with their surfaces almost close to each other, and both revolving at the same time. The cotton, brought into *rovings*, that is, in long rolls, about the thickness of candles, is inserted between these cylinders, which, turning, draw it out, while a spindle twists it into a coarse thread. From



these cylinders, the cotton passes to a second pair, moving more rapidly, and drawing it out to a still greater length, rendering it finer than the first; for if the second pair revolve five times as fast as the first, it will make the thread five times as long, and, there being only the original quantity of cotton, five times as fine. By repeating the process through different pairs of cylinders, every succeeding pair increasing in the velocity of their rotation, the thread is brought to any degree of fineness; while the twisting of the spindle gives it firmness and tenacity.

“A cotton manufactory is now a very large concern, carried on chiefly in extensive buildings, where steam-engines, or if a stream of water can be had, large water-wheels, are the moving power. Some of these manufactories contain several thousand spindles; and are of such extent as to spin at the rate of a thousand yards of twist, or warp yarn, in a minute. The number of hands employed in them is so great, that it is not uncommon for the weekly wages of a single factory to amount to five hundred pounds.

“Cotton spinning is carried on in many parts of the country; but its principal seats are in Lancashire, in England, and Lanark, in Scotland. Manchester is the great centre of the English cotton trade, as is Glasgow of the Scottish. Ireland has some manufactories of this article, but they are comparatively small.

“The manufacture of the cotton yarn into fabrics is more widely distributed than the spinning. Cheap plain fabrics are manufactured near the spot where the yarn is spun; but finer sorts generally at a distance. Frame-knitting, an exceedingly ingenious

process, by which net-lace, stockings, and indeed every kind of chain work, is produced, is most extensively practised at Nottingham, Leicester, and in the neighbouring districts.

“The printing of cotton, a very ingenious process, of which I shall hereafter take notice, is carried on at many places: and some of the best work, known by the name of *town print*, is done in London and its vicinity.

“The great advantage of skill in manufactures appears strikingly in cotton. One pound of East-India cotton in wool, has, when spun into yarn, been raised in value to five guineas; and, afterwards, when woven into muslin and ornamented with needlework, it has been worth fifteen pounds; yielding a profit of almost six thousand per cent. on the raw material.

“Seventy years ago, the cotton trade in Great Britain was very insignificant; and even fifty years since the whole value of cotton goods manufactured by us did not amount to two millions sterling; yet the price to the consumer was very high. At present, the goods manufactured every year in this country are worth more than thirty millions sterling, although the price is not much above a tenth of what it formerly was: so that we may safely affirm the value of the manufacture has increased a hundred-fold in fifty years.

“Hindoostan is the country whence fine cottons were first imported into Europe; and many of the names given to cotton fabrics are of Hindoo origin. At present, so completely is the case altered, we have in Great Britain at least five millions of *mule spindles*, for so is the machinery called which spins

the finest yarn. These produce as much as five millions of Hindoo females could spin with their fingers; and the whole management of the spindles gives employment to about eighty thousand persons. Hence we now supply the weavers of Hindoostan with cotton yarn at less than half the price it could be spun for them in their own country.

“The quantity of cotton yearly imported into Great Britain amounts to upwards of three hundred millions of pounds. Of this immense quantity, some is exported again; but the greater portion is made up into cloths of various descriptions; such as *fustians*, which are thick but coarse woolly cottons; *velveteens*, or coarse velvets; and *corduroys*, or striped velvets; all which are much used for the dresses of working people, being both cheap and durable. A great number of the coarser sorts are exported to Germany, whence, in return, we receive wool for our fine broad-cloths.

“*Jeans* and *dimities* are also of cotton; as are *stockings* and *gloves*, either knit or frame-worked. *Under clothing* and *sheeting* are frequently made of it, as being cheaper and warmer than linen.

“*Muslins* are the finest sort of cotton cloths, forming the lightest, most transparent, and beautiful dresses for females. Originally, muslin came from the East Indies; but it is now made equally fine at home. The chief manufacture in Great Britain is at Paisley.

“*Calicoes*, so called because they were originally brought from *Calicut*, in the Hindoo peninsula, are thicker and coarser than muslins, being made of larger threads.

“ These are the common fabrics of cotton, which serve various domestic purposes ; and when printed, or stained with different colours, form very cheap and generally handsome female dresses, for ordinary uses.

“ Cotton thread for sewing has been brought to such great perfection, that it has almost superseded the thread made of flax.

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### COUNTERPANES.

“ HAVING dilated thus much upon the material, it is time to advert to the article which gave rise to the present dissertation. This counterpane, also called a *quilt*, is composed of cotton. It comprises two webs, between which a quantity of cotton wool is laid to raise the figures in the pattern ; hence it has the appearance of two sheets with a wadding between them, to confine which in its place, the sheets are sewed or quilted together. Such was the original quilt, or counterpane, specimens of which are still to be met with in country parts. They are worked with a needle in various patterns ; but these products of our machinery at once imitate and excel them. The best sort of the needle-worked counterpanes come from Marseilles, in the south of France, whence they were called *Marseilles quilts* ; a name retained by those which are loom-worked, though made at Manchester.

“ You may frequently meet with a more ordinary sort of counterpane, made with very thick threads in the woof, and raised in knots, or loops, in various

figures. These are single webs, and not so warm as the others; but, being cheaper, are more in use in the middle ranks of life.

“For very common purposes, a kind of counterpane is woven, of various coloured worsteds, in cheques, or squares. These are known under the names of *rugs* and *coverlets*.

“Some persons are fond of amusing themselves with making *patchwork* counterpanes, consisting of a number of shreds of printed cotton, of all the patterns they can collect, cut into diamonds, rounds, squares, and other figures, and neatly sewed together. When completed to the required size, this piece of patchwork is quilted down to a plain sheet of cotton with a wadding of cotton wool between the two surfaces. Works of this kind display somewhat of taste, though, I fear, not a very correct one, and evidence the patience and perseverance of the maker; but I always think, when I see a counterpane of this kind, that the time consumed upon it might have been better employed.

#### BED FURNITURE.

“The hangings, or curtains, of a bed, with their accompaniments of bases, valances, headcloth, and testercloth, are denominated *the furniture*. It generally consists of the same substances with the drapery, or window-curtains, of the bed-room. In hot climates, where people are annoyed by the large species of gnats, called *mosquitoes*, the beds are closely covered round with very thin gauze, to keep off those noisome insects, without excluding the air.

“The most elegant kind of bed furniture is made of silk damask, fringed and otherwise trimmed with

gold and silk twisted together. Next in value, is the moreen furniture, such as I have described in the parlour, when treating on the curtains there.

“ But the most generally used, as being the most cleanly and the cheapest, is of printed cotton, such as the furniture now before you. Cottons of this kind, when of coarse quality and stained with few colours, usually bear the name of *printed calicoes*, or simply *prints*; but when fine in fabric, and covered with richer and more numerous colours, they obtain the denomination of *chintz*, or *chintz patterns*, as being imitations, or rather improvements, of the original chintz, which was formerly imported from India, and bore a very high price. They are now printed in England, and are reckoned superior to those they imitate.

“ The printing of cotton is in many respects curious, and, as such, an object worthy your curiosity and attention. Some cottons, or *calicoes* as the workpeople call them, are figured by the use of different coloured threads in the weaving; these are either *stripes*, *checks*, or *ginghams*; but anything of a varied pattern, in device or colour, is printed.

“ Two methods are in use for this purpose; one is by means of copper plates, on which the patterns are engraved. The lines cut by the engraver are filled in with colour; and after the surface of the plate has been cleaned, so as to leave no colour except in the lines, the calico is laid upon it and violently pressed with a roller, which forces the cloth into the engraving, so as to imbibe the colour. Most of you have seen the processes of engraving and printing a picture, and this is much like it: in

one case the impression is taken upon paper softened by wetting, in the other upon cotton cloth.

“ The other mode of calico printing is by means of wooden blocks. The pattern is drawn very correctly upon a block of smooth hard wood, as box or holly : then all the parts between the strokes of the pattern are cut away, so as to leave the pattern raised upon the surface of the block. This is dabbed over with colour, and by pressing it forcibly upon the cloth, an exact copy of the pattern will remain upon it, whether of flowers, birds, or ornamental sprigs, as you see them on this curtain.

“ By one of these methods, an outline is obtained, which is afterwards filled up with gay colours; in the best chintzes, by hand, with a camel’s hair pencil; but for ordinary prints, with blocks, one of which is cut, as I have already described, for each colour.

“ Previously to the printing, the calico is dipped in a strong solution of alum, or some similar astringent liquid. This is called the *mordant*, a term borrowed from the French, and signifying *biting*, because it makes the colour *bite*, or hold, upon the cloth; it also gives brilliancy to the tint. Sometimes, instead of printing with colour, the pattern is printed with this mordant; and when it is dry, the cotton cloth is dipped in a dye of the requisite tint. The cloth, of course, comes out all of one colour: but, after repeated washings, the dye disappears except where the mordant was printed, and there the tint remains in great brilliancy. This process of printing with the mordant, dyeing, and washing out again, must be repeated for every colour wanted for the pattern, and is very troublesome and expensive;

but it is deemed to hold firmer than by any other method.”

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## THE WARDROBE.

“ The clothing of the English is derived from a great many places ; yet we make more clothing, and employ a much greater number of hands in its manufacture, than any other country.

“ An English lady, though but moderately well dressed, may have upon her person articles brought from all the four quarters of the world : such as linen of Europe ; cotton and fur from America ; leather from Africa ; and silk from Asia. Then if the ornaments and jewels, with which she decorates herself, be taken into the account, we shall scarcely find time to enumerate all the places whence they are brought ; and even the sea itself, which furnishes the coral or the pearls for her necklace and ear-rings, must not be left out of the catalogue.

“ Thus a well furnished wardrobe becomes, if not a system of geography, at least an index to the produce, commerce, and manufactures of many nations.

“ No article of clothing, in civilised society, is obtained immediately out of the ground ; it must have a preparation from either the animal or vegetable tribes, to make it fit to defend the human body from the inclemencies of weather, or to ornament it. Cloth for gentlemen’s use is made of wool ; sometimes of a mixture of the lighter kinds of wool and silk or cotton, or both ; the more ornamental are of silk. But linen, cotton, and silk,



more usually constitute the clothing of females. Silk, wool, furs of all kinds, and leather, are animal substances ; cotton and linen are vegetable.

#### HATS.

“ For our hats, we are indebted to the sheep, the rabbit, and the beaver ; occasionally, some other animals render their assistance, but none so largely as the poor silkworm. Some hats are altogether vegetable, being plaited or woven of straw, willow shavings, grass, palm leaves, and other substances. The hats commonly called *beaver hats*, (though for common purposes they have no beaver on them,) consist of wool and rabbits’ fur, entangled together into a sort of cloth-like substance, called *felt*. It is said, that the invention was the effect of accident, as indeed many of our best inventions are. Clement, surnamed the Saint, who was fourth bishop of Rome, fleeing from persecution, had his feet blistered ; and to evade the torture to which this subjected him, he stuffed some wool between the soles of his feet and his sandals. As he continued his journey, the wool, from the continual motion and pressure of his feet, became so matted as to resemble cloth ; and when Clement settled at Rome, he improved the discovery, and is still accounted the patron of hatters, who, in Roman Catholic countries, hold a festival on the day dedicated to him, 23d November.

“ Whether this legend be founded on fact, or otherwise, I cannot determine ; and therefore return to the process of hat-making. The sheep’s wool, being cut short, is mixed with the rabbits’ fur, by beating it with a kind of bow-string ; which spreads

out the materials regularly, till, by means of the little barbs at their extremities, they so adhere together, that the whole mass may be handled. This is called a *batt*: a second batt is added to it; and by dint of pressure, properly applied, the hairs and wool are made to unite, so that the two batts become one. It is now a *felt*, and undergoes an operation, called *basoning*, in which it is pressed about with the hand for a length of time, and occasionally sprinkled with water. The next operation is *soaking*, in which the felt is worked upon a plank in hot water slightly tinctured with sulphuric acid. During this operation, some beaver fur is laid on the outside of the felt, to give it a glossy appearance; but for common hats, the beaver is omitted, and some cheaper fur is substituted. The intended hat is now somewhat like a funnel in form; it is then placed on a wooden block, of suitable shape, to which it is pressed in some parts, and stretched out in others, to give it the proper figure. It is next to be dyed; which is done by boiling it, while still on the block, in a decoction of logwood, galls, gum, verdigris, and green vitriol. After remaining in this liquor about an hour and a half, it is taken out and exposed to the air for about the same time; and this process of boiling and airing is repeated seven or eight times, before it is considered sufficiently dyed. The hat next passes to the stiffener, who gives it a proper degree of firmness, by the application of beer grounds and thin glue. Lastly, when dry, it is again shaped, and acquires a gloss by being moistened, brushed, and smoothed with a warm iron.

“ The goodness of the hat depends much on the fineness of the wool, and the proper felting in of the beaver. The hair of animals is the only article that can be felted ; and the finer it is, the better it felts.

“ Silk hats, which are now as much used as beaver, consist of a coarse felt, made much in the same manner, only without either rabbits' fur or beaver. After being brought into shape on the block, it is not dyed, but stiffened ; and then a fabric of silk, woven somewhat in the manner of cut velvet, is strained upon it, and kept in its place with a solution of shell lac, or of caoutchouc, otherwise India rubber, which not only makes it adhere to the felt, but renders it impervious to wet. Hence these hats are of great use to travellers, who are frequently exposed to rain.

#### STRAW BONNETS.

“ Looking at a bundle of straw, and comparing it with a hat or a bonnet, you must be at a loss to conceive how so beautiful an article can be made of so coarse a material ; more especially when you observe how very brittle the straw is in its natural state. The ingenuity of man has, however, so completely overcome these apparent difficulties, that the work is, for the most part, performed by children.

“ The first thing in this manufacture is cutting the straw, with a very sharp knife, near each joint, into lengths of about eight inches each. The thin outer skin, which is husky and not clean, is then gently scraped off, which leaves the body of the straw of a clear bright colour. In the next place, the straws are tied up in bundles and dipped in

water, after which they are shut up in a box, with holes in the bottom, and placed over burning brimstone, which whitens and improves their colour. For men's hats and common bonnets, the straw is used without splitting; in which case it is flatted by being passed between rollers; but for finer work, each straw is split, by being thrust through a little machine, so contrived as to reduce it into four, five, or six delicate narrow strips. The machine consists of a small tube, just large enough to admit of a straw being thrust through it; and furnished within with several small, thin, and very sharp blades, fixed in the sides, so that as the straw passes, they divide it. The lengths, thus prepared, are called *splints*.

“ The splints, tied up in small bundles, are then carried to the plaiter, who dips a few at a time in water, to make them pliable; and holding some in the left hand, according to the number to be contained in the plait, as three, four, five, or six, presses them with the thumb and middle finger of each hand, inwards, over each other, keeping the bright side of the straw upwards, and occasionally using the fore-fingers to stroke in any straggling splints, or such as do not bend in the proper place. A fresh splint is tucked in before the one in hand is worked up; or if any defect appear in a splint after it has been taken in, it is left sticking out, to be afterwards trimmed off with the scissors. Although the splints are damped, to make them pliable, they must not be wetted too much, nor be allowed to soak in the water, as that would spoil the colour. The plaiter continues her piece till it is five yards long,

rolling it upon a card as she proceeds : four of these pieces constitute a *score* ; and it is by the score that plaiting is sold.

“ From the plaiter the straw goes into the hands of the maker ; who sews the plait side to side, beginning at the middle of the crown, and working round and round till the hat or bonnet is completed. It is then put upon a wooden block, and pressed into more perfect shape and smoothness with a hot iron.

“ From so trifling a substance as straw, it is really surprising to see articles of so much lightness, neatness, and beauty, produced !

#### SILK.

“ There was a time, when, had the simple question, ‘ Where does silk come from ? ’ been put to a person in Europe, he would not have been able to give a correct answer. It is true, that from the time of Alexander’s Asiatic expedition, the Greeks were acquainted with silk, as an article of luxurious apparel ; and the Persians had supplied the Romans with it, down to the time of the emperor Justinian ; but for ages after it had been known in Europe, those who brought it were ignorant of its origin, whether it were a vegetable or an animal product, and equally ignorant as to the country whence it originally came.

“ The great beauty of silk, compared with every other article of clothing, rendered it an object of very general request ; but as it came from a great distance, and passed through many hands before it was fit for apparel, the price was so exorbitantly

high, that only the most wealthy of the Romans could purchase it.

“It was by the commerce of the Red Sea, or through Armenia and Asia Minor, that Europeans received silk, for several centuries after the commencement of the Christian æra. It was said to come from India, or from China ; but on this point, as I have already observed, nothing certain was known. At length, in the reign of Justinian, about A.D. 555, two monks, under the patronage of that emperor, undertook a pilgrimage in quest of this great secret. They travelled to India, and probably even to China, and discovered that the article so much valued in Europe was produced by a species of caterpillar, which we now call the *silkworm*. The jealousy of the natives prevented them from obtaining much information on the subject ; but they did happen to learn that the eggs of the caterpillar might be kept for a length of time in a state of preservation fit to be hatched ; and that the animal’s favourite food was the leaves of mulberry-trees. They wished to bring some of the eggs to Europe, but this was prohibited ; and they were so closely watched, that for a time they seemed likely to return without them. At length, however, they contrived to bring away a considerable number of the eggs concealed in their bamboo walking-staves, such as pilgrims then used ; and distributing them at Constantinople, Athens, Thebes, and Corinth, they were there hatched, and the worms throve as well as in their native country. The rearing of silkworms soon spread through all the countries of the Levant : Greece, Sicily, and several places in Italy, also ob-

tained some of these valuable insects ; extensive manufactories of silk quickly followed ; and the price was considerably lowered. Venice and Genoa were long emporiums of the silk trade ; the manufacture was carried into France in 1489 ; and a company of silkweavers existed in England about forty years previously.

“ Mulberry leaves, especially those of the white mulberry, are the favourite food of the silkworm ; and those trees grow in great abundance throughout the south-east of Europe. The insect appears to be native in China, in which country, as well as in the adjoining districts of Tibet and India, a wild worm is found, which spins a coarse kind of silk, and the poor people collect it in the woods, and make it into clothing.

“ The eggs of the silkworm are about the size of pins' heads, and of a yellowish colour. The insect is concealed within the egg about six months, and then out comes a small black caterpillar with eight pair of feet. It feeds voraciously upon mulberry leaves, so that it cannot be reared in any country where the climate is not warm enough for the mulberry-tree to grow luxuriantly and certainly. The insect will, indeed, eat the leaves of lettuces ; but it does not thrive upon them. It feeds night and day ; the more it feeds, the faster it grows ; and the faster it grows, the more silk it will spin ; hence its voracity is a good sign for those who rear them for profit. The Chinese feed them with fresh leaves every half-hour, day and night. As the insect grows, its coat assumes a milky or pearly colour : at the end of seven days, it has so much increased in size,

that its skin is unable to contain it, and the insect casts it off, having a new skin already prepared beneath. This casting of the skin occurs several times; and just before the fifth skin is thrown off, the worm, or caterpillar, has attained its full size, immediately after which it begins to spin its cocoon of silk. The insect constructs this cocoon from the outside, and works internally, till it has formed itself a bed on which to repose, while it passes through its chrysalite state of torpor. The cocoon, when completed, is about the size of a pigeon's egg; and in this the worm remains about three weeks, at the end of which time it gnaws its way out, in the form of a winged moth, the chief function of which is to lay eggs for another generation of silkworms; and then it dies.

“ Thus the silkworm, taken in all its stages, is an annual insect; in its natural state, it remains in the egg during that period of the year when the trees are not in leaf; it is hatched and feeds when food is most plentiful; and in the summer, when the leaves begin to be dry and parched, it ceases to eat, spins its cocoon, lays its eggs and dies. The number of eggs laid by a single silkworm is from two to three hundred.

“ The substance which forms the silken thread, for which these insects are so much prized, is concealed in the worm's stomach, in two compartments: when it spins, it sends out a thread from each of these, joining them together with a gummy matter, also from its stomach, by the help of two hooks in its mouth. Each cocoon consists of a continued thread, about four or five hundred ells in length, and in weight not more than three grains. The thread,



though twofold, is too delicate and fine for use by itself; several threads are therefore united together, according to the work for which they are intended; this is the business of the silk throwster.

“The method of preserving the eggs, varies in different places; sometimes, the moth is placed on a sheet of paper, with the edges turned up, so as to form a kind of tray; sometimes, upon a coarse linen cloth; in both cases, the moth is placed in a dark room, that it may have no disturbance; and in due time, the eggs are found gummed to the paper, or cloth, with the moth dead. At first, the paper, or cloth, is hung up in an airy room; but not to a hempen line, as that would be injurious to the eggs: in a few days, the eggs are sufficiently dry for the paper to be rolled up, or the cloth to be folded, with the eggs inward, to be put away till wanted in the following season.

“In the early part of the spring, the eggs are kept pretty cool, lest they should be hatched before the mulberry leaves are sufficiently forward to furnish the young caterpillars with food. As soon as these leaves begin to bud, a little warmth is allowed to the eggs, which presently begin to swell and become pointed. The roll of paper is then spread out, and being hung with its back towards the sun, the eggs assume a greyish colour, which in a few days becomes black. Such eggs as have been preserved on cloths are treated much in the same manner, only they are detached from the cloth with water; in either case the eggs are laid out in shallow trays of brown paper, which in a day or two are covered with small black worms, about the size of ants.

“As soon as the worms are hatched, chopped mulberry leaves are spread over them, and a fresh supply is given as often as the former are consumed, or become dry. In these trays, the worms remain till they have cast their first or even their second coat. Then they are put in larger trays, and more abundantly fed; and when they have attained their full size, they are removed to a larger and rather colder apartment, the temperature of which is gradually lowered, till it becomes cold, which sets the worm to spinning.

“When the cocoons are ready, a sufficient number, for the next year's supply, is selected from the largest and such as are most open at the ends. These, as I have already stated, are placed in a dark room, upon paper, or linen; and in due time the grubs gnaw their way through the cocoons, come out in the form of moths, lay their eggs, and die. A pound of cocoons furnishes about two ounces of eggs, or nearly eight thousand in number.

“The hole made by the moth in getting out of its cocoon, divides the string of silk, of which the latter is composed, into a number of short pieces, which spoils it for winding; such cocoons, therefore, as are not to be reserved for a fresh brood, are put into a tolerably hot oven, in baskets, to kill the enclosed worm. Sometimes this is done by plunging them in boiling water, or exposing them to steam for an hour or two, after which the cocoons are dried in an oven at a moderate temperature.

“In Italy, five ounces of eggs, which cost two shillings an ounce, are brought to maturity at a total expense of twenty-one pounds; and the pro-

duce is worth about forty-nine pounds. Eggs of a reddish or yellowish hue are good for nothing, especially the latter; these can only be distinguished by exposure to the air, which darkens the good eggs, and leaves the others unaffected.

“ The weight of mulberry leaves consumed by the worms from five ounces of eggs, rather exceeds a thousand pounds for each ounce; the greater portion of which is eaten between the twenty-third and thirty-second days; the time and quantity varying a little with the temperature of the climate.

“ Each cocoon is surrounded with a coarse kind of web, which is carefully separated from it, as being of no use to the throwster; but it is mixed with the damaged cocoons, together with the coarser parts and refuse of the good; and the whole, being carded and spun, becomes what is called *spun* or *flos silk*, which is used for many purposes, as coverings for hats, cheap stockings, and those inferior kinds of velvet, denominated *plush* and *shag*.

“ From the breeder, the cocoons pass to the throwster, who casts them into a trough, filled with water as hot as the hand can well bear: this loosens the gummy matter, with which the worm had fastened the thread together; and then he whisks them about till he obtains the ends. Taking as many of these as his purpose requires, he twists them pretty firmly together into a single thread, which he thrusts through a hole in an iron plate, fixed over the trough. On the other side of this plate is a reel, to which the thread is fastened; and by turning the reel, the whole length of the threads in the several cocoons is drawn out, adhering to each other by

their own gumminess, and forming a single thread, fit for the manufacturer. At least two of the threads, as loosened from the cocoons, are required for a thread fit for the weaver: the threads of eight cocoons are necessary to make one fit for ribbons; for velvets, fourteen are requisite; and for some purposes, more than fourteen are used, up to thirty, beyond which it is difficult to make them unite. If a thread break, it is immediately joined again; or its place is supplied by another, if the cocoon from which it is drawn be expended. The length of the thread varies, some cocoons giving out as much as twelve hundred ells; but in general they yield from five to six hundred. The silk in this simple state, as wound off the cocoons, is called *raw silk*; when doubled and twisted, it has the name of *thrown silk*, or *organzine*, and forms the *warp*, or lengthwise thread of the manufactured broad silk. That which crosses it is called the *tram*, or *woof*, and is more loosely twisted.

The silk-mills at Derby, for winding silk, are among the most wonderful of human contrivances. They consist of 26,586 wheels; and the number of movements kept in motion by these wheels is no less than 97,746; all which are actuated by one great water-wheel. Almost 74,000 yards of silk are wound every time this great wheel goes round; and as that revolves three times in a minute, there may be, and frequently is, wound in one day and a night, three hundred and eighteen millions five hundred and four thousand nine hundred and sixty yards of silk! The multitudinous movements of these mills are arranged in several stories and sets of rooms, one

above another, in an immense pile of building ; and although put in motion by one wheel, any single movement, or set of movements may be stopped, if required, in an instant, while the rest continue to work regularly.

“ Various countries have, at different periods, supplied us with silk. A great deal of raw silk comes still from China ; much more from Persia and Asia Minor. But the most ample supply is from Sicily, Italy, and the southern departments of France. In Bengal, and others of our Indian provinces, silk is raised in great quantities, and comes over ready wound for the weaver.

“ The art of the *weaver* consists in the conversion of thread into cloth ; or combining single threads, each of which is but a line, into a broad substance. If you examine a piece of coarse cloth, you will observe that it consists of two sets of threads, crossing and interlacing each other. One set of these threads runs the whole length of the cloth, and is called the *warp* ; the other set runs straight across the other, passing under one thread and over the next, in regular succession ; this is the *waft*, or *woof* ; and by this contrivance of plaiting, as it were, the threads together, a piece of cloth is produced. The machine contrived for doing this work with regularity and despatch is called a *loom* ; it comprises a stout wooden frame, with a round moveable beam, or roller, at the back, on which one end of the warp is wound, as I explained when describing the carpet loom. In front is another similar roller, for receiving the other end of the warp, and the cloth as it is formed. The threads of the warp are brought

through a sort of comb, called the *reed*, which keeps the threads distinct, and at equal distances from each other, so that they may not get entangled. Of these threads, every other one is connected with a frame, by which they may be pulled down, leaving the rest in their place, with a vacancy between. Through this vacancy, the shuttle, which is a kind of boat, containing the woof, is cast; and as it passes across, it leaves a thread between the two sets of the warp. The reed is thrust smartly against this thread, in order to force it home to its proper place; and immediately the position of the two sets of the warp is reversed; that which was lowest being raised, and that which was uppermost left beneath. The shuttle is now thrown back again, and it leaves a woof thread, as before, but passing over those warp threads which it went under in the former case. The threads are pulled down by means of treadles under the machine, on which the workman presses his foot as he wants to raise or depress the sets of the warp: and, by thus alternately putting down and raising the two sets, and every time darting a thread by the shuttle between them, a firm, close, and broad substance is made, called *cloth*.

“ In weaving *tweeled*, or *twilled fabrics*, the woof, instead of passing over every second thread of the warp, is shot over two, three, or more threads at a time, so as to leave a kind of figured surface on the cloth.

“ Having thus explained the general nature of weaving, I have only to observe that the process is nearly the same, whatever be the substance, whether worsted yarn, flax, cotton, or silk.

“ The fabrics into which silk is woven are various in their qualities and modes of manufacture ; and each is distinguished by a particular name. Probably this wardrobe will supply us with specimens of the kinds most in use.”

“ Before you begin with silks most in use,” interrupted Mrs. Paterson, “ I will just shew the children an article, which, though formerly in great request, is now nearly out of use. It is a remnant of a *brocade* dress, worn in the days of my grandmother.”

The young people expressed their admiration in warm terms at the sight of this relic. The fabric was so stout, and the figures with which it was ornamented were so beautiful !

“ *Brocade*,” resumed Mr. Paterson, “ is, as you see, a strong silk fabric, richly ornamented with flowers and other devices. At the period when it formed a regular article of full dress, the ornaments were frequently of gold and silver threads, very dexterously woven into the body of the silk. At present, fabrics of this kind are out of fashion in England and France ; but in some countries on the Continent, the nobility and gentry are still fond of them.

“ The fabric of this gown, which is woven over and under, like a piece of calico, the warp and the woof, or tram, appearing equally on its face, is called *lustring*, from its lustre, or brilliancy, the propriety of which appellative is lost by the absurd practice of softening down the sound to *loostring* and *lutestring*. The genuine sort is the stoutest of the broad silks ; and it sometimes bears the name of *gros de Naples*,

from its stoutness, and the place where the best sort are, or used to be, manufactured. But a great deal of flimsy silk is now sold at a cheap rate, under this title.

“ The bonnet, hanging upon yonder hook, is of *satın*, which has a smooth, glossy surface, produced by passing the woof over several threads of the warp at a time.

“ Many *ribbons* are made in this manner, and have a very showy appearance; but generally they are woven as narrow lustrings; or sometimes as satin, intermingled in stripes or flowers, and then they are called *figured ribbons*. For caps, they are woven in the form of gauzes and other light fabrics. Coventry is the most celebrated town in England for the manufacture of ribbons. The machines which are in use there are capable of weaving a dozen narrow articles, such as ribbons and tapes, at one time.

“ This pelisse is of *sarcenet*, which is a thinner, slighter kind of lustring, woven in a similar manner, and not unfrequently sold for it at a cheap rate. It is sometimes twilled.

“ The lining of the pelisse is of *persian*, which is still thinner and more flimsy.

“ Here is a cloak, rather out of condition, made of *modé*, which is somewhat like sarcenet, but with the warp and woof of different thicknesses. It is an article not now much in use.

“ If, in addition to the brocade gown, mamma could produce her grandmother's bonnet, we might possibly see a specimen of *tiffany*, a very thin kind of silk, to which some stiffness was given after the



weaving. It was formerly used for trimmings, but is now out of fashion.

“ I have already alluded to *gauze* ribbons, but here is a *gauze* veil, which will give you a better idea of the article. It is of silk, quite transparent, and woven by what is called *chain work*, the threads of the warp being twisted between the cross threads of the woof. It is sometimes elegantly figured. Paisley, in Scotland, was long celebrated for the manufacture of this delicate fabric, which is used for veils, scarfs, neckerchiefs, and ornamental trimmings to various articles of female dress.

“ That elegant light summer dress is of *crape*, an article made of raw silk, in the chain manner, and highly stiffened with wax and gum. It is either figured or plain, and much in use for various purposes, as for shawls, scarfs, neckerchiefs, &c. When dyed black, it has a peculiarly dull appearance, and is used for bonnets, hatbands, and other appendages to mourning. A few years ago, a fabric of this sort, called *China crape*, because introduced to us from China, constituted a beautiful article for summer wear, either in shawls or dresses. Norwich was the chief place of this manufacture; but it is now superseded by more recent inventions.

“ That rich crimson pelisse, so comfortable for cold weather, is of *velvet*,— a silken fabric, in weaving of which the warp is brought over a thin wire, so as to form a line of fine loops; before the wire is withdrawn, the loops are cut open, which gives the fabric a rich shaggy texture, very deep in its colour, and affording an appearance suited to occasions of ceremony, and fit for persons of the highest rank.

Genoa, Venice, Milan, Florence, and Lucca, were once celebrated for their velvets; French velvet, however, now excels them in beauty; and this is rivalled by our own manufacturers of Spitalfields. Some of the velvets, especially English, are made of silk and cotton; others of cotton only; but these do not keep their colour equally well with the silk velvets.

“ In the corner, I perceive a black dress, made for mourning. It is of *bombasine*, a fabric with a silk warp, crossed with fine worsted. This is manufactured most excellently at Norwich. In black, it is appropriated for mourning; but in colours, it constitutes an elegant article of general dress, though now less in use than it was a few years ago. It is worthy of remark, that a difficulty long existed in dyeing bombasine, because the colouring matters which fasten upon wool will not naturally hold permanently upon silk. At one period, only one dyer in London possessed the secret by which the dye could be made to strike on both at the same time; he consequently got the whole trade into his hands, and made a rapid fortune; but now almost every dyer knows the process.

“ This *challi* is somewhat finer than bombasine, and smoother in the surface, but composed of similar materials. We have the idea from the French, and our British manufacturers have improved upon it.

“ At the silk mercers’, you may occasionally find some other fabrics, besides those we have noticed; for the manufacturers are continually contriving something new, to meet the public taste for novelty.

“ I am aware, Emma, that *French silks* have not

passed under our review, because here are none to attract our attention : for so long as British artisans stand in need of employment, your mother and I do not feel justified in giving a preference to a foreign manufacture. Of French silks, however, it may be remarked, that though they seem stouter than the English, yet as the woof is often of spun silk, or mixed with cotton, they are less durable. The French dyes have more bloom upon them, and are at first more showy than the dyes of England ; but in most colours they do not stand so well.

#### MUSLIN.

“ Here are several articles of muslin, which is extensively used in female dress. In the account we had of the produce and manufacture of cotton, muslin was incidentally mentioned as a fabric of that article, and I have now only to notice its different kinds. Here, as in silk, the ingenuity of the manufacturer frequently sends out some novelty, which becomes fashionable for a time, and then is no more heard of. But the three sorts, known under the names of *book muslin*, *jaconot muslin*, and *cambric muslin*, are of more permanent character ; and to these I shall confine myself.

“ *Book muslin*, of which Emma can shew you a specimen in her late ball dress, is the clearest and finest of all the muslins. It is woven very transparent, and, by dressing, made very clear, and rather stiff ; so that it is neither so nappy nor so flimsy as other sorts of muslin. It is sometimes worn over coloured silk, and looks very beautiful.

“ *Jaconot muslin* is a thicker kind, more com-

monly used for ladies' dresses, and very frequently for gentlemen's cravats. It is sometimes woven with stripes or cords running the whole length of the piece. It is also to be had dyed, or printed in various patterns. In all cases, it forms an elegant light article for summer wear.

“ *Cambric muslins*, being closer woven than jaconots, are of stronger fabric, and frequently printed. They are also used for cravats.

“ In Eastern climes, the turbans of the princes consist of a great length of muslin, so fine and so long as to be the labour of twenty years of the weaver's life. And the value of a dress, among the ladies of the palace, is its capability of being drawn through a finger-ring.

## MOUSSELINE DE LAINE.

“ This fashionable article of female attire is a novelty, which bids fair to be a standing rival of the muslins made from cotton. It is of French invention, and was introduced into this country about the year 1835, from Lyons and Rouen. It is, or should be, composed entirely of the finest wool; and, when first imported, bore so high a price that only persons of the wealthier classes could purchase it; a consequence of the heavy import duty to which it was liable. Now, however, the foreign article has been met with such active opposition from British manufacturers, that it is almost driven from the market; and nearly one-half of the weavers, and others connected with their trade, in Paisley, Glasgow, and elsewhere in Scotland, as well as in Norwich, are engaged in the fabrication of *mousselines de laine*,

or, in plain English, *worsted muslins*. For the best sorts, fine wool only is employed, and these fetch high prices; but to meet the demand of all ranks in society, coarser wools have been subsequently employed, and these are even mixed with cotton; so that *mousseline de laine* may now adorn the person of any one who can command the price of an ordinary chintz or printed cotton.

“The extensive demand of this new fabric has given a powerful impulse to the wool trade; but it has, at the same time, considerably weakened the hands of the cotton-spinners.

“The *mousseline de laine* possesses at least one advantage over the muslins of cotton, it does not ignite immediately on coming in contact with flame, and may possibly be the means of saving many an individual of the fair sex from a miserable and painful death.

#### LACE.

“This ornamental article, the use of which I need not explain, is of three sorts, known under the titles of *point lace*, *bone* or *pillow lace*, and *frame-net lace*, or *bobbinet*; each of which has its peculiar mode of manufacture.

“*Point lace* is worked with great labour by the needle, stitch by stitch. It was formerly the chief occupation of young ladies in convents, and was very injurious to the eyes of the workers; but now it is rarely seen, except in the form of small crown-pieces to babies' caps.

“*Bone* or *pillow lace* is so called from its being made with bobbins of bone, or ivory, upon a pillow,



page 213

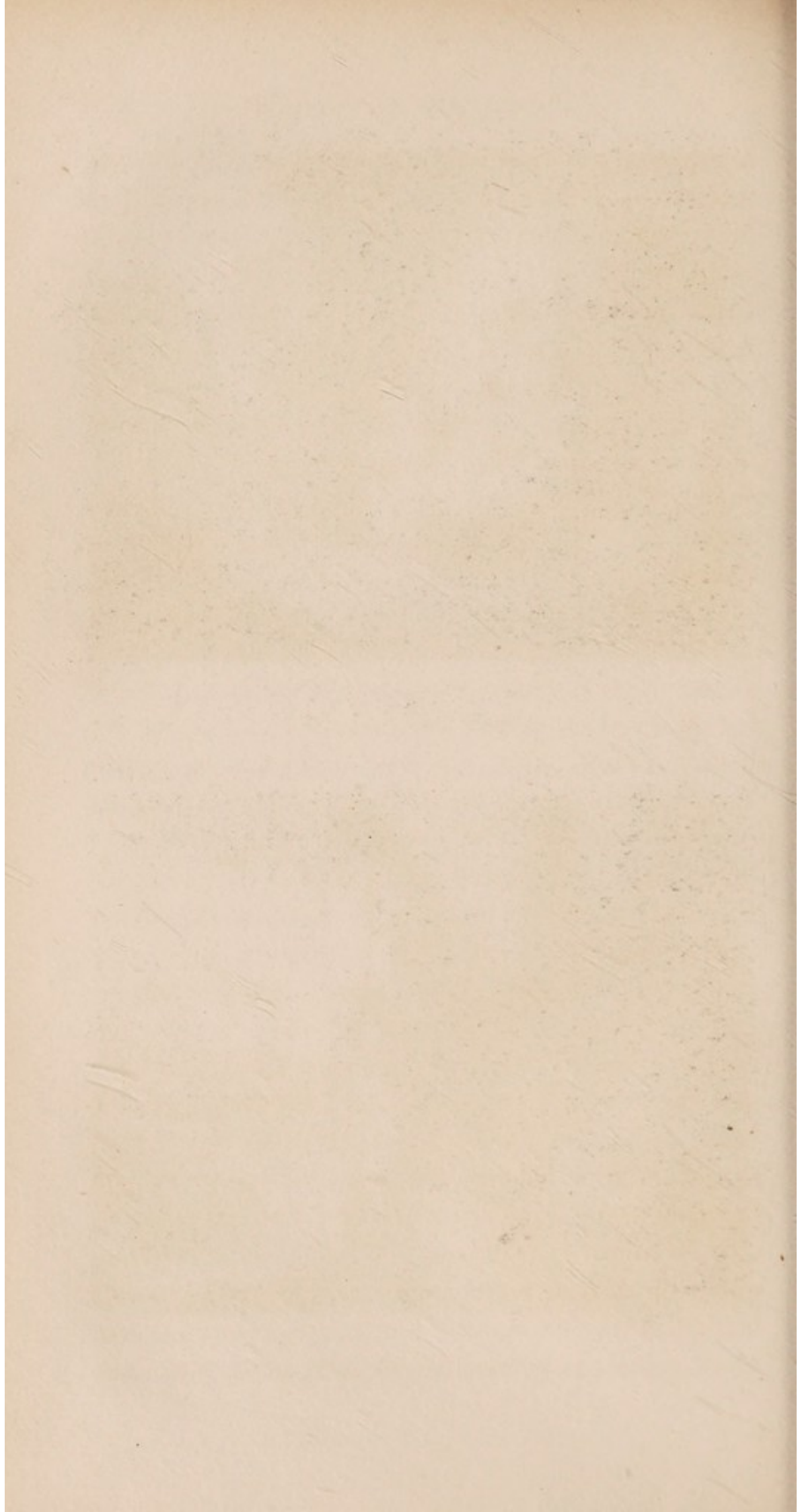
*Lace Making.*



page 372

*Ship Building.*

*Pub<sup>d</sup> June 1. 1839. by John Harris. S<sup>t</sup> Pauls Church Yard.*



or cushion. This pillow is in shape round on one side, and straight on the other, and in substance much harder in its stuffing than the cushion of a sofa. When in use, it is supported by a kind of tripod, or three-legged stool; and the lace-maker sits before it. On the top of the cushion, in the centre, is a piece of parchment, on which the pattern of the intended lace is pricked in holes. In the back rows of these holes pins are stuck through into the cushion; and to the pins are fastened very fine threads, drawn from the bobbins on which they are wound, and which hang down in front. The bobbins, made of ivory, bone, ebony, and sometimes of boxwood, are about the length of one's finger, thin and taper at the upper end, but thick at the lower extremity for the convenience of handling, and each has some distinguishing mark. The thread is wound upon the thin end of the bobbin, and passes through a small hole at the top, to the pin upon the parchment pattern. To each pin, the threads of two bobbins are attached; and the maker, seating herself in front, divides the bobbins into two parcels, so as to have in each parcel one thread only of each pin. One of these parcels she takes between the fingers of her right hand; the other between those of her left; and then she begins throwing the bobbins from one hand to the other, so as to twist the several pairs of threads into the adjacent pairs, without allowing any one pair to be twisted together. When this operation has been performed as often as the pattern requires for the first set of pins, she takes up the bobbins of the next set, till she has completed the whole row. The back row of pins being now done



with, they are taken out and placed forward in the next row of holes upon the pattern ; then the bobbins are again thrown, and the threads twisted, as before, care being taken to work together, not the two bobbins which hang together from the row of pins already twisted, but one of each pair with one of the next pair. Now as the pins prevent the threads from twisting too close, the effect is, that on removing the pins, a row of small eyelet holes appear ; and as the same pair do not go in the second row that went together in the first, the second row of holes is not exactly under, but between them, giving the whole the appearance of a honeycomb.

“ Such is the general principle on which lace is formed ; but I am aware that description alone affords a very inadequate idea of the operation. Should you ever travel into Buckinghamshire or Devonshire, where lace-making is carried on in its greatest extent in England, you will be well rewarded by half an hour’s inspection of the process. Many of the figures, that is, the various sorts of open work in lace, are formed in the working : some are made by running a coarser thread with a needle round the various sprigs depicted in the pattern ; and the edges, which give firmness to the texture, are run in with a needle after the lace comes off the pillow.

“ Bone lace is said to have been the invention of a poor woman in Germany, about the time of our Queen Elizabeth. Her husband, a miner, being out of employment, she endeavoured to support the family by her own labour. Her ingenuity succeeded ; lace became a very fashionable article of female adornment, and has continued so to the present day.

“ This sort of lace was formerly a very extensive branch of English manufacture, giving employment to thousands of poor women and girls, especially in the counties of Buckingham, Bedford, and Devon.

“ At Honiton, in Devonshire, a very costly manufacture of bone lace formerly flourished ; but laces of that expensive kind are not now much worn ; so that we seldom hear either of Honiton lace, or of the laces of Brussels, Antwerp, Valenciennes, and Mechlin, all of which were celebrated for their fine rich fabrics. It used to be said, in days of yore, that a Mechlin head-dress, though it cost twenty guineas, or more, would serve a lady for her whole life ; but the fashion is now so changed, that a lady prefers having something new every year, or even two or three times in a season : consequently, the article must be cheap, and need not be very durable.

“ The *frame-net lace*, or *bobbinet*, is a recent invention, manufactured by machinery ; and as it does not require a twentieth part of the time and labour that are consumed in making bone lace, it can be rendered to the consumer at a very low price. After the lace has been formed, the pattern is worked with a needle, which still employs a number of hands. Nottingham has obtained great celebrity for its beautiful clear and even fabrics of this description.

“ In the kinds of laces, of which I have spoken, the thread is of flax : but there is an inferior kind of the frame-net laces made of cotton threads, from which the pile has been carefully singed, to give them as much as possible the appearance of linen threads. But when brought to the test of washing,

they shew their inferiority. Indeed, there is a richness and gloss on the thread lace, which cannot be imparted to the cotton fabrics; neither are the latter so durable. The fine thread for bone lace is spun by the hand; but the cotton is spun by machinery; so that both the material and its mode of preparation give to thread lace a strength and durability, which the cotton does not possess, though it is certainly more regular in the form of its net-work.

#### FURS.

“Fur is the under covering of the skins of quadrupeds, lying beneath the hair, close upon the skin; or, if you please, it may be called the finest and softest part of the hair itself. In the best furs, each distinct hair is tapering, and stands out from the skin, so as to be turned in any direction without injury. The fur which possesses this quality in the highest degree is that of the sable, a small animal of the weasel tribe; and on this account real sable fur (for it is often counterfeited) bears a higher price than any other. Some of you, because ‘a suit of sable’ signifies a suit of mourning, may have imagined that sable fur is also of a black colour; but this is a mistake; the fur in question is generally of a dark sandy colour, and the name is simply the French word for *sand*.

“Furs are, for the most part, obtained from land animals, of the weasel and squirrel kinds, inhabiting the woods and wild places of northern climates. The mountains of Norway, Finland, Sweden, Lapland, the Ural chain, and the various ridges of north Asia, are the chief resorts for furs in the east-

ern continent. In the west, that is, in America, fur animals are more abundant, and are found in all the woods, from the Canadian frontier to Behring's Strait, as well as in the Aleutian archipelago, and other islands in the northern parts of the Pacific Ocean.

“ The furs of the southern hemisphere are chiefly obtained from the sea, and consist of the skins of a peculiar kind of seal. They are obtained in abundance in the Australasiatic islands, and in some other places.

“ Seals, beavers, otters, and some land animals, have two kinds of hair or fur : first, long hair, so stiff and finely polished, as to throw off water ; and, secondly, a fine close fur among the roots of the long hair, which keeps the animal warm, and is so thick that water penetrates it with great difficulty. This quality is not, indeed, confined to fur animals ; for the shawl goat of Tibet and Cashmere has long hair, besides the very fine wool of which the real Cashmere shawls are made. This goat, though a native of countries bordering upon the tropic of Cancer, and consequently of a hot latitude, resides in a cold atmosphere, on the northern heights of the mountains, the southern slopes of which, as well as the low country of Hindoostan, he sedulously avoids.

“ Some of the beasts of prey, in the hottest climates, furnish furs of great beauty and durability ; such as tigers, leopards, and panthers : but these are not so warm as the furs of the smaller animals, and are too heavy for common purposes.

“ In commerce, the term *fur* means a skin dressed with the hair on : when the hair is taken off, the skin becomes *leather*. An undressed skin is deno-

minated a *pelt*; and hence *peltry* becomes a general name for the trade in skins, before they get into the furrier's hands, who dresses and prepares them for use.

“ For many ages, the northern provinces of Asia supplied these articles of luxury to Europe; and we still draw many furry treasures thence: but our chief supplies now come from our North American colonies; so that we are enabled, from our stores in the New World, to send great quantities to Turkey, and even to China.

“ In cold countries, whether the cold be owing to latitude or to elevation above the general level of the earth's surface, the fur of animals is much softer and closer than in warmer regions. Some animals, such as the ermine and the mountain hare, are dark-coloured in summer, but become white during the winter, when the ground is covered with snow. White fur is much warmer than any other; hence ermine is used for lining robes of state, and other purposes where warmth is required. The ermine is of the weasel tribe, and with us is called a *stoat*; but, in the temperate climate of England, its fur is coarse, and of no value.

“ Among the animals which afford us their furs, we may reckon the following:

“ 1. *Of the feline, or cat tribe*; as, the lion, the tiger, the leopard, the panther, the lynx, and nearly all the smaller species of cats. In the latter, however, the fur is soon injured by water, as cats are not adapted either for burrowing under ground or living in wet places. The skins of the larger sorts are more hardy, but very heavy.

“ 2. *Of the canine, or dog tribe*, of which the fox is the chief; dogs in general not affording good furs. The fur of the common English fox is hardy and warm; and the skins of foxes of the northern regions are still better. The latter are of several colours, as black, white, grey. The black are in the highest estimation, and bear very high prices. The principal countries for foxes' skins are about Behring's Strait.

“ 3. *Of the mustela, or weasel kind*; as, the sable, the marten, the ermine, the minx, and a variety of others, which are chiefly natives of cold climates, and beasts of prey.

“ 4. *Of the sciurus, or squirrel kind*, of which the species and varieties amount to between fifty and sixty; and all yield furs. Those of Canada are by far the most numerous; some are of a black colour, others banded, but the prevailing colour is grey.

“ 5. *Of the mus, or mouse tribe*. A great many of these animals, though small, furnish beautiful furs; the hamster and chinchilla, remarkable for their delicate softness, are among the most numerous of this tribe.

“ The great fur trade of our country lies in the territories about Hudson's Bay, better known by the name of the North-west country. The business is there conducted by young men, in the service of the North-west Company; they consist chiefly of adventurers from the Highlands of Scotland, and have under them a body of Canadians, hunters, and canoe-men. These people repair to the Indian settlements, and establish trading posts among them, frequently at so great a distance, that more than one

summer is requisite for sending them the goods with which they are to traffic, and to receive back the furs they have obtained in exchange. In these distant inhospitable regions, the adventurers remain several years, subjected to almost innumerable privations, and subsisting mostly by hunting; while the managers for the company, who have the principal shares in the undertaking, reside generally at Montreal. To the trading posts more than fifty canoes are sent annually, laden with merchandise, and navigated by nearly a thousand people, known by the denomination of *voyageurs*; a peculiar race, robust and thoughtless, bearing a striking resemblance in these respects to British seamen, and withal great eaters, though frequently subjected to long fasting. It is said, that one of these men will devour a whole fawn for his breakfast; and is not very tenacious whether it be cooked or raw. Though these voyageurs know that for the space of about two thousand miles their exertions must be unremitting, and their subsistence very precarious, they pursue their arduous and toilsome occupation with the utmost cheerfulness. Sometimes one, more provident than his brethren, will reserve his wages, and, on returning to his native parish in Canada, pass the remainder of his days in agricultural pursuits; but, generally, these people acquire dissipated habits, and, on their return, having expended their gains as speedily as possible, are under the necessity of going out on a new excursion.

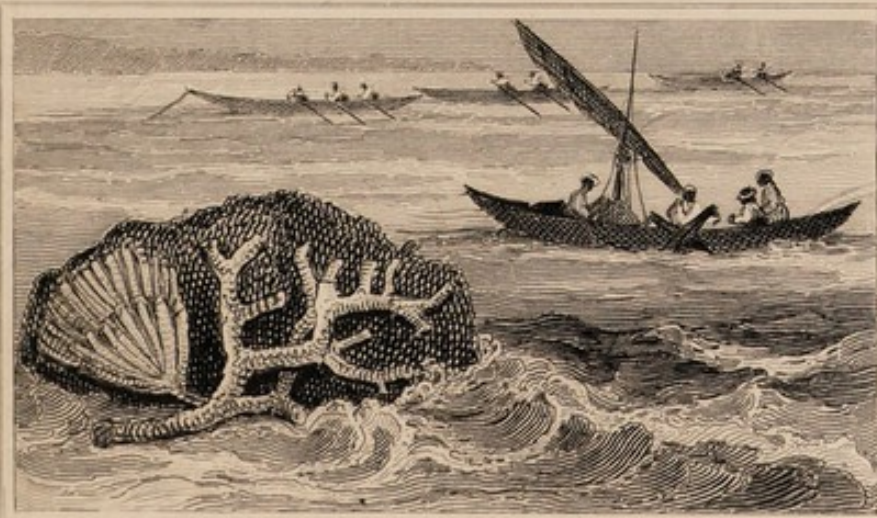
“The goods are made up in packages of about eighty pounds’ weight each, for convenience of being more easily removed and carried at the portages, or



*Page 220.*

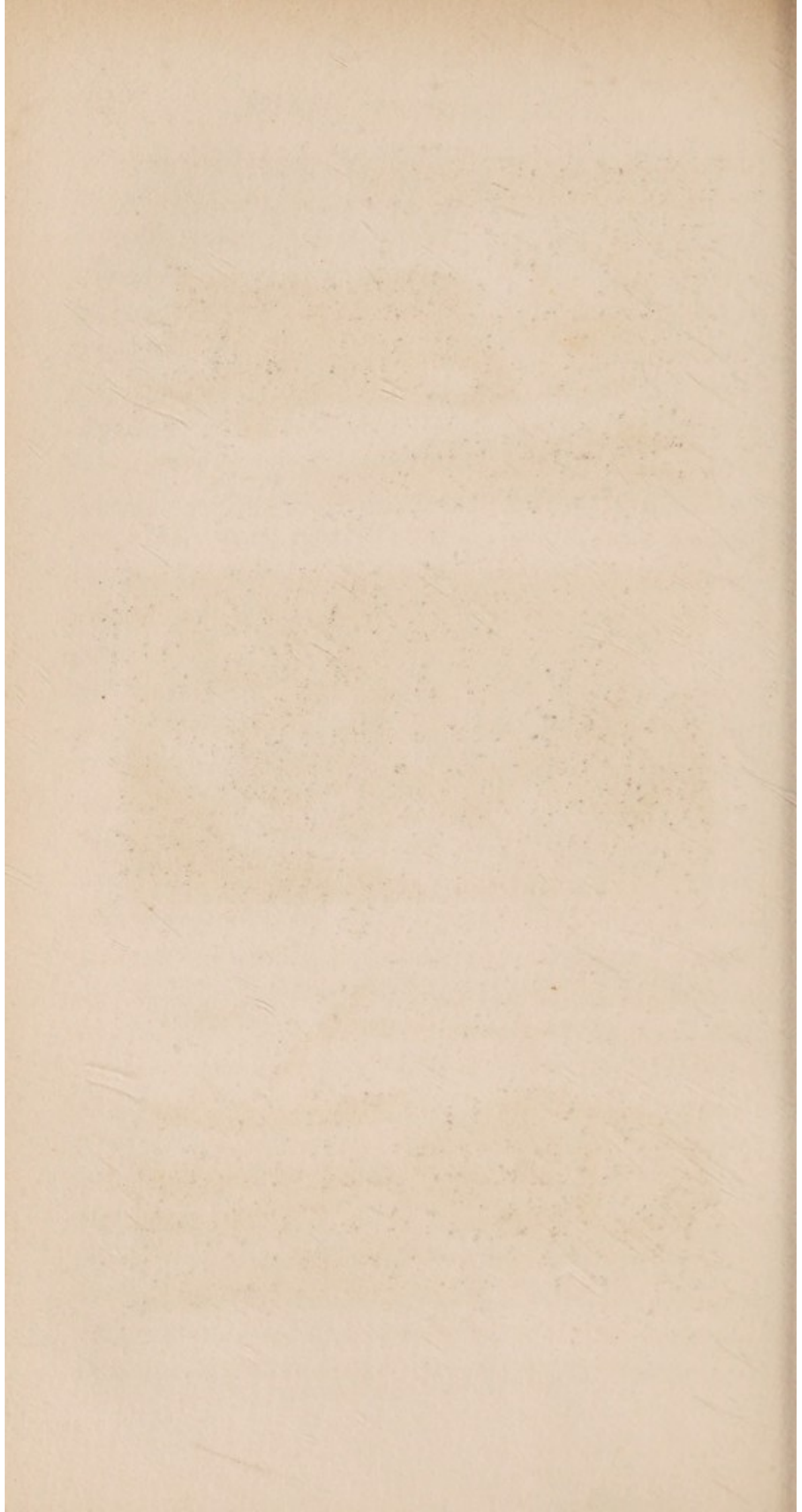


*Page 223.*



*Page 271.*





certain places where the canoes cannot pass along the stream by reason of the shallows and rapids with which the rivers in the parts I am speaking of abound.

“The canoes, in which the goods are conveyed, though light and frail, are constructed with great ingenuity. The frame consists of thin slips of wood, covered with the bark of the birch-tree, the various pieces being sewed together with filaments of a particular root; and the whole is rendered water-proof with a sort of gum, which adheres very firmly, and in drying becomes very hard. These canoes are usually about thirty feet in length and six feet in breadth, tapering to a point at each end, and rounded at the bottom, which is destitute of a keel. Each canoe carries from four to five tons' weight; and is propelled by means of paddles, instead of being rowed with oars. Six men are requisite to carry one of these canoes over a portage; and one man will carry four or even five bales, weighing eighty pounds each, over a portage of several miles.

“The North-west Company, and another trading society, called the *Hudson's Bay Company*, annually export the skins of more than three hundred thousand animals. If to these be added the skins taken by other nations, we may fairly conclude that upwards of a million of wild animals are killed every year, for the sake of their skins only.

“A very lucrative trade in furs, first suggested by the memorable navigator, Captain Cook, consists in buying up the skins procured by the Indians about Nootka Sound, and conveying them to China, where they procure a high price. They are said to be superior to those found about Hudson's Bay.

“As the beaver skin is a prime article in the fur trade, you will be gratified in hearing something about beavers, the commonwealths of which are surprising instances of animal sagacity. Beavers live in societies of three or four hundred each. Their first care is to build a dam across some valley, through which a small stream runs, to stop the waters, so as to form a lake, or pond. In this collection of water they build their huts, each the residence of one or more families, with various apartments, some for living in, others for stores. Their chief stores consist of branches of favourite trees, cut or gnawed into short pieces.

“*Beavers* are sometimes caught in traps, baited with aspen wood, but not often, for they are very cunning and wary. The hunter's usual mode of taking them, is by making a hole in the dam, and letting out the water; by which the beavers, being left on dry ground, are easily killed. A few are left, to stock the place again; and the breach in the dam is carefully closed up. In winter, when the lakes are frozen, the method is to make holes in the ice, around every beaver hut, over which nets are spread. The hunters then break down the hut, and the beavers plunge into the water, under the ice; but, being obliged frequently to go to the holes for fresh air to breathe, they are there entangled in the nets, and taken.

“The catching of *sables*, in Siberia, is an occupation attended with great personal sufferings to the hunters, who are either criminals banished from Russia to those dreary regions, or soldiers. The little animals are caught in traps set at the entrance of their holes in the ground, or they are shot in such

a way as not to spoil the skin. The woods traversed by the hunters are very extensive, and afford no clue to direct their return, except such marks as they make themselves upon the principal trees. If they mistake these, they usually perish. Frequently, they have to wait two or three days, near the hole of a sable, where they have set a trap, watching, in the midst of snow and frost, till the creature comes out. During these labours, which are of long duration, it sometimes happens that the hunters' provisions fail; and, to mitigate the anguish of hunger, they tie thin boards tightly round the stomach; an expedient which does not always prevent their being famished.

“*Ermines*, which furnish an important article of commerce with Norway, Lapland, Russia, &c. are caught in traps, baited with flesh, and made of two flat stones, the uppermost of which, in falling, kills the poor animal, which has been lured by the bait. Sometimes they are shot with blunt arrows.

“As a summary of what has been said, we may remark briefly, that the furs of *ermine*s and *sables* are used to ornament robes of high state and dignity; as well as for ladies' muffs, tippetts, and trimmings. The three latter are also much indebted to the *white* and *brown bear*, the *grey fox*, the *chinchilla mouse*, the *cat*, the *dog*, and several other animals of similar kinds. The fur of *beavers* and *rabbits* is used in the manufacture of hats: but in this, being used without the skin, it obtains the name of *hair*, or *wool*. *Tiger skins* are used as grand saddle-cloths; as are occasionally the skins of *lions*, *leopards*, *panthers*, *lynxes*, &c.

## HAIR.

“ When the hair of animals is used alone, that is, separate from the skin, it is not called fur. About a third of the skins brought from North America are those of the *beaver*, which are not used as furs. The hair, being separated from the skin, forms the nap of fine hats; and the skins, after passing through the hands of the leather currier and dresser, are made into warm and comfortable gloves for winter.

“ The hair of every animal is of some use. That of *horned cattle*, after the tanner has separated it from the hide, is used by the plasterer, to give consistence to his mortar, which it helps to bind, or keep together. The long hair from *horses' tails and manes*, is woven into a kind of satin, for covering chair bottoms; as I have already explained in our Lecture in the Drawing-room. A large manufacture of this article is at Worcester. Horse-hair is also woven into a coarse sort of cloth, useful for many purposes in the stable, scullery, and kitchen. The bottoms of sieves are also generally made of horse-hair, woven for the purpose. It is spun into lines for the laundry; and, sometimes, it is twisted or plaited into bracelets for ladies, or into watch-guards for gentlemen.

“ The long white silky hair of the *Angora goat*, so called from Angora, a city of Anadolia, in Asiatic Turkey, is an article of commerce; and fine stuffs and camlets are made of it.

“ The hair of the *camel*, which falls off every spring, is collected by the people of its native climes, and manufactured into fine stuffs, coverings for tents, and articles of domestic use. A considerable quantity of this hair is exported to Europe, where, among

other uses, it is made into colouring pencils; for the finer sorts of which the hair of the sable, or fitch, is also used; while, for the very ordinary kinds, the hair of the cat is substituted. The latter are good for nothing but for little boys, when colouring stars for their kites. The quality upon which a good pencil depends, is the spring and taper of the hair.

“Of the stiff hair, or bristles, of *hogs*, brushes of various sorts are made. And the shoemaker, by their assistance, gets his waxed end, or thread, easily though the hole which he has made with his awl. The best bristles are imported from Germany.

## FEATHERS.

“Feathers are much used as ornaments for the head, by savages as well as by civilized nations; by ladies, by the military, and by many persons upon state occasions. The finest feathers for these purposes are those of the ostrich.

“It is chiefly for its plumage, that the *ostrich* is hunted. Its feathers have this remarkable quality, that the quill, or shaft, is exactly in the middle of the downy web: while most other feathers have much more of the web on one side of the quill than on the other. Some ostrich feathers are white, some black; and in both cases they certainly rank high for beauty. Such as are taken from the bird while alive are the most valuable, being stronger and sounder than those which are plucked after death. A similar remark may indeed be made respecting hair: that which is cut from the living animal looking best, and retaining its colour longest. Dead hair, as it is called, has little or no gloss.

“ Many foreign birds, which in brilliancy of plumage far outshine those of Britain, furnish us with ornaments for head-dresses. The most beautiful are obtained from the different varieties of *birds of paradise*, which are found chiefly in the islands south-east of the Asiatic continent. As ornaments, the entire skins of these birds are often worn.

“ Though the *peacock*, some of whose feathers I see in that vase, may be said to surpass the whole plumy race for splendour of colours combined with elegance of shape, his feathers have not been very generally adopted as dress ornaments. They are more frequently seen, in England at least, in the coarse, dirty hat of a peasant, than in the head-dress of a court lady. Why this should have happened, I am not sufficiently a connoisseur in taste to determine. Perhaps the length and beauty of the feather requires a more noble and elegant figure to wear it, than is ordinarily to be met with.

“ The *Argus pheasant* has a few feathers in its wings of great beauty; not, indeed, for variety of colours, for the marks are only different shades of lightish brown, or stone colour; but they appear in regular rings and spots, from end to end, so as to give an idea of their being artificially produced.

“ The *egret*, a small species of the heron tribe, bears on his head a very beautiful tuft of feathers, which, in the days of chivalry, were worn by knights upon their helmets, and are now in request for ladies' head-dresses. The bird was once plentiful in Great Britain, but not so now; though it is to be found in marshes and their vicinity, in all the temperate climes of the earth.

## WOOL.

“ I need not remind you that wool is the fleecy covering of the sheep. But you may not be aware that it varies considerably with the breed, or variety of the sheep, and the pasture in which the sheep is fed. On some of these we shall have occasion for remark as we proceed.

“ The wool of Attica, in Greece, and of Tarentum, in Italy, were in high estimation among the ancients ; especially when they had received the purple dye of Tyre. Robes of Tyrian dye constituted, among the Romans, the *imperial purple*, and were so costly that the use of them was confined to the emperors, or at most to members of the imperial family.

“ You must not confound this with the Roman *toga*, which was a woollen garment, but white, fine in texture, and ample in its folds. The Romans drew the best materials from all their provinces to the metropolis. Indeed, the owners were sure to find there a ready mart and good prices for their best commodities.

“ Wherever the Romans took up their abode, they established some of their arts ; so that the nations which they conquered were in reality enriched. In Britain, the seat of their woollen manufacture was at Winchester, where it was conducted on a scale sufficiently extensive to supply their army with clothing. When they abandoned Britain, in the fifth century, this manufacture, though not totally lost, fell into great decay ; nor do we find any symptoms of its revival, till, about a thousand years afterwards, King Edward III. invited to England wool-



combers and weavers from Flanders, to teach his subjects how to work up their own excellent fleeces, which they had long been in the habit of exporting, to receive in return goods manufactured from them, at exorbitant prices.

“ From that period, the woollen trade of England has gradually increased; and is now so considerable, that it not only uses up the wool of about twenty-six millions of sheep, which are supposed to be in the country, furnishing about four hundred and sixty-three thousand packs every year, but also a large importation of finer descriptions of wool from Spain, from the north of Germany, and even from the distant country of Australia. This trade gives employment to about three hundred and thirty-two thousand people; and were it not for the machinery which has been introduced into it, would require the labour of the whole population of the kingdom. The value, as well as the quantity, of wool manufactured, varies in different years; but the annual average value may be taken at twenty-one millions of pounds sterling, which is more than six times as much as it was a century ago.

“ The chief seats of the woollen manufacture are in the West Riding of Yorkshire, the counties of Wilts, Somerset, Gloucester, and Norfolk, in England; and in the counties of Merioneth, Denbigh, and Montgomery, in North Wales; besides which, numerous single manufactories are scattered through other parts of the country. The principal towns in Yorkshire for the sale of cloths are Leeds, Bradford, Halifax, and Wakefield. *Cloths of dyed wool* are mostly made westward of Leeds, which, though it is

the principal mart for cloths, has very few manufactories within the town. *White cloths*, or such as are made of undyed wool, are manufactured to the westward of Wakefield. *Flannels* and *baizes* are made about Halifax; *blankettings*, in the neighbourhood of Leeds and Huddersfield; light fabrics, called *stuffs*, about Bradford and Halifax: and the finest *broad cloths*, perhaps in Yorkshire, at Saddleworth. At Wakefield, cloths are dyed in a very superior manner.

“ The finer cloths are made in the west of England. Bradford, in Wiltshire, is the centre of the most superior manufacture. In Gloucestershire also, especially in the district called the *Bottoms*, about Stroud, cloths are made, to a considerable extent; some of them are broad cloths; but the largest portion consists of narrows and fancy goods; all of the best materials and workmanship. The water of this district is celebrated for the dyeing of scarlet and other grain colours, on which account the clothing trade has been extended upwards of twenty miles along the river Frome, on the banks of which are numerous fulling-mills, dye-houses, and tenter-grounds.

“ Taunton, in Somersetshire, is the centre of the manufacture of that county, of which the fabric is rather coarser than in the other western counties.

“ In Norfolk, the fabrics are almost all of the lighter description; many of them comprise mixtures of wool and silk, as *poplins*, *lustres*, and *bombasines*. For the light thin textures, which are not thickened by fulling, and have no nap on them, long wools are used; and these are more twisted in spinning than

is necessary for coarse cloths. The Norwich manufacturers have produced shawls, equal in beauty and fineness of fabric to the celebrated Cashmere shawls, at one tenth of the price.

“ The woollen manufactures of Wales consist chiefly of *flannels*, of quality superior to those of other parts of Britain. Welchpool is the grand market for this article. In the villages, for many miles round, the flannel is woven; and the weavers take it to Welchpool, as to a place of ready sale. The dealers, who buy it up here in a rough state, send it on little Welch ponies to Shrewsbury, where it is finished; and thence it is exported to all parts.

“ Within the last fifty years, woollen cloths have been brought to a very high state of perfection, as well in the manufacturing as in the dyeing. Better materials have also been used: for Saxony wool is much finer than that of Spain, although the sheep are of the same breed, having been originally transported from Spain to the north of Germany. The fine-wool breed of Spain, called *merinos*, are supposed to have come, originally, from the mountains of Barbary; and vast flocks of them migrate northward and southward, according to the season, from the sandy plains of Spain towards the frontiers of Portugal. Though none of the English breeds have fleeces equal to these, yet some of our wools, both long and short, are very valuable.

“ In the Shetland Islands, are the remains of a breed of sheep with remarkably fine wool. The animal is very small, not much exceeding the size of a large hare, and generally of a brown or black colour. The mixed wools of this breed are knitted

by hand into stockings, of a very warm and delicate texture; these used to fetch a very high price in England; but since the use of silk has become common, in consequence of its increase in quantity and decrease in price, the demand for fine worsted stockings has fallen off.

“ The fabrics formed of wool are very various; *superfine broad cloths* stand at the head of the list. These are chiefly worn at home, where the prevailing colours are blue and black. *Narrow cloths*, which are half the breadth of the broad, are generally of stronger fabric, and not so fine. Of these a great exportation takes place. *Kerseymeres*, which are generally narrow, are twilled, and of various thicknesses. *Kerseys* are nearly of the same fabric with the last mentioned, but much thicker and stouter. *Coatings*, which are of a coarse open texture, are used for great coats and other inferior purposes. Besides these, we have *swansdown*, a loose and woolly but warm fabric, for waistcoats; *flannels* and *fleecy hosiery*, for invalids; *stockings*, upper and under; *calimancoes*, for women's shoes; and *stuffs*, of various degrees of fineness, for gowns. The latter used to be worn mostly by servants and poor people, who now prefer cotton; and the genteeler part of society have taken to them, under the names of *merinos*, &c.

“ In addition to the fabrics already noticed, our attention should be directed towards two inferior articles, which, though far from splendid, give employment to a great number of hands, at Sudbury, in Suffolk; these are *buntine* for flags, and *shrouds* for the dead.

“ *Buntine* is a thin open sort of woollen stuff, very pliable, though strong; it is woven in stripes, blue, white, red, &c. which stripes are afterwards sewed strongly together, in the form required for any particular flag; their different shapes and the arrangement of the colours having specific meanings.

“ To encourage the growth of wool, a law was made, in an early period of our history, enjoining all bodies to be buried in wool, under a heavy penalty. To meet this law, the manufacture of shrouds took place, consisting of a very thin stuff, of a whitish colour, of which a dress for the dead is made up. But since cotton has become of equal importance with wool, in a commercial point of view, this law has been abrogated by act of parliament. Yet though people may now bury their dead in what habiliments they please, the manufacture of shrouds is still considerable.

“ As our observations have brought us into Suffolk, we may as well notice the spinning of yarn and worsted, which is carried on to some extent at Lavenham and its vicinity. Though a market town, it is a place of so little thoroughfare, that the young girls, who are all spinners, have their wheels out in the road, when the weather will permit, and pursue their work and gossiping jokes sociably together, occasionally beguiling their labour with a song, in the burden of which they all join in chorus. Such a mixture of industry and simple happiness is scarcely to be equalled elsewhere.

“ The wheel, about a yard in diameter, is twirled forcibly round by the spinner with the fingers of her right hand; and a band which passes round this wheel goes over a small spindle, turning it as many

times faster as the wheel is larger than the spindle. The axis of the spindle projects, and ends in a point, with a small notch upon it. On the fingers of her left hand, the spinner has a lock of wool, from which she draws out a few hairs, and having twisted them into a kind of thread, fastens it to the spindle: then gently extending her left arm, she so brings out this thread, that the notch of the spindle catches it, and twists it with great rapidity. Mean while, she extends her arm still farther out, allowing the twisting of the spindle to draw more from the lock of wool on her fingers, as long as the twirl given to the wheel continues; then she brings her hand back almost close to the wheel, allowing the spindle to coil upon itself the thread it has just twisted. She then twirls the wheel again, gives out more wool to the thread upon the spindle, which is twisted and coiled as before; and thus continues her work till the spindle, being full, is replaced by another.

“ The thread thus spun is called *yarn*; and when two, three, or more yarns are twisted together, it is called *worsted*. The yarn, or *worsted*, thicker or thinner according to the fabric for which it is intended, is given to the weaver to make into cloth.

“ In our lectures on Carpets and Silks, I have given you some general ideas of weaving. The fabrication of woollen cloths is not very dissimilar. There is the *warp*, comprising the threads which run through the length of the piece; and the *woof*, which is thrown by the shuttle in the direction of its breadth. The threads of the warp are kept in their places by means of treadles and reeds; and the threads of the woof are pressed closely against each

other, by forcibly striking the reeds as many as a dozen times against each thread, in order to render the cloth quite thick.

“ But the cloth, when woven, is not directly fit for use. It must first be cleansed from the oil and grease which has been used in the spinning and weaving, to make the wool pliable. It therefore goes from the loom to the fulling-mill, to be washed, first with fullers’ earth and water, and afterwards with soap and water. The piece of cloth next passes to the carder, who with a species of thistle, called a teazel, (*dipsacus fullonum*,) raises a fine smooth nap upon it; for, you know, in a piece of broad cloth, you do not perceive the threads till it is nearly worn out. You may frequently see teazels growing wild in the hedges; but these are disregarded, as being small and deficient in numbers for the supply required. The larger sort, used by clothiers, is cultivated in fields purposely. The termination of the points of this sort are turned back with a kind of hook, which, when properly applied to the cloth, scratches up the external parts of the yarn, and gives a roughness to the surface. This roughness, however, is as yet uneven and unsightly; the shearers, therefore, take the cloth in hand, and with very large broad shears, which lie close down upon the surface, clip away the superfluous nap, and leave it quite even. This roughening and shearing are frequently repeated, before the cloth is ready for being pressed; which last operation renders it glossy, and leaves the fabric thinner than it was at first.

“ But as yet the cloth is white: it must therefore go to the dyer, to have the intended colour given to

it. And as the art of dyeing is rather curious, I will endeavour to explain its leading principles. You know, when you gather mulberries, blackberries, bilberries, or such like fruit, your fingers are stained of a reddish hue; or they become brown, if you handle fresh walnuts. You might make a quantity of brown liquor, by putting green walnuts into water; and if you were to dip a piece of white cloth into it, the cloth would come out of a brownish colour, paler or deeper in proportion to the strength of your dye. But this would not be durable; the colour would gradually fade by exposure to the air: and if the cloth were washed a few times, it would be so far lost as to leave merely a faint stain behind. The cause of this loss of colour is the want of a previous preparation of the cloth, by steeping it in what the dyers call a *mordant*, of which you have had some account in our lecture on Cotton. Different stuffs require different kinds of mordants: alum is sufficient for linens and cottons; solutions of metal are required for wool and silk. Various materials, also, are requisite to give the colour wanted; of these, some are woods, as Brazil, which gives a red tint; or logwood, which yields a purple one. Woad and indigo, both plants, afford blue dyes; and the crocus, or saffron flower, gives a good yellow. Some dyes are animal products, as scarlet, from the cochineal insect; and the bright pinky red, which is obtained from gum lac, the resinous produce of a small insect, with which it forms its nests, or cells.

“ Properly speaking, there are but three simple original colours, red, yellow, and blue; these naturally exist in various shades, and cannot be obtained



by any mixtures. But all the variety of other tints which we behold, arise from admixtures of these; thus, blue and yellow make green; blue and red make purple and lilac, according as the red or blue predominates; red and yellow make orange, or buff; and browns of different hues, are produced by a combination of all the three original colours, with the addition of some sulphate of iron. A mixture of the last-named article, with nut-galls, logwood, and verdigris, produces black.

“ The cloth, after being scoured with a brush, to cleanse out any remaining grease, is dipped in the mordant, and thoroughly dried; after which it is dipped in the colouring liquor, dried, and dipped again, as often as is necessary to impart the full tone of colour. The mordant has two effects; it fixes the colouring matter in the substance of the cloth, and also gives greater brilliancy to the tint itself. In dyeing mixed colours, the cloth is sometimes first dipped in one tint, and, when dry, dipped in the other; as in dyeing green, the cloth is first dyed blue, and then dipped in a yellow dye. And, occasionally, the colours are mixed together before the dipping.

“ The wool is sometimes dyed previously to its being spun and woven; it is then said to be *dyed in grain*; and its colour is more durable than when dyed in the piece.

#### MACKINTOSH WATER-PROOF CLOTH.

“ Of late, cloths intended for the use of travellers and persons exposed to the weather, have been subjected to a process, which renders them impervious to water. The invention is attributed to Mr. Mackin-

tosh, of Glasgow, who has obtained a patent to secure the preparation to himself for a certain number of years.

“ This useful and comfortable invention is, like many others, when once known, of a very simple kind ; consisting in the solution of caoutchouc, or Indian-rubber, in an oil, called *naphtha*, obtained by the distillation and rectification of coal tar. On the cloth intended to be made water-proof, this solution is spread, and being then neatly covered with another cloth, it is subjected to severe pressure, by means of rollers. When perfectly dry, the two cloths are united, having between them a thin layer of Indian rubber, which prevents the penetration of water.

## LEATHER.

“ You are generally aware, that leather is originally the skin of some beast ; but, perhaps, you cannot tell how it becomes so stiff and hard as are the soles of our shoes, so pliable as the upper leathers, and so soft as our gloves. Certainly, to a person who knows nothing of the process, it must appear mysterious that articles apparently so dissimilar should be produced from the same materials, and by means very nearly alike. Attend, and I will endeavour to unfold this mystery.

“ All leather is made of skins ; and, originally, the raw skins were worn upon the feet, as indeed they still are by many uncivilized nations. But such skins soon get very stiff, so as rather to gall than protect the feet : and they are also thin, and rather brittle than hard. To render them more suitable for their destined purpose, the ingenuity of man has

been exercised; and, after many trials, it has been discovered that if soaked in certain vegetable decoctions, or liquors, they acquire thickness, firmness, pliability, and toughness, losing at the same time their disposition to putrefy and rot. The process, indeed, is long and toilsome; but it is very useful, making the skin quite a different thing from what it was at first.

“The vegetable liquor to which I have alluded, contains a principle, called *tannin*, which is very astringent, and seems to bind up and harden whatever it acts upon. It may be obtained from many vegetable substances, by boiling them in water; the barks of trees generally contain it; but none yield it so abundantly as the bark and nut-galls of the oak.

“Skins may be shortly defined as tough membranes, full of an animal matter, called *gelatine*, or jelly. If long boiled, they are dissolved into jelly, and so are transformed into glue. Oak-bark, galls, and other strong astringents, act on this gelatine, so as to harden and fix it in the skin, which itself imbibes a gummy or resinous quality from the bark. Thus a new substance is formed by a mixture of the tannin and gelatine, held together by the fibres of the skin; and this is leather.

“The place where this operation is performed, is called a *tan-yard*; and if you ever go into one, you must walk with great care, lest you fall into one of the numerous pits in which the process is carried on.

“When the hides, or skins, are taken to the tan-yard, if not immediately wanted, they are sprinkled with salt, to prevent them from putrefying. But, notwithstanding this care, the smell of a tan-yard is

not so grateful to the olfactories as a flower-garden when roses are in bloom ; nor would you wish to repeat a visit to one.

“ The first part of the process of tanning consists in steeping the hides in water, to cleanse them from the blood and filth of the slaughter-house ; and they are also divested of the horns, ears, and tails. Next, they are to be freed from the hair, or wool, by being laid in a pit filled up with lime-water. When they have lain a few days in this pit, they are taken out, drained, and put into another pit, with fresh lime-water ; and thus they are soaked, drained, and put into fresh lime-water twice a week, for several weeks, till the hair, or wool, will pull off easily. The skins are then laid over a roundish beam of wood, and the hair, &c. is scraped off with a proper knife.

“ And now for the process of tanning, properly so called : after the skins have been cleansed and freed from hair, or wool, they are carefully laid in pits, one upon another, with a layer of bark, or tan, ground to a coarse powder, between every two skins ; and then the pits are filled up with water. Here they remain for some months, except that they are occasionally shifted into other pits, with stronger degrees of tan, till it has incorporated with the whole substance, which is then leather. Some tanners, to save time, suspend the skins in pits of tannin, so that the liquor gets at them more readily than when they are laid one upon another ; the work is thus accomplished in a few weeks ; but as the pits will not contain so many skins at a time, in this method, little, if anything, is gained upon the whole. When sufficiently tanned, the leather is dried, stretched, and cleaned.

“ It is of bullocks’ hides that I have been speaking; and the leather so made is for the soles of shoes. Cows’ and calves’ skins, for the upper leather, are managed on the same principle, but are not allowed to remain so long in the tan-pits.

“ Softer leather, for gloves, &c. are not saturated with vegetable tannin, but are thickened by repeated soakings in water, in which salt and alum have been dissolved.

“ From the tanner, the skins intended for upper leathers, pass into the hands of the currier, who shaves, or scrapes, the inside of the skin with a peculiar kind of knife, so as to reduce its substance, and bring it to an uniform thickness. It is then rubbed over with train oil, or with oil and tallow, to make it quite soft; and, to produce what is called *waxed leather*, the flesh side is rubbed well with bees’ wax. Oil and lamp-black are used to give colour to the leather; or copperas water, if it be not oiled.

“ The leather is now ready for the shoemaker, who forms it for use upon a small block of wood, called a *last*, cut to the shape of the foot, or nearly so. From the currier he obtains the soles cut into oblong pieces, large enough for the purpose; and having nailed one of these upon the last, he forms it to the required shape with a sharp knife. He then takes a skin of black leather, and, folding it, lays upon it a paper pattern of one quarter. Around this pattern he passes a knife, in shape somewhat like a cheese-knife, and which moves in any direction with the greatest facility. This cut gives him the two quarters and their straps. Then he lays down a paper pattern for the upper leather, and strikes it

out with his curved knife in an instant. These pieces are adjusted to the sole upon the last, and sewed to it with waxed threads, usually called *waxed ends*, consisting of two, three, or four lengths of thread well waxed, with a hog's bristle fastened to each end. With an awl, the workman pierces the leather, and the bristles serve him as needles, to get the thread through the hole. Each end of the thread passes through the same hole, but from opposite sides, so that when pulled hard, it draws the parts sewn together very tight. The workman keeps the last with its appurtenances steady on his knee, by a strap, which passes under his foot. If the leather be not quite smooth and even, he beats it with a broad hammer upon a stone, which he holds in his lap, and is thence called a *lap-stone*. The heels are afterwards fixed with wooden pegs upon the hinder extremity of the sole. Such are the general principles of shoe-making; some minor particulars, as welting, closing, binding, &c. scarcely admit of description; to understand them, you should see the processes.

“Stafford is deemed the great manufactory of shoes; but there is not a town, nor perhaps a village, in England, where shoes are not made. Bristol is a mart for leather; and the citizens pique themselves, not without just ground, for the strength and durability of their shoes.

“The upper leather for men's shoes is usually of calf's skin; for ladies, of kid, Morocco, Spanish, and other sorts of leather, mostly prepared from sheep's skin. Indeed jean, satin, velvet, and other stuffs, are common for them.

“The lighter kinds of leather are frequently dyed

in beautiful colours. Kid gloves for ladies, have pink, yellow, blue, and other delicate hues. Gentlemen's gloves are of that yellow known by the name of *York tan*, or they are of various shades of olive green or drab. Morocco leather is usually of a bright scarlet; Spanish leather is mostly blue or black; and Turkey leather is generally dark purple. All these are grained, in a machine, to imitate the original foreign articles, the use of which is nearly superseded by British art.

“ The dyeing of leather is conducted on much the same principles as the dyeing of woollen; that is, the skin must first be prepared by a mordant, to make it imbibe the colouring material.

#### PINS.

“ Before we quit the dressing-room, we should pay our respectful attention to two diminutive but very useful articles, to which we are greatly indebted for the making up and adjustment of dress; I mean pins and needles.

“ Prior to the time of our Queen Elizabeth, the ladies of the court had nothing better to fasten their clothes with, than skewers, some of wood, others of bone, and some of ivory, with here and there a buckle, or brooch. About that period, brass pins, something like such as we have now, began to be in fashion in France; but they were considered so great a luxury, that the maker was prohibited having an open shop for them, except on two days of the year, in the beginning of January; a circumstance which gave rise to the custom of ladies receiving from their husbands, at the commencement of the

year, a certain allowance, called *pin money*, for their private use.

“ In England, the manufacture of pins was begun at Gloucester, in the year 1626, by one John Tilsby; and it has so increased in that city, that there are now nine large manufactories, employing about fifteen hundred persons, and sending to London only, pins to the value of twenty thousand pounds sterling every year; besides supplying a great part of England, Scotland, Ireland, and many places abroad. But pin-making is not confined to Gloucester; other places have their manufactories; among which, Waltham Abbey, and London itself, are competitors for superiority in the quality of their pins.

“ Pins are made of brass, drawn out into wire, by dragging the rod of metal through a hole in an iron plate, by means of a wheel. The hole being rather smaller than the rod, reduces its thickness, but throws the superfluity into the length. As the wheel turns, it winds the wire, as it passes through the hole, upon a roller; and when the whole length of wire has passed, it is dragged through another hole, less than the former. And thus it is passed through a succession of holes, till the wire is reduced to the desired substance; after which it is made straight by being drawn between two rows of iron pins, firmly fixed, so as to leave a straight passage between them; and then it is cut into lengths, each of which is equal to six pins.

“ These lengths are taken to the grinder, to be pointed. A boy is seated before two grindstones, one coarse, the other fine in grit; and these are turned by a wheel, with great velocity. The boy



takes up as many of the lengths of wire as he can manage between his thumb and fore-finger, and holds all their ends flat upon the coarse grindstone, taking care to give them a turn between his thumb and finger; he next uses the finer stone, by which they are almost instantaneously pointed. The other ends are pointed by the same means, so that upon each bar are two pins. All this is done in less time than I have taken to describe the process, for in one hour a boy can point sixteen thousand pins.

“ The pointed wires then go to the cutter, who takes from each end the length of a pin; the remainder of the bars are ground again to points, which are cut off as before; and so on till the six pins are obtained from each length.

“ The heading of the pins is one of the most curious parts of the process, and is mostly done by children. A wire worm is first formed by means of a wheel, one twirl of which twists a wire, intended for the heads, about a straight wire, of the thickness of the pin. The turns are so close together, that the straight wire cannot be seen till it is drawn out, and then, of course, it leaves the twisted wire hollow. This hollow wire, or worm, is cut into small pieces, each containing two twists; and these are to be heads for the pins; but first they must be made red-hot, and cooled, to soften them.

“ A dishful of these heads is placed before each child, who is furnished with a small anvil, and a hammer, which he works, or causes to strike upon the anvil, with his foot. He then adroitly thrusts the blunt end of a pin into one of the hollow twists, lays it on the anvil, and with a blow of the hammer,

fastens it on. This also is done with such rapidity, that if you were looking on, you would scarcely distinguish the several movements of his hands.

“ As yet the pins, though perfect in shape, are only yellow brass: to make them look nice and neat, fit for a lady’s use, they must be whitened, or *silvered*, as it is called. A solution of tin is prepared with wine-lees, into which the pins are cast; and after a while, the tin leaves the liquid, and fastens upon the brass. When the pins are taken out, they are of a dull white colour, and require polishing. They are, therefore, thrown into a vessel of bran, which, being turned round with great velocity, rubs them perfectly bright.

“ Looking at the pins just now, you would be ready to say it would cost more trouble to pick them out of the bran than they were worth. And so indeed it would, were they to be separated in such a way. But the sorting is done by a process very similar to that of winnowing corn. The bran and pins are thrown against the wind; which blows back the bran, while the pins fall, by their own weight, in the opposite direction.

“ The last operation is that of sticking the pins, neatly and regularly, upon paper; so many in a row, and one over the other exactly; each paper containing pins of the same size, whether minikins, short whites, middlings, corkings, blanket pins, or any other.

“ A great many pins are also sold without this troublesome process, in packets or boxes, of different weights, from an ounce to a pound. In this

state, mixed pins, or pins of various sizes thrown together, are always sold.

#### NEEDLES.

“ Emma and Louisa have, doubtless, heard of Whitechapel needles ; and, in former days, I suppose, they were the best. But they are now manufactured as well in many other places in England ; and at Chichester they are made as good as elsewhere.”

Mr. Paterson was here interrupted by mamma, who reminded him that the term *Whitechapel* had become obsolete ; and that the best needles were distinguished by the names of *gold eyes* and *silver eyes* ; a mode of manufacture of modern invention, for the purpose of saving the thread, which was liable to be cut by the common steel eyes.

Mr. Paterson proceeded : “ Needles were first made in England by a native of Hindoostan, in 1545 ; but at his death the art was lost till 1560, when it was revived by Christopher Greening, who was settled, by an ancestor of the present Lord Milton, at Long Crendon, in Buckinghamshire, where a manufacture of needles has been ever since carried on, though it is now in a declining state.

“ The best kinds of steel for needles are the German and Hungarian. In the making of them, the first thing is to pass the steel through a fire, and under a hammer, to reduce it from its square figure to that of a cylinder. It is then drawn through a series of holes, to bring it to a proper thickness, as I have just described with respect to the wire used in pin-making. The steel, thus reduced to a fine

wire, is cut into pieces of the length of the intended needles. They are next flattened at one end, that the eye may be punched out at a blow ; but as this does not always take the piece clean out, it is laid on a block of lead, and another punch clears the eye. The tops of the heads are then filed roundish, and a groove is also filed on each side of the eye. The point is next formed with a file, and the whole needle is filed over. During all these operations, the steel is very soft, and in that state the needle would be worth little. It must be hardened, which is done by making a certain number of needles red-hot, and then plunging them into cold water. Now, on the other hand, they are too brittle, and would break with a touch ; therefore, they must be tempered, which is done by heating them again, to a certain degree, and allowing them to cool gradually. Or, which is much better, when heated for the hardening, they are cooled in oil instead of water, and afterwards tempered by holding them in a hot shovel over the fire till the oil upon them blazes, and then letting them cool gradually.

“ As the processes of hardening and tempering twist the greater portion of the needles, they are straightened, one by one, with a hammer : a very tedious work, as you will easily conceive.

“ The needles are now to be polished, which is done by ranging from twelve to fifteen thousand in small heaps, on a piece of buckram, previously sprinkled with emery dust. More emery dust is thrown upon the needles, till they are buried in it ; some olive oil is then sprinkled upon them ; and the whole, needles and emery, are rolled up together in

the buckram, which is well bound at the ends, to prevent the needles falling out. A thick plank, heavily laden with stones, is then laid upon the roll, and two workmen move it backwards and forwards, for a day and a half, or even two days, so that the needles, being rubbed against each other with oil and emery, gradually acquire a polish. Many are broken by this method; but they are not altogether lost, the needle-points being in request among framemakers, cabinet-makers, and others, to fasten on ornaments and delicate work, where the smallest nails would be too clumsy. After polishing, the needles are cleansed from the emery powder and oil, with soap and water; then they are dried in hot bran, the points are smoothed on an emery stone, turned by a wheel; and, finally, they are made up in packets of two hundred and fifty each, for the wholesale dealer; the different sizes being distinguished by numbers, commencing with 1 for the largest, and ending with 25 for the smallest."

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### THE TOILET.

"Having completed our consideration of the several processes of manufacturing the necessary articles of dress, we are naturally led to take a survey of the superfluities, or ornamental parts, which are found about the toilet: not, indeed, on account of their real utility to the wearer, but because custom and fashion have rendered them of importance to commerce and the industrious mechanics who prepare them for use."

Mrs. Paterson, anticipating such a conclusion to the Wardrobe lecture, had taken care to provide, in addition to her own jewellery, such a selection, by loan from the jeweller's, as might give her children an opportunity of close personal inspection of the articles treated of. And now she opened the secret drawers of her cabinet, and made a display of rings, bracelets, brooches, necklaces, lockets, ornaments for the headdress, and a variety of other brilliant and costly articles, which perfectly astonished the young auditory.

“The toilet,” proceeded Mr. Paterson, “derives its name from the cloth which is spread upon the table in the chamber, or dressing-room, of a lady. The term, which is French, has been extended from the cloth, first, to the table which it covers; secondly, to the articles usually placed upon the table, collectively; and, finally, to the act of using those articles.

“The love of ornament has been a predominant passion among mankind, in all ages and in all climes: civilised and barbarous nations equally owning its sway, and pressing into their service such articles as they respectively can command, fashioned by such skill as either may possess, to render themselves—beautiful, shall I say?—perhaps conspicuous, may suit the case better.

“It is not a little amusing to observe the diverse methods pursued by different nations, and even by individuals of the same nation, to attain this end: some having recourse to things as ornaments, to which others, though by no means behind them in the general desire of adventitious embellishments, would give a quite contrary designation.

## JEWELLERY.

“The proper subjects for the toilet are jewels and perfumes. A jewel, properly speaking, is a precious stone, as a diamond, a ruby, or the like; but as these require to be set in gold, silver, or other metal, the term has been extended to the setting as well as the jewel, and even to all little ornamental articles, even though devoid of precious stones: thus a plain gold ring, a gold necklace, ear-rings, &c. may be included under the general title of *jewellery*.

“The proper object of the *jeweller's* profession being precious stones, it may be proper to observe that they are substances procured either by digging into the interior of mountains, or by searching the sands of rivers, which, descending from the mountains, bring down with their waters many of these gems.

“At the head of precious stones, stands the *diamond*, which, when cut and polished, should be perfectly colourless and transparent, and of extreme hardness, reflecting the rays of light with great splendour. The setting for a diamond is either open at the back, or the inside of the back is blackened; because the reflection from the cut and polished face of the diamond is more brilliant than from any metal. Next in value to the diamond is the *ruby*, somewhat similar in substance, but of a bright and deep red colour. Then we have the blue *sapphire*, the yellow *topaz*, the purple *amethyst*, the green *emerald*, the yellowish green *chrysolite*, and the deep red *garnet*. These are all transparent, and constitute *gems*, properly so called. But some stones are ac-

counted as gems, although they are only semi-transparent, as *opal*, *cornelian*, *lapis lazuli*, *jasper*, *jet*, &c. To these we must add, as articles belonging to the jeweller, the marine products of *pearls* and *corals*.

“ It is the business of the *lapidary* to shape and polish precious stones, which is done chiefly by grinding them upon a wheel with diamond powder. Then the jeweller makes them up, either separately, or many together, in various shapes, as rings, brooches, bracelets, &c.

“ The substances set in gold, or other metals, which are not called gems, are of three classes: *shells*, or the matter of shells; *stones*, produced, as I have said, by nature, though generally cut and polished by art; and *pastes*, or *enamels*, which are imitations in glass of natural stones. Some of the latter are so well fabricated, that they can scarcely be distinguished from real gems; but as they want hardness, and soon get covered with scratches, they are of comparatively little value.

“ Of testaceous jewellery, or such as consists of the matter of shells, there are two kinds, *pearls* and *corals*; the former of which are formed by animals of the oyster kind, the latter by a species of worms, called *zoophytes*, each of which we shall consider in its turn.

#### DIAMONDS.

“ The diamond, as I have already remarked, is the most brilliant of all the precious stones; and its excellency is greatest when it displays its lustre without being seen itself.”



An exclamation of surprise was here uttered by the young auditors; but Mr. Paterson, without suffering himself to be interrupted, went on.

“ If you look at that brilliant on the table, you will admit that it is not the body of the diamond, but the rays of light reflected from it, which you see. The comparison for a diamond is water; and a *gem of the first water* means a diamond which resembles a pure drop of water from the spring. Now, you know, when looking at such a drop, you do not see the particles of the water; your eye only discovers the glistening reflection of light which it projects. It is only when the water is so foul, as to diminish its reflecting power, that it becomes visible.

“ Having thus elucidated one mystery, I shall tell you of another, which is, that diamonds consist of pure carbon, or charcoal! It is true, that, externally, they bear all the characteristics of stones; but, upon exposure to intense heat, in a furnace, instead of melting, as other precious stones do, into a kind of glass, they are consumed and visibly lost, as charcoal would be. Chemists and mineralogists have, therefore, classed them with carbon; but the other precious gems, as rubies, topazes, &c. are included in the class of stones.

“ Diamonds, which as yet have been found only in the East Indies and in Brazil, are distinguished by jewellers as *Oriental* and *Occidental*; not indeed with particular reference to their coming from the East or from the West, but according to their qualities, the finest and hardest being always called *Oriental*, even though found in Brazil. This has arisen from a supposition, originally entertained, but

now exploded, that Brazilian diamonds were inferior in brilliancy and hardness to those of the East.

“ The properties of a diamond comprehend colour, clearness, and shape. Such as are quite colourless are deemed *of the first water*, and are most valuable. Such as have a reddish hue are generally good, and of the *second water*. Such as are blueish or greenish, are soft and bad, and come under the denomination of *coloured stones*. Clearness consists in the diamond being free from clouds or specks, which are not unfrequently the effects of cracks or flaws in the stone.

“ In their native, or rough state, diamonds are in the form either of roundish pebbles, with shining surfaces, or of octohedral crystals, that is, crystals having eight three-cornered faces. In the latter form, the crystals are frequently irregular; and consist of very thin plates, or leaves, yet closely united, the direction of which must be ascertained before they can be properly worked. In general, they are covered with a thin crust, which renders them semi-transparent; but when the crust is removed, they are quite diaphanous, or clear.

“ Cut diamonds are distinguished, according to their figure, by the names of *brilliant*s and *rose diamonds*. Brilliant is such as are cut in faces both at top and bottom, with the table, or principal face, flat. Rose diamonds are quite flat underneath, and have their upper part cut in divers small faces, usually triangles, the uppermost of which terminates in a point. They are scarcely half the thickness of brilliant of equal superficies; and being consequently much cheaper, are used for low-priced jewellery.

“ The value of diamonds is decided by the weight of a single carat, which is about the hundred and fiftieth part of an ounce troy, and worth two pounds sterling in money. To know the value of a rough diamond, ascertain the number of carats it weighs; multiply these by themselves, and the product by two, which will give the amount in money. Thus, the great Portuguese diamond, which was found in Brazil, weighs 1680 carats; these multiplied by themselves give a product of 2,822,400, which is the square of 1680; and this product multiplied by two, gives the sum of 5,644,800*l.* as the value of the diamond. But the value of fine brilliants is estimated by squaring the weight in carats, as in the case of rough diamonds, and multiplying the product by 8, which gives the amount in pounds sterling. This mode of valuation, however, should be understood as applicable only to diamonds not exceeding 20 carats in weight. The value of the larger sort depends upon the competition of the purchasers.

“ The diamonds of India are found chiefly in the upper countries of the Carnatic, in the south; and in the provinces of Bengal and Allahabad, in the centre. Golconda was formerly the centre of the trade.

“ Diamond mines are always situate in barren places. These precious stones are never found native in the rock; but among loose clayey gravel: and it is generally believed that they are formed in about fifteen years; though the mode of their formation is altogether unknown.

“ The East-India diamonds are generally imported from Madras, in small packages, called *bulsas*: and so honestly is the trade conducted, that these

bulsas are bought and sold by invoice, without being opened for examination.

“ From its scarcity, as well as its beauty, the diamond has always been in request. The ancients called it *adamant*; a term still in use to express anything extremely hard.

“ Brazilian diamonds are found in the interior of Brazil, embedded in gravel, among the mountains called *Serro do Frio*. At first, they were supposed to exist in the mountains themselves; but experience has proved, that, like the diamonds of Hindoostan, they are formed in ferruginous gravel, or sand; that is, such as contains a great deal of iron. The mines, as they are called, are above ground, and are farmed to individuals, who employ seven or eight thousand slaves in working them.

“ The largest diamond on record is the great Portuguese diamond, to which I have already alluded: its weight, as I have stated, is 1680 carats; but, originally it was much heavier: for the ignorant peasant, who found it, must needs try its hardness by the stroke of a large hammer upon an anvil, by which he shivered off a portion. This prodigious diamond still remains uncut, on account of the great expense the cutting and polishing would incur.

“ Next in size is a diamond in the imperial sceptre of Russia, weighing 779 carats, and being cut is estimated to be worth 4,854,728*l.* sterling; although it cost hardly 135,417 guineas. This diamond was once an eye of a Malabarian idol, and was stolen by a French soldier, who, having deserted from his regiment, contrived to become a priest of the idol, by which he had an opportunity of stealing one of its eyes. He

then escaped to Madras, where he sold the diamond to a ship's captain for twenty thousand rupees, or about two thousand pounds sterling. A Jew next purchased it for about seventeen thousand guineas: and a Greek merchant, the next possessor, sold it, at Amsterdam, in 1766, to Prince Orloff, for his imperial mistress Catherine II. at the price of something more than 136,000*l.* A model of this diamond, which is not of a regular form, is kept in the British Museum.

“As the method of obtaining diamonds differs but little in the several mines, I need only describe the process at two or three, to give you a general idea of all.

“Near the town, or fortress, of Raolconda, about five days' journey south-west of Golconda, is a diamond mine, which has been resorted to for upwards of two centuries. The soil is here sandy, and full of rocks and copse. In the clefts of the rocks, which vary from half an inch to an inch in breadth, the miners search with hooked irons, dragging out the sand, wherein the diamonds are concealed; and, when the cleft, or vein, terminates, they break up the rock to recover it, and renew the search. When a sufficient quantity of sand, or earth, has been dragged out, it is carefully washed, and the stones which it contained, being mostly diamonds, are sought for. To prevent the miners secreting any for themselves, they work naked, with the exception of one narrow stripe of cloth; yet they now and then contrive to swallow a stone, and bring it away without detection.

“At Gani, or Coulour, seven days' journey eastward from Golconda, is a mine, in which diamonds weighing from ten to upwards of forty carats are obtained, but not of the best water; they are usually

tinged with the quality of the soil, being black where that is marshy; red, where it is ferruginous, or tinged with iron; and sometimes green and yellow, according to the minerals with which the earth is impregnated. They have the farther defect of a greasy appearance, so that when polished they have not the requisite clear lustre; yet here was found the celebrated diamond of the Great Mogul Aureng Zebe, which, before it was cut, weighed 793 carats. This mine was discovered, in the seventeenth century, by a peasant who, in digging, turned up a natural fragment of twenty-five carats. This specimen soon led to an examination of the spot: and now about sixty thousand poor people, men, women, and children, are usually employed. When the miners have pitched upon a spot, where they hope to obtain diamonds, they level an adjacent place, somewhat larger than the spot itself, and enclose it with walls, about two feet high. After a few superstitious ceremonies, to propitiate the supposed genii of the place, and a feast given by the master of the mine, to encourage his workpeople, every one goes to his particular department; the men digging up the earth in the spot first pitched upon, the women and children carrying off the soil so dug to the enclosed area. The men continue digging till they find water, which is generally at the depth of twelve or fourteen feet; and this water is used to wash the earth in the enclosure, two or three times; after which it is let off by an aperture in the wall. When well washed and thoroughly dried, the earth is sifted; such as remains in lumps is beaten to powder, and again sifted; and, finally, it is well searched with the hands for diamonds, which

habit teaches the workers to distinguish by the feel. This mine is on a plain, at the foot of mountains ; and the nearer the mountains the people dig, the larger are the diamonds they find.

“ The most ancient mine in Hindoostan is the river mine of Goual, near Soumelpour, a large town in the province of Bengal ; whence are brought all our fine diamond points, or *natural sparks*, as they are denominated. The river Goual runs into the Ganges ; and after the monsoons, or heavy rains, which periodically lay all the low country under water, the people of the district, to the number of eight or ten thousand, assemble for the purpose of seeking diamonds in the sand and earth, which the inundation has brought down from the mountains. After examining the banks of the river, which at that season is very low, a spot is fixed upon for working. Around this they make a dam with earth, fascines, and stones ; and, after lading out the water, they dig it about two feet deep. The sand thus obtained is washed and examined, as I have just described, and the precious stones are got out.

#### COLOURED STONES.

“ Under this title are comprehended all the precious stones below diamonds. Though inferior in hardness, they are very beautiful, as the specimens before you evince. Look at that sapphire brooch, those ruby ear-rings, that emerald in the ring, that necklace of amethysts, and those clasps set with Bristol stones, or rock crystals, little inferior in brilliancy to true diamonds ; and you will perceive that coloured stones are valuable as ornaments. To these, in the course of our lecture, I shall have to add some

others, such as you see among the articles in carnelian, jasper, garnet, opal, &c.

“ Coloured stones are compounds of various ingredients, as clay, flint, iron, and other matters. The hardest are such as are composed of clay; and are known by the general designation of *sapphires*; though, in common language, that name is restricted to such as are of a blue colour. They are found in various countries; but the best are from Ceylon and the country of Pegu, eastward of the Ganges.

“ The *Oriental ruby*, of a crimson or carmine colour, is next in hardness to the diamond; and the finest specimens bear nearly an equal price. The *blue ruby* is next in value, and nearly as hard, but not so brilliant as the red. The *yellow ruby*, which is the *Oriental topaz* of the jewellers, is of less value than either of the two former, yet much superior to the common topaz.

“ *Emery* belongs to the same class of stones; but, having no beauty, is used only for polishing hard substances. It is found in Guernsey, Tuscany, and many parts of Germany, in large masses, of no determinate shape or size, but very heavy. Lapidaries cut the ordinary gems on their wheels, by sprinkling the wetted powder of emery over them; but it will not do for diamonds, which require their own dust.

“ The *emerald* is a green stone, composed mostly of flint. When pure and well coloured, qualities not often met with, it is very beautiful, and even hard. The more ordinary kinds are clouded in colour, and more soft and brittle than the sapphire. *Beryl* belongs to this class, but is softer, and not so beautiful as the emerald. The best emeralds come



from Peru ; but beryl is met with in the mountains of some parts of Scotland and Ireland.

“ The *common topaz* is very abundant, and of various colours, as yellow, green, blue, and red. It contains less flint and more clay than the emerald ; and is found in Brazil, Saxony, some parts of Britain, and in many other countries.

“ *Rock crystal*, which is almost wholly flint, is sometimes coloured, sometimes transparent. Specimens of the latter kind have often considerable beauty, only inferior to that of the diamond. The most transparent of these are known under various titles, as *false diamonds*, *Bristol stones*, *Cornish diamonds*, *Kerry stones*, *Alençon diamonds*, *Iceland crystal*, &c. Glasses for spectacles, opera glasses, &c. are frequently made of rock crystal, or, as the lapidaries call it, *pebble crystal*.

“ The *amethyst* is of a purple colour, and principally composed of quartz, or flint, strongly tinged with blue and deep red ; and, as either of these prevails, exhibiting different shades of purple, sometimes approaching to violet, and sometimes fading to a pale rose colour. In size, the stones vary from that of a small vetch, to an inch and a half in diameter, sometimes more. It is obtained in the East and West Indies, as well as in several parts of Europe ; but, as we find with other gems, the Oriental productions are the best. In its purest state, the amethyst, not inferior to any of the gems in beauty, is of equal value and hardness with the sapphire and the ruby.

“ Many other kinds of coloured stones are known among jewellers, who also have different names for some of those which I have described.

“ Of stones of inferior value, the greater portion

are composed of flint. The colouring matter of these, and indeed of all stones, is understood to be metallic, in most cases iron; but in the emerald it is oxide of chrome. Some of the most valued in this class of stones, are the following:

“*Chalcedony*, of various colours, striped and variegated. The colours are often very beautiful; indeed, more so than those of gems of higher price; but the stone is very abundant.

“*Jasper*, like the chalcedony, is of various colours, and usually divided into the four species of *Egyptian*, *striped*, *porcelain*, and *common* jasper. It is used frequently for seals.

“*Chrysoprase*, of a dull apple-green; frequently made up in trinkets.

“*Carnelians*, of different colours, as red, brown, green, yellow, white, and clouded. They take a fine polish, and, being tough, answer well for engraving upon. The best come from Arabia and India.

“*Heliotrope*, or *blood-stone*, of a dull green colour, spotted with red and yellow, is found in many countries, among others in Scotland and Iceland; and is used for purposes similar to those of the carnelian.

“*Opal*, of which there are many varieties, has a play of almost all colours in it, and is found in Hungary and other countries. The finer specimens rank among the most beautiful of gems.

“*Chrysolite*, of a greenish colour, transparent, and very beautiful, contains a great deal of manganese, and is chiefly obtained from Upper Egypt.

“*Tourmaline*, green, blue, or brown, contains a considerable admixture of clay, and is not one of the brightest of stones, though frequently cut.

“ *Garnet*, which comprises nearly equal portions of flint, lime, and clay, is of a deep red colour, and, when fine, is a handsome stone.

“ *Pyrope*, which is allied to the garnet, is of a deep blood-red, and rather splendid.

#### PASTES.

“ The desire for ornamental decorations is not confined to the rich ; persons in the humbler classes of society equally feel it ; and to gratify this, in the most numerous body of purchasers, at prices within their reach, jewellers have invented imitations of the precious stones. These are composed of glass, manufactured in a particular manner, and are denominated *pastes*. In general, the imitation is good, and the appearance as splendid as the gems they represent ; being only inferior in hardness.

“ The best composition for pastes consists of ten parts of prepared crystal, six parts of salt of polverine, a species of potash, quite free from colour, and two parts of sulphate of lead ; when these have been reduced to a fine powder, they are mixed with pure water, and made into a hard paste, which, after having been thoroughly dried in the sun, is calcined in a potter’s furnace. It is then pulverized, and ground to perfect fineness upon a porphyry stone ; and the powder is set, in a pot, to purify in a glass-blower’s furnace for three days. On being taken from the furnace, it is cast into water, and afterwards returned to the furnace, where it remains for fifteen days, in which time all foulness and tendency to blistering is carried off, and the paste much resembles natural diamonds. For the imitation of other gems, the same paste is coloured ; so that though inferior to the diamond in hardness, it is

equal in that respect to many of the coloured stones, and even superior to some of them. To give an emerald colour, brass, thrice calcined, is added; for a sea-green, brass simply calcined to redness; for sapphire, the additions are, zaffer and manganese; which are also used in different proportions for amethyst; for topaz, manganese and tartar. A very fine red is made from gold; and one, not much inferior, from iron. A sky colour is obtained from silver; and much finer from Bohemian granite. Other compositions are used for the different colours which you see in jewellery of this kind; some resembling the natural gems, and others dictated by fancy.

“When the paste has been formed at the glass-house, it is sent to the lapidary, who cuts and polishes it to the required pattern; and then the jeweller performs his part of setting the stones in gold, or inferior metal.

“The composition which I have described, is the hardest and best; but in many cases, other materials are used, which require less attention, and are much cheaper; at the same time they are much softer, and more generally used for coloured stones. The most simple of these is: six parts of white sand, cleansed; three parts of red lead; two parts of purified pearl-ash; and one part of nitre. These, pounded, mixed, and calcined, make a paste fit for earrings, brooches, and such articles as are not liable to be much rubbed; but it is unfit for rings, buckles, or whatever may be exposed to scratches.

## PEARLS.

“We now proceed to pearls, which, as I have already hinted, are procured from shell-fish of the oyster and muscle kind; and are in fact drops of

the same matter as that which forms the inside of their shells.

“The formation of the pearl arises, as is believed, from a disease in the fish, causing the matter designed for the enlargement of the shell to form a small ball distinct from it. The larger, smoother, rounder, and brighter the pearl, the more it is prized.

“The lustre of pearl shells and pearls is owing to their formation of very thin layers of two very different substances; one of these is lime which is opaque, the other is animal matter which is transparent. Thus, the real colour of the one being pure white, and the other devoid of colour, the light is divided into different tints at the surfaces of the plates or layers, in the same way that the solar rays are distributed in divers colours in the rainbow by the surface of drops of clear water.

“The rivers of Scotland abound in a sort of muscles, from which many beautiful though small and inferior pearls are obtained.

“The pearl-bearing shell of the Indian seas, which produces these beautiful concretions in greatest abundance, is arranged by naturalists among the muscle tribes, and is named *Mytilus margaritiferus*: it has been remarked that none of those which yield pearls, whether oysters or muscles, are fit to be eaten.

“The pearl fisheries in Europe are of little value. Scotland has been noticed; and in Bavaria also pearls are found.

“America has some pearl fisheries: in the Gulf of Mexico, and all along the coasts of the Caribbean Sea; the Isle of Margarita is so named from its pearls, *Margarita* signifying a *pearl*, in the Latin, Greek, and Hebrew languages: on the western side

of the Isthmus of Darien, and at the Gallipagos Isles, the fishery is considerable.

“ But the finest and most valuable pearls come from Asia, where the chief fishery is on the coast of Ceylon; good pearls are also obtained along the Arabian coast, and in the Gulf of Ormuz.

“ Ceylon, as you are all aware, is a large island, in the Indian Ocean, near the south-east point of the peninsula of Hindoostan. The bank, where the pearl fish abound, lies about twenty miles out at sea, opposite the Bay of Condatchy. The government does not allow the whole bank to be fished in any one season; but it is divided into four portions, one of which suffices for a year: thus, as the fishers make progress through the whole, each portion has time to recover the devastations made upon it. The number of beds is about fourteen; of which the principal bed, or bank, is ten miles in length, and two in breadth; and the best fishing is in six or eight fathoms of water. The produce is variable; in some years to the value of two hundred thousand pounds sterling, and in others less than thirty thousand.

“ The fishing begins in February, and is continued through the month of March. In stormy days, the divers cannot proceed. The boats set off at the signal of a gun, about ten o'clock in the evening, when the land breeze is in their favour; they reach the banks about break of day; and about noon the sea breeze rises, with which they return to land.

“ Each boat carries about twenty men; half of whom are to row, and assist the divers, especially in coming up, when they are considerably exhausted. Of the other ten who are divers, five go down at a

time ; one company resting, while the other dives. Each diver has a large stone tied to his foot, of forty or fifty pounds' weight, to enable him to sink ; this has a line fastened to it, that it may be drawn up when the diver rises, and serve again.

“ When about to descend, the diver seizes the rope between the toes of his right foot, for by custom he can use his toes as well as his fingers, and he holds a net-bag with his left foot. He grasps another rope with his right hand ; and, holding his nostrils with his left, plunges into the sea. On reaching the bottom, he hangs the net round his neck, and, as quickly as possible, puts in as many oysters as he can gather up, in about two minutes. By jerking the rope, he gives notice to those above to draw him up ; and loosing the stone from his foot, he rises quickly into the air.

“ When in the boat again, the violence of the operation appears by his discharging water, and sometimes blood, from his mouth, ears, and nose. He then rests, while the other five descend. Each man will thus go to the bottom forty or fifty times in one day, bringing up possibly a hundred shells each time. They are the poorest of the people who labour in this dangerous way ; and live but a few years, being liable to the bursting of blood-vessels, drowning, being devoured by sharks, or dying of consumption.

“ When the boats return to land, the shells are heaped in pits, which are lined with mats, to prevent them from coming in contact with the earth itself. They could not be opened while alive, without great force and more trouble ; but when they begin to pu-

trefy, they fly open, and the pearls are taken out without injury.

“ Pearls should be of a clear white, and highly glistening; this lustre is called their *water*. So we say in Europe; but in the East, those which are tinged with a little yellow are preferred; especially as they are reported never to change their colour. The white are apt to degenerate to a very dingy yellow, after forty or fifty years' wearing.

“ The natives paint them with powder of pearls; and drill them with great dexterity, so that they may be strung ready for use.

“ Pearls are valued according to the squares of their weights. If a pearl of one carat be worth ten shillings, a pearl of six carats will be worth thirty-six times as much, or eighteen pounds; for the square of six, that is six multiplied by itself, is thirty-six.

“ The ignorant are often deceived by buying, as genuine productions of nature, articles which are mere fabrications, or *artificial pearls*. Some pretend to unite several small pearls into one large one, which is impossible. From the scales of some fish a silvery matter may be obtained; this is dropped into a hollow bead of very thin glass; and the appearance is so nearly that of the real pearl, that none but a practised eye can distinguish the difference. Nay, a thin skin from the eye of the mackarel, may be stamped into a half-globular shape, which, when set, may deceive the inattentive. The French are very dexterous imitators of pearls; and the pastes they make of a certain powder united with isinglass, possess the weight, the lustre, and nearly all the properties of real pearls.



“ The article called *mother-of-pearl*, is not a product of the pearl muscle, but the substance of the shell of another genus, found in warm seas, where the water is not very deep: it is obtained in the Indian Ocean; but more abundantly, and of the finest colours, in the Red Sea, the seas on the coasts of China, and the waters of the Eastern Isles. It is named *Nautilus Pompilius*, or great chambered sailor fish. The inner side is exquisitely polished by nature, of the whiteness and water of pearl itself; and the outside, after the external coating has been removed by aquafortis and the lapidary's wheel, has a similar lustre. It is cut into pieces with a saw, and made into many sorts of trinkets. It is also used with great advantage, as *buhl*, for inlaying the nicer sorts of cabinet-work.

#### CORAL.

“ If it were possible by any means to empty a sea, more especially a sea in any of the warm latitudes, as quickly as one might empty a basin of water, the bottom would afford a sight equally singular and splendid. But as this cannot be done, we must be content with the description given by those who pass over such seas: when the water is clear, and not very deep, and the light of a vertical sun penetrates to the bottom, a most interesting spectacle is displayed. The bottom itself is covered with plants, or plant-looking substances; many of which, however, are animals, or the products of animals, requiring but little exertion of the imagination to make them semblances of flowers in a garden, and fruits in an orchard, blended together; these are relieved with tribes of

swimming fishes, crustaceous animalculæ, in numberless grotesque assemblages, and sea snakes, sporting on the submarine parterre. Among these various objects are corals and corallines; but the former are met with in some seas in much greater abundance than in others.

“ I have been led to these remarks by the sight of that set of coral ear-rings, necklace, brooch, and bracelets, which you were probably not prepared to look upon as animal products. Indeed, many wiser heads than yours have been deceived in respect to the origin of coral, which for a long time was believed to be a marine plant, growing to stones, yet without leaves or roots, and producing flowers and seeds, or matter analogous to seeds. Such is the account given of it by the best ancient naturalists. But it is now ascertained that all corals and corallines are the productions of insects, or animalculæ, some of which raise immense masses of rocks from the greatest depths of the ocean, in a very short time; and it is quite probable that these creatures, which are scarcely visible to the naked eye, have raised in the ocean as much matter as is contained in many stupendous ridges of mountains on the surface of the earth. Some of their reefs, or rocks, extend thousands of miles, in parts of the sea, which, at a very little distance, are unfathomable. The islands in the Pacific Ocean are mostly coral rocks, covered over with earth: some are much more ancient than others; and it is supposed that, as these submarine works are still going on, new islands may from time to time appear.

“ These immense masses, which are the habitations of myriads of minute insects of the polypus kind, are

formed much in the same manner that snails form and enlarge their shells, by matter emanating from their own bodies ; and what was formerly supposed to have been the flower of the plant, is now ascertained to be no other than the insect itself, seated in its cell, and expanding its fibrous arms towards the sun. From an original stem of coral, which may be considered as the work of the parent polypus, new branches spring out, and from these other shoots are projected, as the colony increases in numbers, each shoot getting before the former range. The growing mass, as its branches are extended, becomes hard, and uninhabitable in its inner recesses ; and in the course of time rises above the water, where it stops, as the insect cannot live out of its element. There sea-weeds and sand, left upon it by the tide, become dry and putrefy ; the seeds of the weeds vegetate in the decayed matter, and the decayed leaves, thus produced, render the soil deeper. Seeds more important are dropped into it by birds, or are floated upon it by the waves. Trees and grass gradually grow up ; the quantity of soil is increased ; hills arise, rippling streams appear ; and at last man, by choice or accident, takes possession, and cultivates what has been thus formed.

“ In these marine productions, the animals labour like those of the testaceous or shell kind ; each according to his species, for they are numerous ; and the productions themselves, varying according to their several forms, magnitudes, and colours, are classed by naturalists under the titles of *corals* and *corallines*.

“ Of *corals*, there are, properly, but three kinds, red, white, and black : the latter, as it is the rarest,

is most esteemed. When newly taken up from the sea, coral is enveloped in a soft and thin crustaceous covering, whence the common mistake that coral is soft while in the water; but when this covering is removed, as it usually is before it is sent to market, the coral is found hard and compact. In this bark, or coating, the insects have their residence; the coral itself being a substance formed by them to support their various cells.

“The red coral, most esteemed in Europe, is fished up in the Mediterranean Sea. The principal fisheries are at Marseilles, in France; in the Strait of Messina, between Sicily and Naples; and in the vicinity of the Lipari Islands. Eighteen or twenty barks belonging to Messina, are employed in it; each bark is manned by eight seamen, accustomed to the business, and well acquainted with the navigation of the surrounding seas. They are not exclusively devoted to the fishery, but follow it when destitute of better employment; for it is very laborious, attended with considerable danger, and but ill paid for. The quantity of coral annually obtained by these vessels is said to exceed three thousand pounds’ weight, various in quality and colour, some being white, some red, of different shades. The size and fineness of the coral, as well as the colour, regulate the value; some is worth ten guineas an ounce, and some scarcely worth ten pence a pound. The oldest coral is deepest in colour, of which no less than nine different shades are reckoned, from dark crimson to pale carnation. The white coral is also of various hues; but the red is the most constant object of research.

“The principal instruments used by the coral

fishers are called in France *engin* and *salabre*, which latter the Italians denominate *ordigno*. The *engin* consists of a long spar, or beam, which, by means of a weight in its middle, is sunk in the water, while its ends are directed from the boat by two cords fastened to them. One of the ends is furnished with an iron hoop, about eighteen inches in diameter, forming a mouth to a strong hemispherical net. At opposite sides of the hoop are two other nets, of nearly a triangular or conical figure, descending considerably below the other net. The second implement consists of two long spars, fastened together in form of a cross, through the centre of which a cord passes, with a cannon shot fastened to it below: the shot serving to sink the cross, and the cord to raise it, as occasion may require. To each of the four extremities of the cross is fixed a large funnel-shaped net, with meshes of unequal sizes. These implements are carried out to sea in barks manned with the stoutest seamen; the service being both fatiguing and hazardous. One man has the management of the nets; the rest work the vessel, and assist in drawing them in. When they arrive at a spot where they expect to find coral, the caster sinks his nets, and when the coral is strongly entangled in them, they are drawn up again. Sometimes this is more than a single bark full of men can do; five or six of the vessels must unite their forces; and if, in hauling in, the rope happen to break, the jerk overturns the boat, and the men are precipitated into the sea, at the imminent peril of their lives.

“ The largest quantities of coral are obtained at depths of from sixty to a hundred and twenty-five feet;

and some is obtained from the depth of nine hundred or a thousand feet; but at great depths, the growth is much slower than in such as are more moderate.

“ Of the numerous formations called *corallines*, we have specimens, you know, in the Study, of the most remarkable. When closely inspected, some of these seem to consist of small ivory chips, strung together; and some of a number of little tubercles, attached in a row to a fibre almost as fine as a hair. Here and there is also a flat piece, very rough and stony, which, if examined with a magnifying glass, proves to be a rich, beautiful, and regular arrangement of hollow, arched cells, each of which was once the habitation of a small insect.

“ As I have already hinted, corallines were formerly reckoned a genus of plants, of which thirty-six species are enumerated by Tournefort: in the Linnæan system, they are classed with zoophytes, or substances partaking of the nature of plants and living creatures; but they are distinguished from plants by their texture and hardness; and, though formed by living creatures, are not themselves animated. Some seem to consist of a single tube, containing a single parent animal; every branch emitted contains an offspring of this parent, dependent upon it, and yet capable of producing its like in the emission of a new branch. Others consist of many such tubes united, rising up together, and encircling the deserted tubes of their progenitors, whose decayed remains become the foundation of a rising generation.

“ Corallines are now distributed into four kinds, namely,

“ 1. *Articulated*, consisting of short pieces of stony brittle matter, the surface of which is covered with pores, or cells, joined together by a tough, membranous, flexible substance, composed of many similar tubes, compacted together. It is fixed to rocks and shells by stony joints which, as they rise, are united to others, by extremely fine and slender tubes. As the stems expand, they become pennated, or furnished with what appear to be winged leaves, exactly opposite to each other, and are jointed like the stems themselves. These joints resemble the upper part of an inverted cone, a little compressed; and the whole surface is covered over with very minute circular-shaped cells. Upon some specimens are seen small figures, like the seed-vessels of flowers, with which the branches frequently terminate. These corallines are found of different colours, red, green, ash, and white; but on exposure to the sun and air, they all become white.

“ 2. *Celliferous*, or such as when magnified prove to consist of fine thin shells, the habitations of small animals, connected together, and disposed like branches, in a variety of elegant forms, and nearly as fine as common sewing silk.

“ 3. *Tubular*, composed of a number of simple tubes, growing up nearly together; or of branched tubes, without either denticles or vesicles. These are horny and elastic; when taken out of the water, they shrivel, but recover their original form on being replaced in their natural element. Some appear wrinkled like the windpipe, and others like the intestines of small animals.

“ 4. *Vesiculated*, distinguished by their horny

hollow ramifications, most of which are furnished with small denticles, resembling leaves on mosses ; and, at certain seasons of the year, small bodies, like bladders, proceed from the stems and branches. They are elastic ; and, when dry, of a yellowish or pale brown colour. They adhere to rocks, shells, and fuci, by small root-like tubes ; lose their form when dried, but recover it in water.

## PERFUMES.

“ Perfumes are derived partly from animal, partly from vegetable substances ; the latter sort are most numerous ; and it is probable that in both sorts the scent, or perfume, arises from what chemists call an essential oil, or an oil naturally existing in the substance, and capable of being drawn from it by simple distillation with water.

“ All the animal perfumes are peculiar substances. The vegetable perfumes are extracted from woods, resins or gums, leaves, flowers, and even from entire plants. The common vegetable perfumes are obtained by distilling the substance in spirit, or in water, and are generally named after the plant, with the word *water* added ; as lavender water, citron water, &c. They are, as I have said, very numerous ; but it will be sufficient to notice one or two.

“ *Hungary water* is said to derive its name from a queen of Hungary having been cured of palsy by it. In this sense, it was taken internally, or used as an embrocation, not as a perfume. It is distilled with spirit from the blossoms of rosemary ; and is reputed to be better managed in France than in England.



“ *Lavender water* is distilled from lavender flowers, with spirit. The flowers themselves are frequently put into drawers, among clean linen, to which they communicate a fragrant wholesome odour.

“ *Rose water* is obtained by distilling the blossoms of roses in pure water, without spirit. It is frequently used by the luxurious to wash themselves with.

“ *Oil of roses*, or *ottar of roses*, as it is called in the East, is one of the finest of perfumes. Roses are cultivated in the East-Indies in extensive fields, in order to obtain this precious commodity. It is found as a scum, rising upon rose-water, repeatedly and carefully distilled. So small a quantity of oil is obtained from a large field of roses, that the price has always been enormous. It is said, at one time, to have been a guinea a drop ; but the ottar may be obtained with less trouble than by distillation, by exposing to the sun, water, in which are steeping the petals of the rose, cleared from all the stalks and green parts. This must be covered up warm at night. When the scum rises, it should be taken off by a small piece of cotton fastened to the end of a stick, which may be squeezed into a very diminutive phial, and closely stopped.

“ Of the animal perfumes, *musk* is the most favourite, as it is one of the strongest in nature. It is scarcely bearable, unless much diluted, or mixed with other weaker perfumes. Musk is a sort of coagulated fluid, contained in a bag under the belly of an animal found in the forests of Tibet, Tonquin, and Cochinchina. The animal is said to be of the antelope or goat species ; but it seems not to be well known to naturalists : perhaps, there may be several

sorts, as the accounts differ. Musk is of considerable service in medicine, to which it ought properly to be confined.

*Civet*, which is of a milder and more pleasing fragrance than musk, is obtained from an animal of the weasel kind, though usually called a *civet cat*. The creature is wild in the warmer climates; but will live in colder regions, if carefully brought up. Much of this article comes from the East Indies, about Calicut; some from the coast of Guinea; and some from Brazil. The Turks, Indians, Africans, and even the Dutch, keep civet animals as articles of trade, from which they derive great profit, as the demand for civet is very considerable.

“*Ambergris*, or *grey amber*, though long esteemed for its fragrant odour, was, in respect of its origin, a subject of dispute among naturalists. It is generally found floating in the Atlantic Ocean, or upon the sea-coast of Brazil, Madagascar, Africa, Hindoostan, China, Japan, and the Molucca Islands; but most of the ambergris which is brought to England, comes from the Bahama Isles, Providence, &c. where it is found on the coast, as well as in the abdomen of whales, by the fishermen, in lumps of various shapes and sizes, weighing from half an ounce to a hundred weight, or more. An American fisherman, some years ago, found a piece of ambergris in a whale, weighing about one hundred and thirty pounds, which he sold for five hundred pounds sterling.

“ This substance has been variously taken for a kind of wax or gum, distilled from trees, and dropped into the sea; or a sort of bitumen arising from the bottom of the sea; or a vegetable production,

issuing out of the root of a tree, of which it was affirmed, the roots always shoot towards the sea, and discharge their sap into it; again, it was considered as formed of honeycombs, which fall into the sea from the rocks where bees had made their nests; indeed, the various hypotheses relative to this article are more than I can enumerate: each had its advocates, who strenuously supported their favourite theories by arguments, some of which were plausible, others absurd. It is now admitted that all were in error, and that ambergris is a preternatural concretion in the intestines of the spermaceti whale, arising from ill-digested portions of the cuttle-fish, on which it mostly feeds, and of which particles of the beaks are observable in all masses of ambergris of any considerable size. The use of ambergris, though now usually confined to perfumery, in Europe, was formerly recommended in medicine by several eminent physicians; and it is not only so used in Asia and part of Africa, but also as a condiment in cookery.

#### SPONGE.

“ This scent-box, or *vinaigrette*, contains a shred of sponge, on which a few drops of fragrant essence, or aromatic vinegar, have been poured, to afford relief in cases of headach or faintness.

“ Although sponge has been known and extensively used, from the earliest times, its nature was long unascertained. In the days of Alexander the Great, sponge was supposed to possess animal life; and this opinion prevailed in the days of Pliny: but little attention was paid to the subject till the beginning of the eighteenth century of the Christian

era, when Count Marsigli, founder of the French *Institute*, made an examination of sponges, and declared them to be *vegetables*. Subsequent experiments have proved that he was mistaken; and sponge is now classed among the *zoophytes*, or animal plants; that is substances, possessing animal life, with the growth of vegetables, such as I have just described in our lecture on Corals and Corallines.

“Sponge is found adhering to rocks, as well on our own coasts as in various other parts of the world; but more particularly about the islands of the Greek archipelago, where the inhabitants are trained to dive for it. Although a light, soft, porous, and compressible substance, readily imbibing water, and as readily giving it out again, sponge adheres firmly to the rock, and is not detached without considerable trouble. It is also fished for in the Red Sea. The great mart for sponge is at Smyrna.

“Fifty species of sponge have been already discovered; of which ten belong to the British coasts.

“Sponge is much used for a variety of purposes. Richard and Louisa can bear testimony to its utility when they clean their slates, at the conclusion of their lessons in ciphering.”

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## THE HOUSE.

“We have pretty well gone through the several apartments, and examined most of their contents,” said Mr. Paterson, as he resumed his seat in the parlour; “but we have yet to take into account the

house itself, and the materials with which it is constructed.

“ The term *house* is general and vague; and may be applied to a palace or a cottage, as well as to all the intermediate kinds of buildings fit for human residence. Some houses are round in their plan, others oval; but the most usual forms in Britain are oblong or square.

“ Four walls and a roof are the essential parts of a house; and the ground which it covers is the natural floor.

“ In countries abounding in wood, very rude houses are constructed of sticks and coarse basket-work, or wattling, as it is called, which is generally plastered over with mud, or clay, or sometimes covered with the skins of wild beasts, or with moss, to keep out the wind. In places where wood is scarce, the houses are made of turf, cut from the surface of the ground, with the grass or heath upon it; and sometimes the walls are formed with earth, rammed tightly together by means of a mould: this last is what the French term building *en pizé*. Many of these habitations may be seen in Dorsetshire; and when the earthen walls have been plastered with mortar, and whitewashed, they have a neat appearance, and are more durable than could be expected.

“ Better houses are built of stone, bricks, and timber; the question whether stone or brick shall be preferred, generally depending upon the nature of the land; some districts abounding in stone, others in brick earth. The practice of building with flints, or chalk and flints combined, was once very prevalent in parts where those articles are found, particu-

larly in the south-east of England: but it has been superseded by the use of bricks, which come cheaper and save labour, since the inland navigable canals have opened an easy communication with districts where bricks are made.

## STONE.

“ In those parts of England where stone is plentiful, it is used in the building of houses. It is of various qualities; and the handsomest is the sandstone, or *freestone*, as it is frequently called, found in the vicinity of Bath. The limestone of Portland is also good; but the most durable is *granite*, which is composed of large grains, or crystals, closely compacted together. It comes from the hilly counties of Devon and Cornwall, and from the mountains of Scotland: the latter is smaller in grain and harder than the two former.

“ Granite is used for the foundations of large public buildings; for paving streets, particularly the carriage ways; and for building bridges, such as those of Waterloo and the new London, which are among the handsomest and strongest structures of their kind in the world.

“ *Portland stone*, which is also called *freestone*, because, like that of Bath, it works freely without splitting, is obtained from a rocky peninsula, called the *Island of Portland*, in Dorsetshire. When first taken from the quarry, it cuts with almost as much ease as a log of oak; but, on exposure to the air, it acquires whiteness and hardness. It is a good stone for building, though not so durable as granite. St. Paul's Cathedral, part of Westminster Bridge, and

the whole of Blackfriars' Bridge, are built with it; as are likewise many grand houses belonging to noblemen and gentlemen. The Portland quarries have been wrought ever since the reign of James I. and it is calculated that nine thousand tons' weight are brought thence every year. The blocks are very large, some of them weighing six or eight tons; though others do not exceed one ton. A triangle, with a system of pulleys at its top, is used in lifting these immense masses on and off the carriages: the latter are very low, with small wheels, but very strong axletrees, supporting a platform of stout planks.

“Opposite to Portland, on the Dorsetshire coast, is a district called the *Isle of Purbeck*; but it is more properly a peninsula, as it may be approached by land. It contains several rocks of variegated marble, and quarries of stone and slate. The marble takes a good polish, and the stones are useful for paving.

“Numerous stone quarries exist in the British dominions, varying in quality, and suitable in each variety for some specific purpose. Among the smallest kinds are *flints*; some of which are found in gravel, others in beds of chalk. When broken, they exhibit a greyish or blackish glossy appearance, semi-transparent. Walls are sometimes built with them; as are some old churches in the eastern counties: but the most important use now made of them, is in the porcelain and glass manufactures, as I have before explained.

“*Limestone*, though coarse, is very useful: when burned, it becomes lime, an important article in mortar and cements used in building.

“*Slate*, another kind of stone, is used for cover-



page 263.

*Brick Making.*

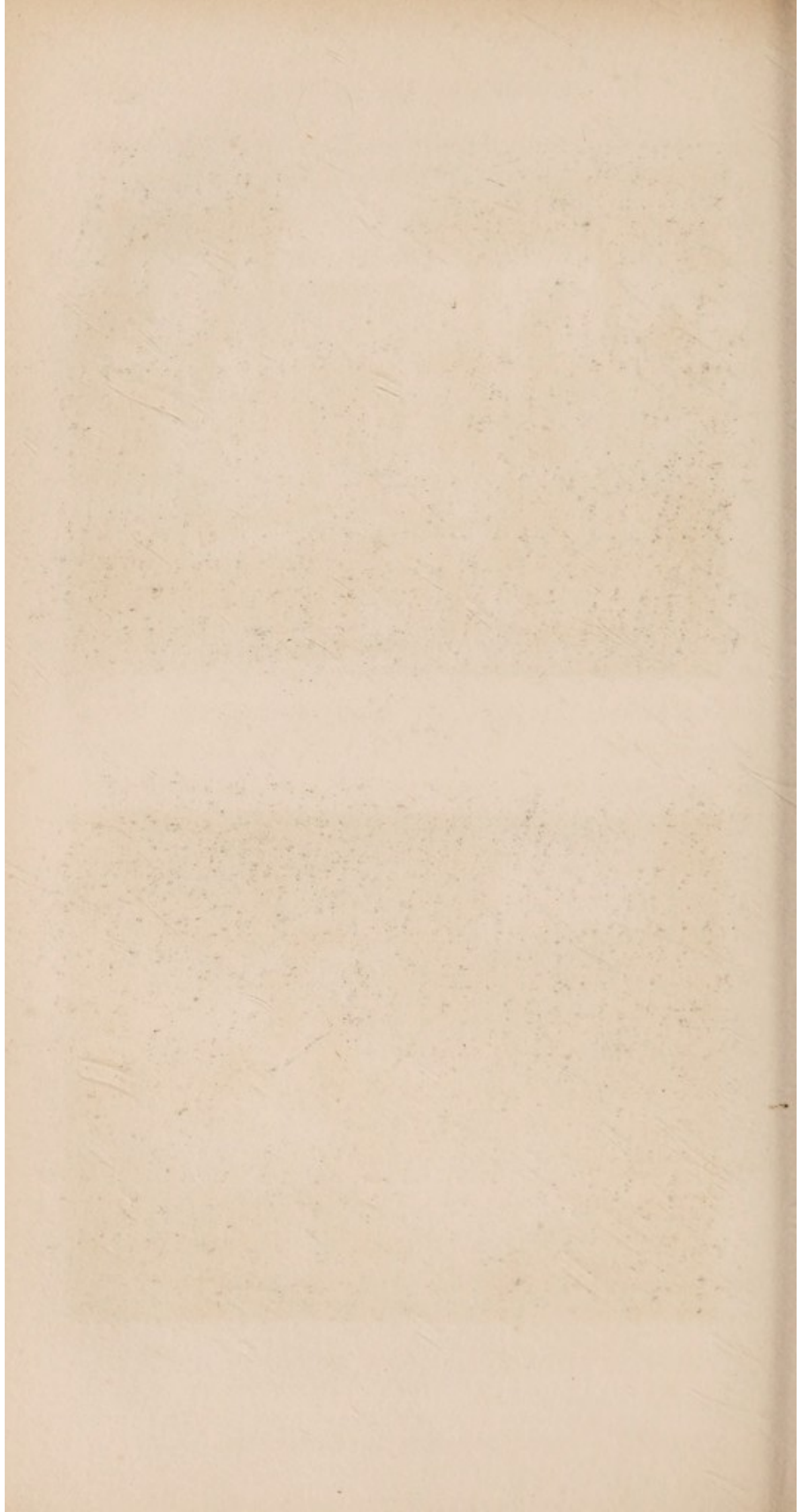


page 361.

*Basket Making.*

Pub<sup>d</sup> June 11839 by John Harris, S<sup>t</sup> Pauls Church Yard.





ing houses and other buildings. It splits naturally into thin plates, and is of a bluish grey colour. *Horsham stone*, so called from Horsham, in Sussex, is a kind of slate; but the best in every respect, comes from the northern counties of Westmoreland, Cumberland, and some parts of Yorkshire. In Wales, also, are extensive slate quarries, from which slabs are obtained so large that a single one would cover a small house; of these, excellent water cisterns are formed.

“ In the neighbourhood of Reigate, in Surrey, is a kind of freestone, denominated *firestone*, from its quality of withstanding heat in chimneys, &c. without cracking. This is also well known to housewives by the title of *hearthstone*, and is useful for scouring hearths, window-cills, door-steps, and other similar places.

## BRICKS.

“ Where stone cannot be procured without a heavy expense of carriage, bricks are used for the walls of houses, and are almost always at hand, as they are obtained from the soil, provided it be clayey.

“ The making of bricks is of such ancient date, that we may fairly presume it to have been of antediluvian origin. But be that as it may, we find bricks used by the celebrated Babel builders, shortly after the general deluge. In Egypt also, at an early age, brickmaking was common; and the Israelites, in their state of slavery in that country, were employed in the manufacture. How the bricks were made in those remote times, we scarcely know; some specimens from the ruins supposed to be those of

Babylon, or even of Babel itself, are in the British Museum: they are of much larger dimensions than the bricks now in use, and in a good state of hardness and preservation; but do not appear to have been subjected to the action of fire.

“ Modern bricks are fabricated of red clay, mixed with a little sand, or coal ashes. After the ingredients have been well mixed together with water, the bricks are formed in a mould, dried in the sun, and finally burned in a kiln, or clamp, till they are partially vitrified and made hard. An excellent clay for brickmaking is found about Stourbridge, in Worcestershire, though it is as much, or more, used for making crucibles, or melting pots, for chemists and refiners. Windsor loam is likewise in great repute among brickmakers; and at Woolpit, in Suffolk, a peculiar sort of white brick is made. But by far the largest quantity of bricks is made about London, from the stiff loam, or clay, with which that vicinity abounds; and here also the white bricks are imitated by an admixture of chalk with the brick earth.

“ Bricks are so important an article, that their manufacture is regulated by law, and they pay a heavy duty to the state. Statute bricks are, therefore, all made of one size; nine inches in length, four in breadth, and two and a half inches thick, when burned.

“ In building, the bricklayer takes care to lay the bricks in a certain manner, to make them *bond*, as he calls it. Some are placed lengthwise in the wall, some across it; and one layer is so laid upon the other, that one joint may not come upon another beneath, but upon the middle of the brick: thus one

helps to keep the other in its place, and the wall cannot break unless the bricks themselves be fractured.

## TILES.

“ Tiles may be described as flat thin bricks, made in much the same way, but of better earth. They constitute a light durable covering for a house ; and are sometimes glazed like coarse pottery, to throw off the rain-water ; in this state, they make a better appearance on the top of a house than red tiles. Two shapes of tiles are in use for roofs of houses, one flat, the other, called *pantiles*, crooked ; the latter seem to be now generally preferred, because they are cheaper. For paving, tiles are made of larger size than those for roofs, and are distinguished by the name of *paving tiles*. They are a good substitute for stone paving, but are apt to break by the infliction of any sharp blow.

## MORTAR.

“ I need hardly tell you that this material is used as well to keep the bricks, or stones, of a wall in their places, and to unite them together, as to prevent the air and damp from penetrating between them. But what is mortar ? It is, or should be, a composition of lime and sand, tempered with water into a sort of paste, which has a quality of *setting*, or becoming hard, on exposure to the air ; and thus it cements together the bricks, or stones, between which it is laid. To make the best sort of mortar, the limestone is burned in a kiln, then broken with hammers, ground to powder in a mill, mixed up with a proper quantity of river sand, and used as soon as the water

is added to it. This sets much quicker than the mortar commonly in use, and is much harder. But it is more usual to take the lime as it comes in lumps; from the kiln, and throw water upon it, which causes it to burst and crumble into a coarse powder, which, being mixed with sand, or sometimes with road-drift, or even common earth, is sifted, or *skreened*, as the workmen call it, to get out the lumps; and the finer parts, mixed with more water, are used as mortar. This takes a long time in drying, and is never very hard, the spirit of the lime having been allowed to evaporate in the operation, and the material substituted for river sand being too soft for the purpose.

“Mortar is also used as plastering. It then receives the addition of bullocks’ hair, to make it hang together upon a broad surface. In this state it is spread upon walls, or upon laths nailed to the timbers, for ceilings, or partitions between apartments.

#### CEMENT AND STUCCO.

“Cement, or *compo*, (a builder’s contraction of *composition*,) is a kind of mortar, containing a mixture of iron. The stone used for lime in this composition is found on many parts of the sea-coast, particularly in Essex, and in the Isle of Sheppy, in Kent, at the mouth of the Thames. The rock, or stone, which comprises a mixture of shells, sand, and iron, is burned, like lime, and ground to powder in mills. The finer sort has red lead added to it, which makes it take a smooth surface. It is kept in close barrels, to exclude the air, which would spoil it; and when used, as much as the workmen can lay on

at once, is mixed up with water into a paste. While soft, it can be moulded into any required form ; but this must be done expeditiously, as it sets almost immediately, and in the course of twenty-four hours becomes as hard as stone itself ; a property derived from the metal it contains.

“ Stucco is made of burned plaster stone, or gypsum, which contains lime and sulphuric acid. It is used for fine work in the interior of houses, as cornices, ornaments upon ceilings, &c. but is softer than cement.

## MARBLE.

“ This beautiful kind of stone, used by builders principally for chimney-pieces, and other ornamental parts of houses, takes a fine polish, and is sometimes pure white, sometimes richly coloured.

“ Many countries produce marble : in England, the best is found in Devonshire and Derbyshire ; it is found in some parts of the west of Scotland, and in the Hebrides ; also in France, Sweden, and Norway. Some of these are very curious, bearing a resemblance in their shades to landscapes and ruins. But the finest marbles come from Italy and Greece. The chimney-piece in the drawingroom, so delicately white, and adorned with beautiful sculpture, is from Carrara, in Italy : I mean the marble only ; the workmanship is English. This Carrara marble is preferred by sculptors for their statues, and on that account is best known among builders by the title of *statuary marble* ; as is also Parian marble, from the Isle of Paros, in the Grecian archipelago, which is equally white, bears a fine polish, and keeps its

colour well. Many of the ancient statues are of Parian marble. The chimney-piece before us, containing various shades of yellowish brown, is *Sienna*, and comes from Italy.

#### TIMBER.

“ Timber, an important article in the construction of houses, consists of the solid part of trees. The term is used in contradistinction to *wood*, which is applied to a collection of growing trees, as well as to the substance of the trees themselves, when used for different purposes unconnected with the construction of houses.

“ House or builders’ timber is made only of large trees; the main trunk always yields better timber than the branches; and the portion towards the root is the best.

“ In different countries, different sorts of timber are used; but, though oak is unquestionably the best, the prevailing timber in England is that of the pine, or fir, better known by the name of *deal*. Oak is, indeed, occasionally used, as are also elm, chestnut, and several other kinds: but for common purposes deal is preferred, as requiring less seasoning, and being lighter and more durable than any of them, oak and chestnut excepted.

“ The *elm*, which is one of the handsomest of our forest trees, is very useful as timber in places where it can be constantly kept wet; and being less liable to rot than other wood, it is preferred for coffins. It is very tough and pliable, and therefore easily worked: it does not readily split, and bears the driving of spikes, or large nails, better than any other wood.

“The *beech* furnishes timber of a very fine close grain; for which it is preferred by turners. It is also used for chairs, bedsteads, mill-work, &c.; and in buildings which are constantly wet, it equals, if not excels elm. Being very tough, it is used in thin leaves for bandboxes. Its defects are its being apt to warp when exposed to the weather, and to be worm-eaten when kept dry.

“*Ash* is a light thin wood, but tough, serving well for poles, oars, and much of the wheelwright’s work. As timber, it will last well in such parts of a building as are skreened from the weather.

“*Walnut-tree* is not used as building timber with us; though the joiners use it in some of their ornamental works; and it is excellent for gunstocks. Before mahogany came into general use, our best furniture was made of walnut-tree.

“*Wild chestnut* timber was formerly much esteemed; but is now little used.

“*Poplar, abel, and aspen* timbers, which differ very little from each other, are frequently substituted for fir; but are less durable.

## DEAL.

“This, as I have said, is the timber most generally in use among builders in England. It is the wood of the pine or fir tribe; but the name is, properly, that of one of the forms in which pine timber is brought to market.

“Pines and firs, which are among the most abundant of trees, grow in cold or mountainous countries. Great part of the British possessions in North America are covered with extensive pine forests, as are



also the mountains of Norway and Sweden, and the sandy tracts of Prussia and Russia, on the south-east of the Baltic. Pine forests exist in many other parts of the world.

“The pine grows with a straight stem, and, in close forests, has no branches for a great height above the root; so that, when dressed for the carpenter, it makes less waste than a branchy tree. The species of pines are numerous. The largest trees grow near the western side of North America; and some are of such magnitude, that a very tall steeple for a church might be formed out of a single tree. Such very large trees, however, do not supply timber so good as the smaller, the middle being very soft and spongy, forming what the workmen call *sap-wood*.

“The best deal brought to England is from the north of Europe. When the trees are imported round, they are called *masts*, if large; or *spars*, if small. When brought over squared, they are *logs*, if long; and *battens*, if short. Masts of a single piece are sometimes from eighty to a hundred feet in length: and these when cut into flat pieces, are called *deals*, from which the timber itself has obtained its name. Deals are of various lengths, and from three to four inches in thickness.

“The logs are squared with the axe; but the sawing is mostly performed by mills, where several large saws are kept in motion by water-wheels. The tree is brought to the saw and kept in its place by machinery: so that the cut is made with equal accuracy and expedition.

“The soil of Norway seems peculiarly to suit the

fir and pine tribes. Were you to visit some of the ports of Norway, you would behold such mountainous piles of deals, that you might be led to imagine so large a quantity could never be used; but wait till an order or two arrive from England, and you will find the repositories emptied, and ready for the reception of a fresh supply, which is perhaps at the very time floating down the stream. For as Norway is much intersected with lakes and long arms of the sea, the timber is floated along them, with comparative ease, from the place where it was felled to the repository for exportation. These streams also supply the saw-mills, and keep them in motion by their numerous falls of water.

“ Christiana is a principal port whence the Norway timber is shipped; and Drontheim has also a considerable export trade in the same article. From Gottenburgh, in Sweden, a large exportation of deals is made; and from Memel, in East Prussia, we receive logs.

“ From Canada and New Brunswick, in North America, great quantities of fir timber are imported into Great Britain. Being of larger size than that of Norway, and subject to less duty, it is much cheaper: but it is also less valuable, on account of its being softer, and nothing near so durable.

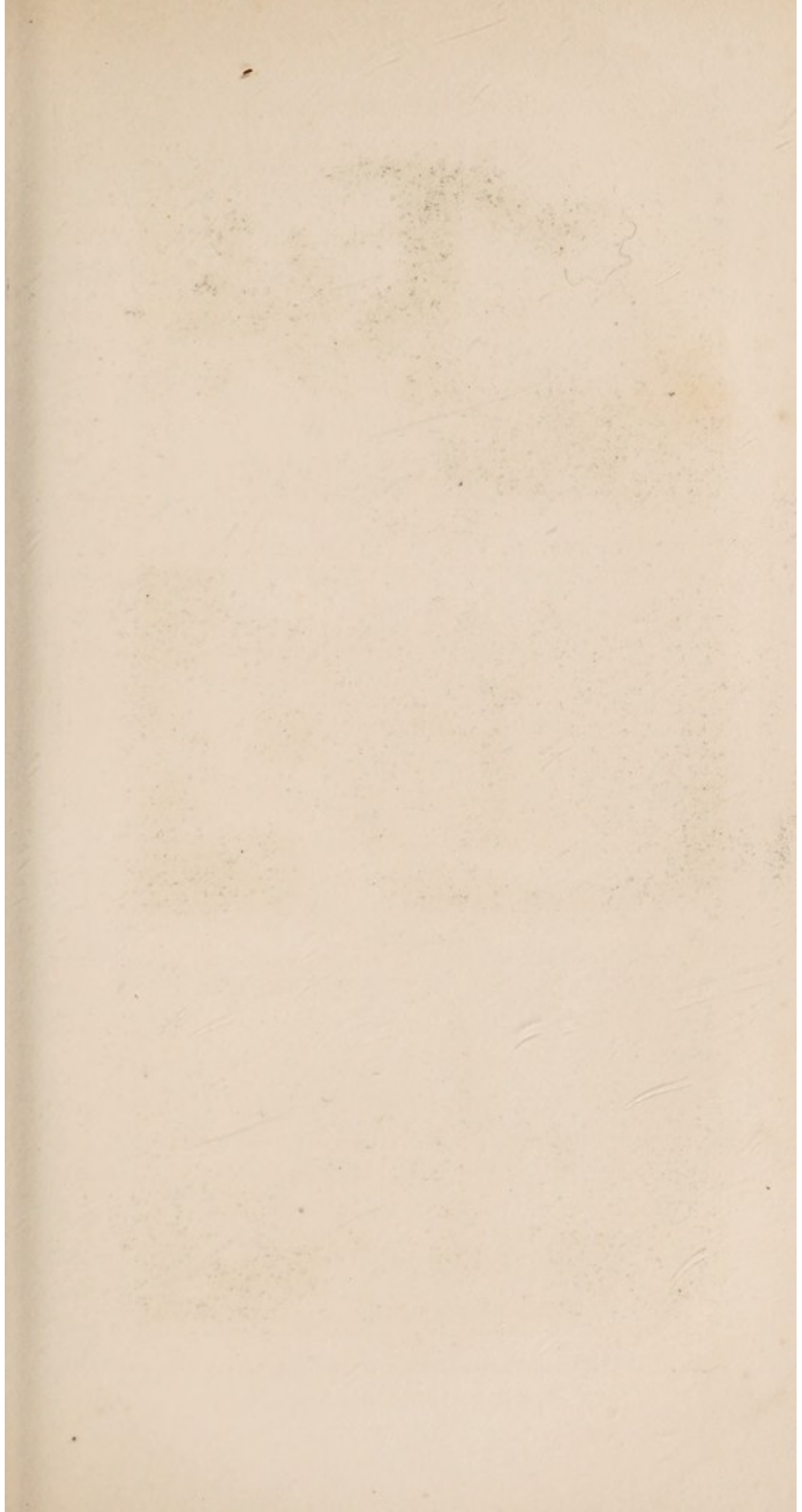
“ Deals are of two colours, *red* and *white*: the former has its juices remaining in it; the latter has been deprived of them while still a growing tree. These juices are of considerable value, and from them are drawn the *oil of turpentine*, the *rosin*, the *tar*, and the *pitch*, of commerce.

## TURPENTINE AND ROSIN.

“ I have just said, that white deal has had its juices drawn off: in this state the timber is reduced in value; but the loss is more than compensated by the product. While the tree is growing, the sap rises in the spring, and would flow through every pore, to form new buds for branches, leaves, and fruit. But at this season, the natives make incisions, or holes, through the bark, into which they sometimes thrust a sort of trough, or pipe, to catch the flowing juice, and conduct it into vessels placed beneath. This juice is *turpentine*, such as you may frequently see exuding from a piece of new red deal. Its qualities vary a little, in different kinds of trees, perhaps owing to a difference in the soils in which they grow. The Scottish fir, the silver fir, and the larch, all afford turpentine; that from the larch, called *Venice turpentine*, is the strongest. The greatest quantities come from the American forests; and France, Switzerland, Norway, and Russia, all contribute to the general supply.

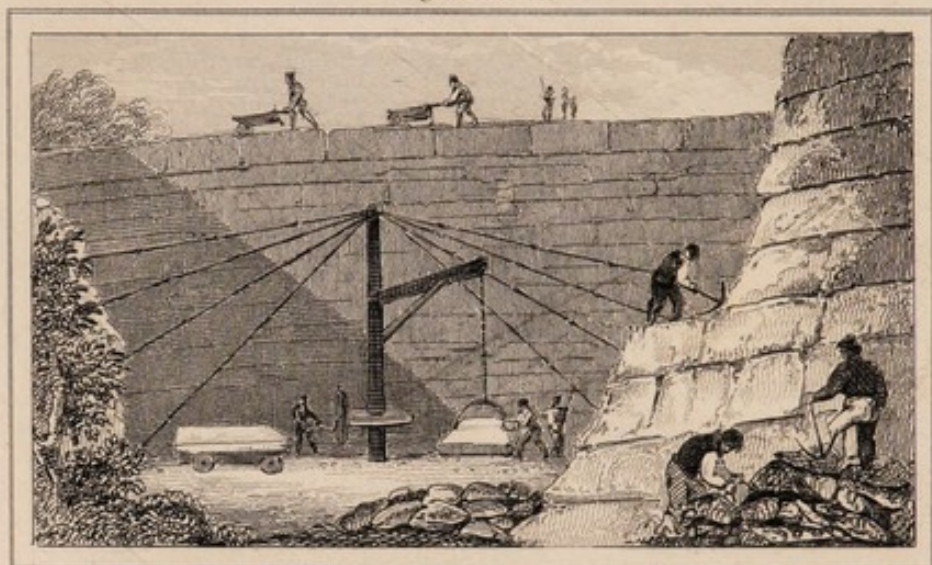
“ Turpentine melts with heat, but does not dissolve in water; hence pines thrive best in cold climates. In its crude form, that is, as you have seen it come out of a deal, turpentine is used in medicine and in the arts; but much more extensively in its refined state: for it consists of two distinct substances; an oil, which is liquid, very light and inflammable, with a strong odour; and rosin, which is brittle.

“ In the trees, these two are blended together; but, by distillation, they are separated; the oil pass-





*Page 292.*



*Page 284.*



*Page 350.*

ing over into the receiver, and leaving the rosin behind. The oil of turpentine, sometimes called *spirit of turpentine*, is a powerful solvent, capable of dissolving many gums; it is potent as a medicine; and, in painting, is used to give a drying quality to many colours, which without it would long continue moist, or sticky.

“The rosin, which remains in the still, being taken out, is melted again, strained, and poured into barrels, where it cools, and becomes fit for merchandise. It is of considerable use in the arts; and James, in common with other fiddlers, is much indebted to it, whenever he wishes to play on his violin.

## TAR AND PITCH.

“Tar is another product of the fir-tree; and is drawn from the roots and coarser fragments, in a peculiar manner. A hollow pyramid is built with the pieces, which is covered over with leaves, turf, or other matters. Within the hollow, a fire is lighted, which half boils or burns the wood, so as to force out the sap, which runs into a reservoir at the bottom; this is *tar*.

“But this is not the only article produced by the burning; the wood, being baked, or burned, without air, becomes *charcoal*; and the smoke, thus kept in and condensed, is converted into a soot, which passes under the name of *lamp-black*. I may as well observe, by the way, that real lamp-black is the soot produced by the smoke of a wick burning in a lamp supplied with oil; and charcoal is more extensively made by burning the wood of willows, in a closed

pile, so as to char the wood without consuming it entirely.

“ In some parts of France, ovens are built, in the form of an egg standing on its point, in which the wood is burned, and the tar runs out by a hole in the bottom. In these the operation is carried on in a more certain and pure manner.

“ The use of tar is so extensive in our shipping, that British sailors have obtained the name of *Jack Tars*.

“ By boiling together tar and the coarser black rosin, in due proportions, *pitch* is obtained. The flavour of pitch is not very pleasant to us; but the ancients coated the insides of their wine vessels with pitch, admiring the zest it gave to the liquid, and supposing that it imparted some medicinal virtue. Something of a similar fancy prevailed in England, about seventy years ago, when tar-water was all the fashion, and swallowed as freely as is soda-water in the present day.

#### ASPHALTE.

“ Besides the pitch obtained, as I have just described, from the fir tree, there is a *mineral pitch*, generally known by the name of *bitumen*, or *asphaltum*, a particular sort of which has lately been recommended to public notice as a valuable cement for building purposes, for covering roofs and floors, for paving, both out of doors and within, and for various other useful objects.

“ By the term *bitumen*, mineralogists understand a mineral oil, which is found in different parts of the earth, in various states of consistence; in each of

which states, it forms a distinct species, as *naphtha*, *petroleum*, *asphaltum*, or, as we borrow the name from the French, *asphalte*, and *mineral caoutchouc*, or Indian rubber. Each of these will demand our attention in its proper place: for the present, I shall confine my observations to *asphalte*.

“The term *bitumen* has been long familiar to the world, in connection with building. Ancient Babel was built with bricks cemented together with bitumen, which was found abundantly in the part of Asia where that celebrated edifice was reared. In Palestine, a bituminous earth is still found, particularly in the vicinity of the Dead Sea, which, on account of the impregnation of its waters with bitumen, is frequently denominated the *Asphaltic Lake*.

“The first attempt, in modern times, to turn *asphalte* to use in building, was by an ingenious and learned Greek, named Eirinis, who, about the year 1712, discovered, in the Val de Travers, in the province of Neuchâtel, a fine bed of asphaltic rock, and he commenced some experiments upon its uses for cementing purposes. He describes the rock as composed of a mineral substance, more clammy and glutinous than pitch, very solid, and capable of repelling alike the influence of air, water, and frost; better adapted than any other substance for cementing and binding buildings; preserving timber from dry-rot, worms, and even the ravages of time. He also states, that its efficacy and durability were tried on many buildings in France, Neuchâtel, and Switzerland. He was not, however, adequately supported; and, except being occasionally wrought by succeeding speculators, the asphaltic mine of the Val



de Travers was thought little of, till about the beginning of the year 1838, when it became the property of the Count de Sassenay, who has established a company for raising the asphalte, and for its sale in the surrounding countries.

“ Prior to this, the Count had been, for six years, proprietor and manager of some asphaltic mines at Seyssel, in France, in the department of Ain, on the Rhône, and had obtained of the French government permission to use the asphaltic cement in several fortifications and other public works : in all which, his efforts are said to have been crowned with success.

“ In 1835, experiments began to be made in France upon the use of asphalte for flagging, or paving, public thoroughfares. This also proved successful. The Belgians have since begun to use the article extensively in public works ; and, during the last year, it has been introduced into England, and several places in and about the metropolis have been paved with it.

“ On a comparison of the two kinds of asphaltic cement (that of the Val de Travers and that of Seyssel), Count de Sassenay gives a decided preference to the former, which he describes as an admixture of bitumen with limestone rock, formed in all probability by strong volcanic action, and incapable of being successfully imitated by art.

“ The mode of procuring it is by blasting the mountain, in which the asphalte is contained ; then reducing the asphalte to powder, mixing ninety-four parts of it with six parts of bitumen, or mineral pitch, and melting the whole in large caldrons. When properly dissolved and mixed, the mass is

poured off, and formed into rectangular cakes, which are sold as the asphaltic cement. When wanted for use, it is again melted; and spread, whilst hot, over the desired part, in such thickness as may be requisite. In covering places, subject to be much trodden, as foot-ways, terraces, &c. some fine river sand is mixed with it, which not only gives it more stability, but also imparts a degree of roughness that is not unnecessary. When ornament is required, sands of different colours are sifted upon the cement, whilst it is still hot, in such devices as fancy may direct. Specimens of this may be seen in the pavements laid down in the Zoological Gardens, the Bank rotunda, and other places.

“ The successful use of this cement on the continent, gave rise in England to some speculations among men of property for importing the cement, chiefly from the Seyssel mines, and selling it for the purposes for which it seems to be well adapted. Several companies have been formed with this view; and as one scheme is generally the parent of others, one company has been proposed for finding asphaltic in our own island; where, as the projectors affirm, it abounds in all our coal districts. Whether the idea can be realised, can only be ascertained in the course of time. The companies are all as yet in an infant state; and as the efficiency of their pretensions can only be proved from experience, it would be improper at present to pronounce any opinion upon them.

## OAK.

“ Oak timber, in former days, was much more extensively used in house carpentry than it is now.

Many ancient houses still remain, which consist of a framing of oak beams, filled up with other matters ; the floors and internal finishings, as wainscots, &c. being also of oak.

“ When oak is cut in radii from the centre, or pith, towards the outside, the boards exhibit in their surface a congeries of bright shining pieces, which when smoothed and polished have a handsome appearance. In this state it is called *wainscot*, from the Dutch name of oak boards. It was once much in use as linings for apartments, for best floors, and even for furniture, to which last it is now chiefly confined ; yet the name continues to be applied to the internal covering of walls, though made of deal or other wood.

“ Oak beams are still occasionally used ; and doors, window-frames, and sashes, are also, for good houses, made of oak, or even of mahogany, which stands the weather equally well, though it loses its colour.

“ As to the question, ‘ Where does all the oak come from, with which our immense navy is built ? ’ that may be answered at present ; but where it is to come from in a few years, especially if we should have another war, is not so easily determined. We have no need to look to the map for a foreign port in this case, for the best oak is of English growth. The forest of Deane, in Gloucestershire, the New Forest, in Hampshire, and many private forests, chases, and woods, are the sources whence this valuable timber is obtained. When it is considered, that the oaks necessary to build a man-of-war require no less than forty acres of ground to grow on, and

that the oak does not come to its maturity under eighty or a hundred years, we are ready to wonder how a navy can be built, and how such navies as England has had for many ages, could have been kept up. There need be no surprise, therefore, that we find prime oak timber becoming scarce and dear.

“ Germany, especially in its central and southern parts, abounds in oak timber, of which immense quantities are annually floated down the rivers, more particularly down the Rhine. A great deal of oak timber is also growing in North America. But neither the German nor the American oak is equal in durability to the English: indeed, some of the American is in quality inferior to good deal.

“ England seems, originally, to have abounded in oak forests. Oaks have been dug up, in some places, from a depth of a hundred feet in the earth; they still retained their branches; and the wood had become so hard that no tool could cut it.

“ Some of the ancient oaks were of immense size. The Fairlop oak, in Essex, was between six and seven feet in diameter, at three feet from the ground. But Damory's oak, in Dorsetshire, was the largest of which we have any accounts; its circumference was sixty-eight feet; and, being internally decayed, its cavity, which was sixteen feet in length and twenty feet in breadth, was used by an old man, in the time of the Commonwealth, as an alehouse, for the entertainment of travellers.

“ Besides the uses of oak timber in building either ships or houses, every part of the tree is applied to the service of man. The bark is the main dependence of the tanner, as I have formerly ex-

plained : to the dyer, the sawdust affords a tint for his lighter browns, or drabs ; and with the acorns, pigs are nourished.

#### IRON.

“ This metal is very serviceable in the construction of houses. Many of the artificers’ tools are of iron, with the working parts hardened into steel.

“ Iron, when melted, can be cast in moulds to any required shape, or pattern. Pillars, beams, railings, and various other contrivances, requiring strength and durability, are formed of this *cast iron*, at a very trifling expense ; for when a model is once made, thousands of copies can be taken, by making a mould of it in sand, and pouring in the melted metal.

“ If iron be to stand upright, as a post, to resist the pressure of superincumbent weight, cast iron is best ; but if it have to resist a pull, or a twist, hammered, or *wrought iron*, is preferable. Railings are best made of wrought iron, because they are generally too thin to resist a blow which would break the other sort : but thick posts which can be cast hollow, are as durable in cast iron as stone would be.

“ Although, from ordinary observers, iron obtains but little attention, it is, in reality, the most valuable of metals. Gold and silver, indeed, bear a higher nominal value, but they could not supply the place of iron, without which, we should possess very little of the precious metals themselves. Iron, and fire wherewith to work it, are the two grand instruments by which man has subdued nature to his purposes. The spade and the ploughshare, with which the ground is tilled, are of iron. It is with iron that

stone is got from the quarry, and prepared for building : and it is also iron which fells, squares, saws, and dresses the timber. Iron shears off the wool from the sheep, dresses the flax and the cotton, curries and trims the leather, and mainly assists in procuring every article of clothing, down to the diminutive needle with which it is put together. Iron is requisite for almost every operation in the preparing of food : the kitchen range is of iron, and so is most of the kitchen furniture. Almost all tools are of the same metal ; and some of the very finest works of art owe their value, if not their existence, to iron. The gold and glittering substances which ornament the exterior of a watch, would be useless, but for one iron spring that sets the wheels in motion, and another which regulates that motion. The finest engravings are executed with an iron graver ; and the best impressions of such engravings are from plates of steel.

“ Iron is a great means of conveyance ; horses are shod with it ; carriage-wheels are ringed and defended with it ; sometimes, they are made of it altogether. Bridges have been built with iron, some of them of dimensions so gigantic, that ships pass under with all their sails set : and bridges of iron can be erected in situations impracticable for stone bridges. Railroads are likewise made of iron, upon which one horse can do the work of many.

“ Nor is it on land only that iron is valuable ; the security of the ship is in the iron anchor ; and it is still greater when to that anchor is added an iron cable. Indeed, it is owing to iron, that we are enabled to cross the wide expanse of ocean at all ; for

iron forms the centre of the compass, which directs the mariner in his way, when he has no objects around him but the trackless water, the sunless and the starless sky, and where, but for the magnetic needle, made of iron, he would certainly deviate from his right course.

“ Iron mines exist in many countries ; but, perhaps, they are nowhere so numerous, nor turned to so good account, as in Great Britain.

“ Sweden and Norway have many iron mines, the produce of which is wrought into bars. The ore of several, situate a few miles from Christianstadt, being fused, or smelted, with less difficulty than usual, is mixed with other ores, which are more refractory ; and the combined mass is managed with ease. Fuel is very scarce in that vicinity, and therefore the ore is shipped off to places more convenient for the founderies. The principal iron-works are at Mios, or Moss, on the east side of Christiana bay, where three or four hundred tons of ore are roasted at a time, in each kiln. The furnaces are kept in constant heat and action, day and night, for about ten months together in every year. A cannon foundery is closely connected with them.

“ Swedish iron is reckoned among the best sorts for small ware and cutlery, as used to be well known at Sheffield and Birmingham ; but it is now superseded by the product of our own mines. Great quantities of ore are smelted in Dalecarlia, where, you remember, the celebrated Gustavus Vasa concealed himself from his enemies ; and the iron mines of Sweden, which generally employ about twenty-five thousand persons, yield full fifty-seven thousand tons of metal every year.

“ Russia was formerly a principal source whence we obtained iron. At Katerinebourg, in Siberia, where are the principal works belonging to the government, the river Isset has a dam drawn across it, two hundred yards in length, six yards in height, and forty yards in breadth, by which the water is raised sufficiently to actuate the several engines requisite for working the mines.

“ Iron appears to exist in plenty through all the central states of the North American republic. Some mines have been opened, and are wrought to considerable advantage on James’s river, in Virginia : and as the same plot appears to be well stored with coal, the produce may be expected, at no distant period, to yield great emolument to the proprietors.

“ Great Britain abounds in mines of iron. Where they are adjacent to coal mines, the benefit is very great, as the ore can be smelted at a trifling expense. The mines of South Britain are chiefly in the counties of Salop, York, Hereford, Cumberland, Derby, Stafford, Gloucester, and Chester, in England ; and in those of Glamorgan, Brecon, Caermarthen, and Denbigh, in Wales ; besides some, of minor reputation, in other parts. The mines of North Britain, or Scotland, are at Carron, in the shire of Stirling, in some parts of Lanarkshire, at Devon, in Clackmannanshire, and some other places. The quantity annually manufactured amounts to more than half a million of tons.

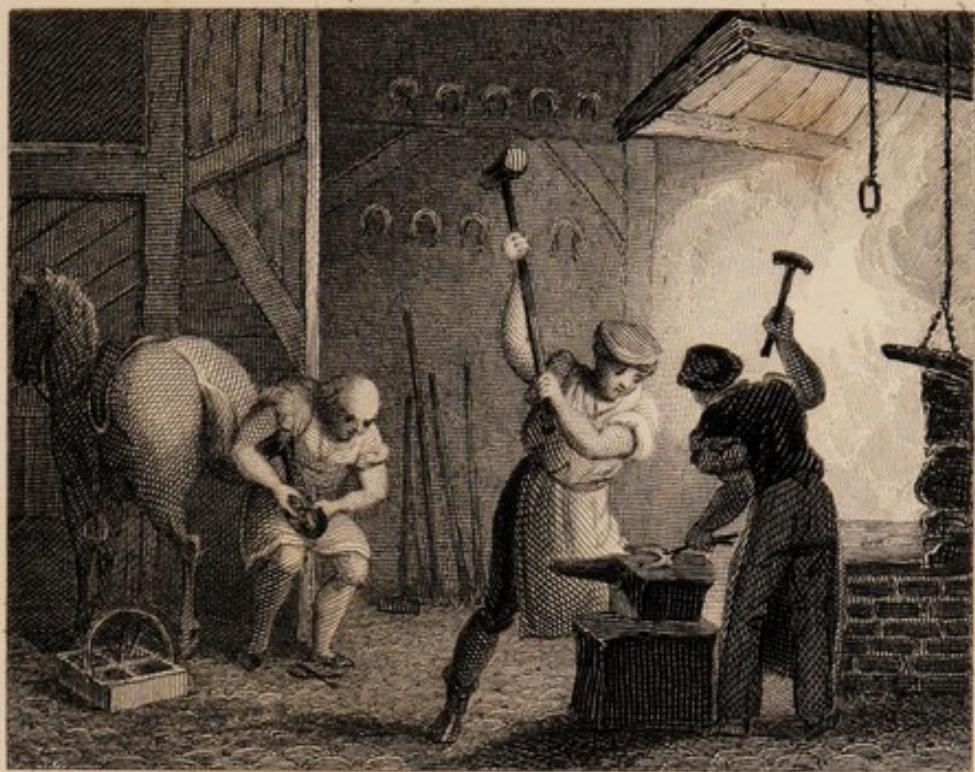
“ Iron, though occasionally found in a metallic state, is most commonly dug up in reddish brown stony lumps, which are sometimes fibrous.



“ After obtaining these lumps, or stones, as they appear to be, the first operation is to roast, or reduce them to a state of fusion, in vast furnaces, twenty or more feet square, and thirty feet high. In these, the heat is excited and kept up by means of two huge pairs of bellows, worked by a water-wheel, and pouring in a continuous blast, one bellows sinking as the other rises.

“ In the midst of the furnace is a hollow, somewhat in the shape of an egg set upright, about two feet in diameter in its widest part, and into this are poured alternate layers of cinders and ore. A fire, kindled at the bottom, is kept up, night and day, for several months, fresh layers of fuel and ore being supplied at the top, as the cinders are consumed and the ore is melted below. In a large bed of sand, before the mouth of the furnace, are made furrows, of the size and shape it is intended the iron shall assume. The heat of the furnace, excited, as I have said, by the bellows, fuses the ore, and the metal drips down, through the grating of the furnace, into a receiver; when this is full, the mouth in front is opened, and the liquid iron runs into the furrows in the sand, where it hisses, boils for a time, and eventually cools in the shape provided for it. The larger masses thus obtained are denominated *sows*, the smaller are called *pigs*.

“ Iron in this state is harsh and unmanageable: being very brittle, it cracks and flies under the hammer; for it consists of a number of crystals, just adhering together, and capable of being separated by a slight blow. To make it more compact, it must be wrought with hammers of great weight, lifted by



page 305.

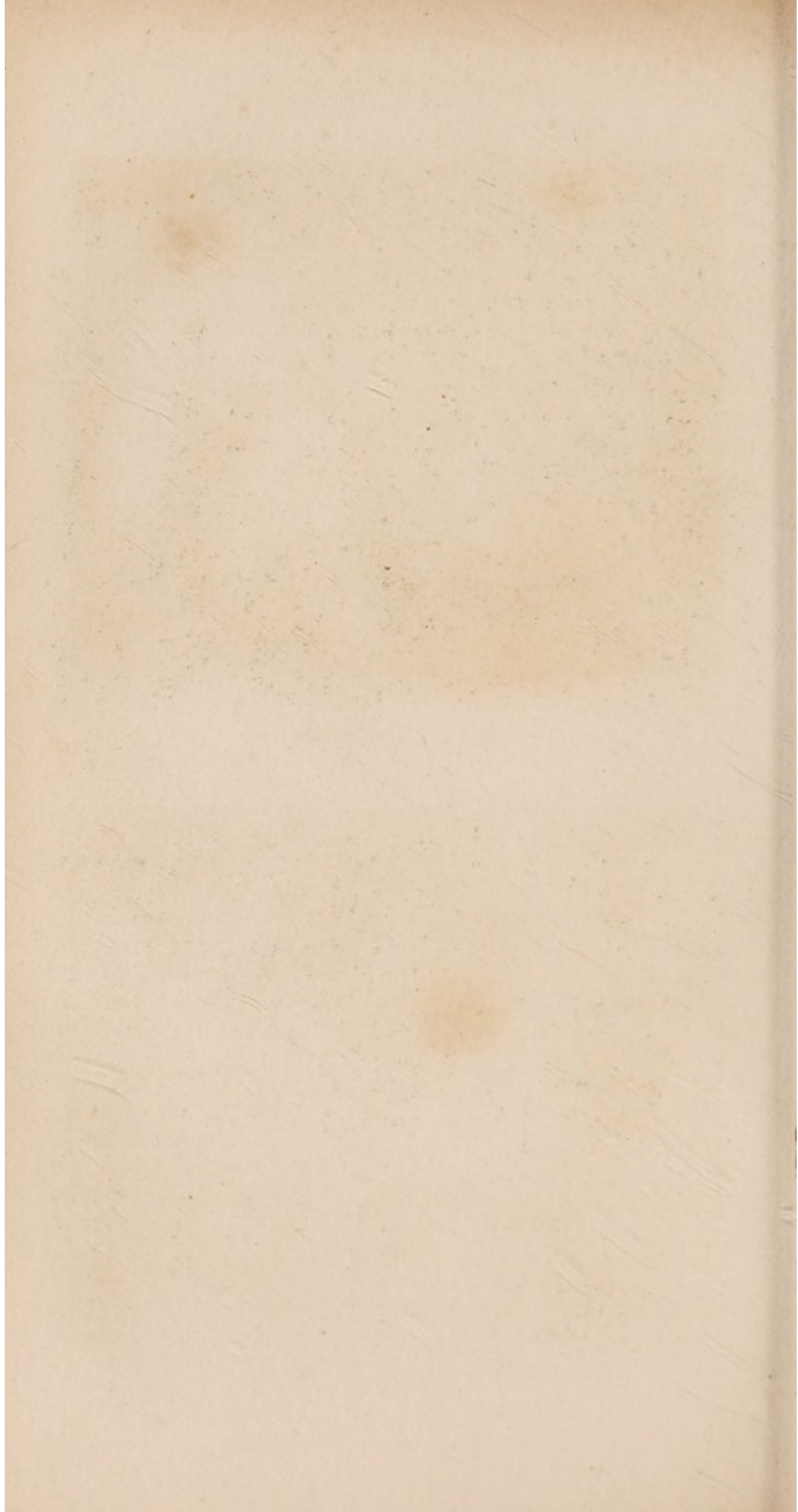
*Iron Forge.*



page 148.

*Etruscan Pottery.*

Pub<sup>d</sup> June 1. 1839 by John Harris, S<sup>t</sup> Pauls Church Yard.



machinery. This immense power, applied upon the iron, which for the purpose is brought to a white heat, forces the crystals, from their globular form, into a lengthened shape, till they become so many threads; and by frequent repetition of the process, these threads get so intertwined as to produce in the mass great toughness, combined with a degree of elasticity. Sometimes, instead of this process of hammering, the iron, while in a white heat, is passed between immense rollers, which produces effects similar to those resulting from the beating. The places where these operations are performed, are called *mill-forges*, of which the most extensive establishment is at Colebrook Dale, in Shropshire.

“ Malleable iron has some properties almost peculiar to itself. It cannot easily be melted; but when two pieces are brought to a white heat, they may, by hammering, be made to unite as firmly as if they had been originally a single piece. This property of *welding*, is confined to hammered iron, steel, and platinum; and is performed by the smith at his forge, with the assistance of his anvil and hammer.

“ The business of the smith comprises two branches, that of the blacksmith and that of the whitesmith. From the hands of the former come large and coarse articles, as horse-shoes, ploughshares, chains, iron doors for safes, &c. The whitesmith manufactures articles of neater and more delicate form, as locks, keys, carpenters' tools, &c.

“ The blacksmith does little with his iron, till he has softened it in the fire of his forge, which is a kind of hearth, raised to a convenient height from

the ground. A large pair of double bellows pours a strong stream of air to the centre of the forge, where he has a fire made of small coals, or coal dust, wetted, to make them give a more intense heat. Into this fire he thrusts his iron, and, working his bellows, brings it to a white heat, in which state it is so soft that a little hammering will reduce it to any required shape.

“ The whitesmith also has a forge ; but he depends less upon it than upon his files. The articles he manufactures are so numerous, that almost every one constitutes a distinct employment : one set of men being confined to the making of locks and keys, another set to the making of files, a third to carpenters’ tools, and so on. Locks, keys, and hinges, are chiefly made at Wolverhampton, in Staffordshire. Nails form distinct manufactures in Lancashire and in Gloucestershire. In Lancashire, also, are made the best files, with tools of all sorts, especially those of the best steel and nicest forms.

#### STEEL.

“ Iron ore consists of a mixture of iron and carbon, or charcoal ; the latter of which is destroyed in the processes of smelting and forging. To transmute the iron into steel, that is, iron in its most refined state, a portion of the carbon must be restored. This is done by burying bar iron in charcoal, in a covered vessel, and exposing it to a red heat, in a furnace. The process requires attention, and can be learned only by practice : too intense a heat would convert the metal into cast iron, instead of steel ; and too little heat would make what is called *cast steel*, in-

stead of steel capable of being hammered and welded. Cast steel, indeed, is much used, but it is more brittle than the other sort.

“ When the iron in the vessel has acquired a proper heat, it is taken out and broken to pieces; the smaller fragments are replaced in the fire, and brought into a state of fusion; after which it is beaten into square bars. These bars are again buried in charcoal, again brought to a great heat, and then thrown into cold water, which, by suddenly contracting the pores, renders them very hard, and converts them into steel.

“ But steel in this state is too hard and brittle for use: it must be tempered by being once more exposed to heat, till it acquires a certain tint, when it is either plunged in water, or allowed to cool gradually, according to the purpose for which it is intended. By such operations, the metal becomes finer in its grain; the surface is susceptible of a high polish, and is less liable to rust than in its original state. It is, consequently, admirable for all fine wares, and for cutting instruments, which require an extremely thin edge, as knives, razors, lancets, &c. Saws, chisels, planes, and even bricklayers' trowels, are made of steel; though when a tool, such as a hatchet, requires size and strength as well as sharpness, it is common to make the substance of tough iron, and merely to plate the edge with steel.

“ Steel is of various descriptions, each sort suited to some specific purpose; thus, *blistered steel*, or steel as it is at first produced, serves for common tools of low price: *shear steel*, which is a degree better, is used for table knives and forks; and *cast*

*steel* is appropriated to razors, fine penknives, and surgeons' instruments.

#### CAST IRON.

“ At Rotherham, in Yorkshire, an extensive manufacture in iron and steel has been carried on at least from the sixteenth century, probably from a more early date. At Colebrook Dale, in Shropshire, are also iron-works upon a stupendous scale. In descending into the dale which winds between two wooded hills, near the Severn, the imagination is roused by the astounding noises of forges, mills, &c. which are constantly at work, as well as by the terrific appearance of flames bursting from the several furnaces, with their black smoke, and the white curling vapours which arise from numerous surrounding limekilns. The effect is at once sublime and terrific; especially if the place be approached in the dusky twilight, when the visitor can just see something, but can scarcely distinguish what.

“ At both these places, the casting of iron is extensively pursued; from a common door-latch, to the stupendous iron bridge, which stretches across a wide river.

Preparatory to the casting, a model, or pattern, is made in wood, or any other convenient substance. If the article is to be shaped on one side only, like the ornaments upon a stove, the pattern is cut and fixed upon a flat board; if the work be intended to be open, as the front of a balcony, the board is omitted.

“ The mould is made in fine sand, just wetted sufficiently to make it adhere together. This is

packed tightly in a shallow box, and the pattern is pressed down upon the surface of the sand, so as to leave upon it a perfect impression of all its parts; after which the mould is dried in an oven. It is then taken to the furnace, where the liquid metal is poured in, either with a ladle, or from the mouth of the furnace, according to its size.

“ When the work is to be cast, not on a flat surface, but standing out round and whole, it is moulded in two parts; that is, in two boxes, each box containing one half of the pattern. The boxes are fitted together with pins, so that the two parts of the pattern may come exactly together; and when the metal is poured in, they furnish a whole. In articles of this kind, as street posts, &c. you may frequently observe the junction of the two moulds, marked by a line down either side.

“ When the article is to be cast hollow, as water-pipes, saucepans, &c. a centre piece, called a *core*, is made of brick-loam, clay, &c. round an iron rod, exactly to the size of the inside of the vessel. A mould is then made for the outside, and placed over the core, so as to leave between them sufficient space for the melted metal to be poured in. The core is afterwards taken out, and the vessel remains hollow.

“ In the larger founderies, a deep pit is dug near the furnace, in which are placed the various moulds, ready and conveniently below the mouth of the furnace, from which last, channels are made to convey the metal into the moulds. In all cases, attention must be paid to have the moulds quite dry; otherwise, when the fervid metal flows in, it would raise the damp into steam, which would blow up the



moulds, spurt the boiling metal around, and desperately wound, if not kill, the workpeople.

“On the foot of that register-stove, you observe the word “CARRON,” and have perhaps wondered why it should be there. It is to denote that the stove was cast at the Carron foundery, or the Carron iron-works, in Stirlingshire, Scotland, which are carried on by a company, who have also a wharf, and extensive ranges of warehouses for their commodities, in London.

“These works stand on the river Carron, a little above its confluence with the Firth of Forth; and more than a hundred acres of land have been converted into reservoirs, to supply the machinery with the continual power of water, by which eighteen large wheels are turned. Less than a century ago, the spot was a wild moor, destitute of houses; but in the year 1761, an iron foundery was built upon it, which has risen to be the largest of its kind in Europe, employing about a thousand people, and consuming daily a hundred tons of coal.

“In addition to the usual articles in cast iron, the boring of cannons is carried on at the Carron foundery; for, although a cannon may be described as a hollow tube, such as may be cast, experience has shewn that it is better to cast the cannon in a solid mass, and bore it afterwards, by which means the hollow is more true, and the case stronger.

“Formerly, cannons were bored in an upright position; the borer was placed with its point upwards, and was moved round and round by the power of machinery. The mass for a cannon was placed upon this borer, pressing with all its weight

upon it, being kept in a steady position by proper stays and braces. As the borer revolved, it cut out the metal, and the cannon, by its own weight, sank upon the borer as fast as the internal matter was cut away. The first borer was square, which gave four sharp edges, with room between them for the cuttings of metal to drop out: the second borer had five edges; and the last had six. The latter, cutting much finer than either of the former, smoothed and polished the inner face.

“ But the method now is, to place the cannon in a horizontal position, with the borer exactly in a line with it, so as to make its way perfectly true. The borer is turned as before, and the same machinery draws the cannon up to it as the core is cut away. The advantage of this method seems to be, that while the machine is boring the interior, the workmen can be finishing the outside.

“ In addition to the places I have mentioned, as remarkable for iron works, some others may be noticed; as Sheffield, for cutlery of all kinds; Woodstock, for ornamental pieces of steel-work, as watch-chains, steel purses, and the like; and Birmingham, for both the foregoing articles, and numerous others.

#### COPPER.

“ The veranda in front of the house is covered with copper, and so is the summer-house in the garden. Some of the gutters on the roof are of the same material; as are also the nails used in the slating.

“ Though less generally useful than iron, copper is still a very serviceable metal, and largely employed

in several of the arts. In building, as a covering for roofs, and for water-pipes and gutters, it is lighter than lead, but more expensive.

“Copper has one disadvantage, from which iron is free: almost all the salts formed by the union of copper with acids, are poisons; and one of the most virulent of these, known by the name of *verdigris*, is formed by the combination of copper with acetic acid, or vinegar. Particular caution ought therefore to be observed, in the use of copper vessels in the kitchen, to keep them clean, and have them properly defended within by a coat of tin. This *verdigris* is of a bright green colour, and much used by painters, dyers, and other artists.

“Though it soon loses its colour by exposure to the air, copper is a very tough and durable metal: it may be rolled into thin plates, drawn into wire, and cast into various forms. For the last purpose, however, it is usually mixed with other metals, on account of its natural softness. When mixed with zinc, the compound becomes *brass*, a more beautiful and generally serviceable substance than copper; and even cheaper, because the zinc, with which the copper is combined, is of much lower price. When copper is mixed with tin, it forms the substance called *bronze*, or *bell-metal*. This is much harder than either copper or brass, and affords a good clear sound when struck, on which account bells are made of it. Statues, also, cast in bronze, are much admired. Bronze soon assumes a brownish colour; and in some situations its surface gets partially converted into *verdigris*, which gives it a greenish shade, as you see on the prominent parts of the bronze vase in the garden.

“ Thin plates of copper are used as a covering, or sheathing, for the bottoms of ships ; and for various other purposes. And plates of a thicker substance are used for engraving upon.

“ Bolts for fastening the planks of ships, slaters’ nails, and many other articles, are made of copper, as being more durable than iron, from its greater ductility, and freedom from atmospheric corrosion.

“ Though by no means so abundant as iron, copper is far from being a scarce metal ; mines of it are found in several countries, and in none does it exist of better quality than in Britain.

“ Some of the earliest copper mines of Britain were in Wales ; and one of the richest, called *Parys Mine*, is in the isle of Anglesea. It is supposed that the Romans obtained copper ore from the Parys mountain ; but the great riches of the place remained undiscovered till the beginning of the year 1768.

“ It is generally the case, that when a country is rich in ores beneath, the surface presents no rural beauties. This remark holds good especially where copper mines exist ; for the fumes of this metal are destructive to vegetation. The visiter, in advancing towards Parys mine, beholds nothing but rough shapeless rocks, piled one upon another, till he approaches a large basin, or wide pit, with a small lake on one side, at which no bird ever stops to sip. The fumes arising from the burning heaps of copper are sufficient to produce suffocation, if incautiously inhaled. Mosses and lichens, which grow on every other rock, cannot live here.

“ The ore, which abounds in sulphur, is purified

by burning. This sulphureous copper ore, or *sulphate of copper*, as a chemist would call it, is the *blue vitriol* of the shops. It is thus purified :—being broken into lumps, about the size of eggs, it is thrown into a chamber formed by two long walls, twenty or even fifty yards in length, equally distant in every part, and about four feet in height. The ore is piled up considerably above the height of the walls, and then covered over with stones and clay, so closely that the fumes cannot escape ; or the interval between the walls is sometimes completely arched over with bricks, for the same purpose. At regular distances, flues are formed at the top of these arches, which extend to a considerable width, bending over like Gothic arches. The fumes of the sulphur rise from the ore, when it is set on fire, into these flues ; and being cooled by the length through which they pass, strike against the top of the arch, and fall down in a very fine dust of sulphur, which, being gathered, melted, and run into moulds, becomes the *stone brimstone* of the shops. These vast mounds of ore take four, six, or even ten months to burn out.

“ The loss of the sulphur reduces the ore to one-fourth of its original bulk, but it is then good copper ; and, after being pressed and washed, is fit for the market. The water used in the washing becomes strongly impregnated with copper, which the acid contained in the sulphur had dissolved. This water is carefully stored in proper pits, as indeed is all the water found in the mines ; because from that some of the finest metal is extracted, by a very curious process. The pits are thirty or forty feet long, half as much broad, and nearly two feet deep. Into

these pits, full of the impregnated water, is laid a considerable quantity of iron : old iron bits, bars, or broken anchors will do ; but it is found best to lay in new plates of iron, four feet long, half a yard broad, and almost an inch thick. The particles of copper floating in the water are precipitated upon the iron ; which is in the mean while dissolved, by the acid liquor, into a yellowish ochre. The iron is frequently taken out, and the copper scraped off ; till at length the iron is wholly consumed. The copper thus obtained is the purest of any.

“ The appearance of Parys mine is uncommon, because it is nearly open to the day ; being a large pit, a hundred yards long, about forty yards wide, and twenty-four yards, or above seventy feet, deep. The copper ore is cut out, as stone is from a quarry, in large lumps. At the ends of this pit, deep hollows are cut into the mountain ; the roofs of which are supported by pillars of metallic ore, left untouched. These caverns wind a considerable way under ground, but the whole mass, sides and roof, will disappear, as the cutting proceeds.

“ The sides of this open pit are almost perpendicular. The descent into it is only by rugged steps, rudely formed in the rocky ore, in a few places assisted by several ladders, and a rope to hold by. The most surprising part of the operation, is that of obtaining the ore from the sides of this pit. Wooden platforms are projected from the top of the opening, from each of which a windlass serves to lower and raise baskets, by which the miners are let down to the part where they work, on the upright face of the precipice. There they get out the ore

with pickaxes, or blast it with gunpowder ; tumbling down the masses of ore, with a thundering noise, to the bottom of the pit.

“ Vast mines of copper are wrought in Cornwall ; for although that country is chiefly celebrated for tin, the copper is also in abundance, and of great importance. Large lumps of native copper, of considerable purity, are also found there, not very deep in the soil.

“ Much copper, of the purest kind, is likewise obtained from the lumps of mundic, or marcasite, found in the tin mines. These lumps were, for years, regarded as of no value, and thrown away ; but science has now discovered a mode of extracting copper from them, to the amount of a hundred and fifty thousand pounds sterling per annum ; and it is equal in goodness to the Swedish.

“ At Ecton Hill, near the river Dove, in Derbyshire, is a peculiar copper mine. Thirteen thousand pounds were spent in searching before any ore could be found ; then, at two hundred yards' depth, vast quantities were discovered. The peculiarity of this mine is, that the ore does not spread its veins, hither and thither, as is commonly the case, but sinks down perpendicularly, widening as it deepens, in the shape of a huge bell. It is one of the deepest mines in Great Britain.

“ Sweden abounds in copper, which is in high esteem : it is found principally in the province of Dalecarlia, a district equally celebrated for its iron mines. The copper mines have been wrought for ages. Huge machines, actuated by water-wheels, some of which are above forty feet in diameter, are

here seen drawing up the ore, and a great chasm appears, of extraordinary depth: for the original excavations, for want of being properly supported, have fallen in. The passage into this great mouth is by wooden stairs, carried over the wild mass of fallen rocks. After this deep descent, the visiter proceeds horizontally; the daylight is soon lost, and the close vapours become offensive, especially as he descends still lower down the winding steps. The pestilential fumes, the darkness, and the rocks, give a dreadful appearance to the whole. The workmen seem like unsubstantial spectres, rather than living inhabitants of the earth. At one part, the steam is so hot as to scorch; and the sulphureous stench is unbearable.

“ In long winding galleries, and high-roofed caverns, the workmen, almost naked, are seen hewing out the rich ore, and wheeling it, in barrows, towards the spot where the buckets hang, which are to raise it above ground.

“ It takes an hour to go down to the bottom of this pit, as it is twelve hundred feet deep: five hundred men are employed in it; and it was here that the great Gustavus Vasa secreted himself, as a common labourer, before he was raised to the throne.

“ A Laplander, travelling with his reindeer near Drontheim, in Norway, discovered copper; which, on examination, led to the opening of a considerable and productive mine, which has now been wrought almost two hundred years. Some of the veins are nearly exhausted, but the eastern division is still productive. The foulness of the air makes the work very oppressive; and sometimes a sugary taste upon



the lips, warns the workmen to flee. Gunpowder is used to split the rocks and loosen the ore, which is principally of a gravelly nature.

“ Very fine copper is found in Japan ; some, indeed, is mixed with gold, which is carefully separated. The copper is cast into small cylinders, the size of one’s finger, and something longer than one’s hand.

“ Copper is indeed widely distributed ; there being scarcely a mountainous country but has its copper mines. Ireland, Hungary, Spain, may be added to those named in Europe ; while the south of Africa, Hudson’s Bay in North America, and especially Chili in South America, are plentifully stored with this valuable metal. In the last named country, the working of copper mines is much more profitable than the working of those of gold and silver, both of which exist in the same region.

“ Besides the brass and bronze already spoken of, copper is an ingredient in several other compound metals. It is used as an alloy for gold ; for although silver is used for a similar purpose, a large portion of it imparts a white colour to the gold ; copper, on the other hand, renders it too red ; so that they are best used together. Alloys of copper were used in very early ages of the world : and many of the swords and other cutting instruments of the Greeks and Romans were made of them. The brass of Corinth was celebrated in ancient times : as is that of Geneva among the moderns. The latter is much used for watch movements, and other delicate articles, in which strength and lightness must be combined.

“ Pinchbeck, or moulu, petit or, imitative gold, and other compositions used for making cheap and showy trinkets, are mixtures of copper and zinc, in various proportions. Some are so well managed, that inexperienced persons mistake them for gold.

## TIN.

“ Tin is a white metal, next in brilliancy to silver, lighter and stiffer than lead, and a wholesome article for culinary utensils.

“ Though found in some other countries, tin is more especially a British, or, rather, an English metal ; for full five hundred years before the Christian æra, that is, about the time of Zedekiah, the last king of Judah, the Phœnicians, who dwelt at Tyre and Sidon, traded to Britain for tin. They gave our island the name of *Baratanac*, or *Land of Tin* ; from which some persons believe the word Britain to be derived. Be this as it may, our tin mines have been worked from that period, and tin is an article of considerable exportation to the present day. Some countries in Germany have mines of tin, but the supply does not exceed their own consumption. China is also said to possess tin mines, yet many tons' weight of tin are annually sent thither from England, which, indeed, affords to most other nations this simple and useful material. In the island of Banca, in the Indian seas, are some tin mines, from which the Dutch formerly derived great profit, by supplying the Chinese with the produce : but the English have superseded them. The tin of Banca is native, or in the state of metal, and is called *grain tin*. It is in the form of stalactites, somewhat re-

sembling the icicles that hang from trees and eaves of houses in frosty weather.

“ The English tin mines are situated in Cornwall and the contiguous county of Devon, where are also many productive mines of copper.

“ In some places, the ore of tin has so much the appearance of common stones, that it can only be distinguished by its great weight. In other parts, tin and earthy substances are so intimately blended, that they look like stone of a blueish grey colour.

“ The entrance to the mine is by a kind of well, called a *shaft*, which is sunk perpendicularly till the workmen come to the vein of ore, which they term the *lode*. When found, the vein must be followed ; perhaps it may dip slantwise for a great way ; or it may turn aside, and then return in a zig-zag form ; but the direction is usually from east to west. The veins penetrate the hardest rocks ; and in pursuing them, the workmen have sometimes to make their way through the rock, either by splitting it with wedges, or blasting it with gunpowder. Sometimes, they have to dig through loose earth, which falls in upon them, to the hazard of their lives ; and then, to secure themselves, they board up a ceiling with stout planks. And it not unfrequently happens, that in digging they come in contact with streams of water, sufficient to drown them. This is pumped out with a steam-engine ; or, if the land allow of it, they cut a channel or drain, called an *adit*, sloping downward, by which the water may run off down the side of the hill.

“ When it is necessary to blast the rock, a hole, more than an inch in diameter, is bored, or cut,

into it, with an iron chisel. If the rock be dry, this will suffice to receive the charge; but if damp, the gunpowder is put into a tin pipe, called a *cartridge*, and then inserted in the hole, which is closed with soft rock, or tough clay, tightly rammed in. A small hole is made through this stopping, sufficient to admit to the cartridge a reed, or straw, filled with gunpowder; and a paper wick, or as James would call it, *touchpaper*, is fixed to the outer end of the reed, sufficient to burn long enough for the man who fires it to get out of the way before the explosion.

“The ways, called *levels*, made in different directions, to follow the ore, are seldom more than sufficiently wide for two miners to work together. They work in sets; relieving each other every eight hours, and keeping up continual operations, day and night.

“Small veins are first discovered, not more, perhaps, than half an inch in diameter; but they increase as they are followed. Sometimes, masses of ore, of twenty pounds' weight, are found: and, not unfrequently, the vein, or lode, breaks off suddenly; but miners, accustomed to this dilemma, are aware that the continuation is to be recovered a little on one side, and, by digging, they generally succeed.

“To raise the ore to the surface of the ground above, a shaft is frequently sunk, just over the spot where it lies. And here the geometrical knowledge of the captain of the mine appears to advantage; for whatever the windings of the mine below, he traces similar windings on the surface above, and directs the workmen where to begin sinking the shaft; at the same time that those below begin to work up-

wards; and both persevere till they meet. When the shaft is completed, a windlass is placed at the top, for drawing up the *kibbutts*, or baskets of ore.

“ The ore, when raised, is broken in stamping mills, the lifters of which are shod with iron, and put in motion by water-wheels. The stamping is continued till the ore is sufficiently small to pass away through an iron grating beneath; and a run of water, in the mean time, helps to cleanse it.

“ The next process is *smelting*, which is done in furnaces built for the purpose; and the smelter has about one-third of the produce for his trouble. The tin, for such it now is, is next assayed, to prove its quality, or fineness; after which it is run into large blocks, and must be *coined*, as it is called, before it can be sent to the market. The coining is performed by an officer of the Duke of Cornwall, who cuts a small portion from one corner, and then stamps the mass with the ducal seal and the name of the smelter. The duchy of Cornwall is hereditary in the Prince of Wales, who receives a duty of four shillings upon every hundred weight of tin that is smelted. When there is no Prince of Wales, as at present is the case, the duty goes to the Crown.

“ Near St. Austle, in Cornwall, is a tin mine, with not fewer than fifty shafts, half of which are still in use, reaching to a depth of nearly seven hundred feet. Some of the veins have been worked a full mile in length.

“ At St. Austle's Moor, is a mine of what is called *stream tin*, which I will endeavour to describe. Into a narrow valley, about three miles in length, numerous small streams empty their waters, which, almost

stagnating, have formed a collection of alluvial soil, nearly twenty feet in depth. The different materials of which this soil is composed, have settled into several strata, the heaviest, of course, being at the bottom. The first three strata consist of earth, clay, and gravel; then follows a stratum of substances more stony, and of firmer consistence, reaching to the depth of ten or twelve feet; and beneath them is a stratum of tin stones, some as large as an apple, others almost as small as sand. The tin found in these stones is very pure. At the depth of eighteen or twenty feet, the solid rock is disclosed, in which is no tin. The earth, sand, and gravel, are washed off, by conducting narrow streams of water through the most promising parts, and thereby the tin stones are laid open with tolerable ease.

“ Tin is, or ought to be, the principal ingredient in *pewter*: the metals mingled with it are lead and zinc, in small quantities. When pewter utensils were superseded by the introduction of earthenware, one considerable market for tin was destroyed.

“ Pewter is much softer than tin; and as compound metals are more easily melted than the pure, they are used as solders for uniting other metals together.

“ A compound of tin with a little lead, and as much bismuth as both together, forms a metal so fusible, that it will melt in boiling water. The fusibility of this compound gives it a value in some philosophical experiments; but in the arts, it is of little or no use.

“ Not so, however, with the compound, or amalgam, of tin and quicksilver, which is fastened to the

backs of looking-glasses, as I have formerly explained.

“ In the operation of making *tin plate*, very thin plates of iron, or copper, are covered on both sides with a coat of tin, which gives to the plate more firmness and solidity than it possesses naturally. These tinned plates are wrought into utensils of great variety for domestic purposes, and are very cleanly and wholesome in the use. The insides of copper and iron vessels are also covered with a coating of tin; which is absolutely indispensable for those of copper, to prevent the deleterious effects of that poisonous metal. It is much better, however, to banish them altogether from the kitchen.

#### LEAD.

“ Lead, as well as copper, is used by the builder, for gutters, or hollows, for covering the ridges and angles of roofs, sometimes for entire roofs, for water-pipes, and some other purposes. In most of these, it is in the form of *sheet lead*, which is lead either passed between rollers of wood or iron, or cast in a mould made on the surface of a large flat table, covered with fine sand; a border keeps the melted lead from running over, and a flat edge of wood, called a *strike*, pushes forward the melted metal, and keeps it of uniform thickness. The pipes are either made of sheet lead, bent about a round staff, and soldered together at the edges, or they are cast in a mould, without a seam, which gives them greater strength.

“ Lead ranks among the most serviceable of metals; at the same time it is one of the dullest,

softest, yet heaviest. It melts with a low heat, and can be easily cast into any required shape: but it is not very ductile; for it cannot be drawn into wire, neither can it be beaten into very thin leaves, for it easily cracks from pressure. The surface soon tarnishes when exposed to the weather; but its substance does not decay so soon as iron or copper.

“Lead is frequently met with in the state of *galena* (the chemists’ *sulphate of lead*) or lead in combination with sulphur. The ore has a greater resemblance to the metal than is usual; yet if a strong fire be applied to it, instead of melting, it will burn. It is encrusted with crystals; and the smaller these crystals are, the more lead is generally obtained.

“Lead abounds in many countries; and is especially plentiful in some parts of Great Britain. At Minera, a few miles from Wrexham, in Denbighshire, it is dug up in masses of more than a hundred weight each, sometimes free from any sparry admixture. The Halkin mountain, in Flintshire, yields abundance of lead; which is also found in other districts of North Wales, as well as in Yorkshire, Northumberland, and other parts of England.

“Scotland, also, has its lead mines; in Lanarkshire, is a village called Lead Hills, from the neighbouring mines; in some parts of Perthshire, also, in the Morven district, and in the isle of Ilay, in Argyleshire, this useful metal is obtained in plenty.

“Lead mines vary much in their productiveness: the vein, or lode, sometimes narrows to less than an inch, and sometimes widens to the breadth of several fathoms. In some cases, the ore is dug out with a



pickaxe: in others, the mine is blasted with gunpowder.

“Lead ores are first roasted, to expel the sulphur; afterwards, they are smelted, and cast into bars for the market.

“Lead in every state, natural or artificial, is poisonous. Mechanics, who work on it, suffer more or less from its noxious effluvia; the men who manufacture it into white lead for painting, and painters themselves, are afflicted with a peculiar, and very terrible kind of colic; to prevent which, it is usual, at many of the large works, for each man to swallow a wineglassful of castor-oil when he leaves off. It is said that women are less liable to be affected with this disease than men; and on that account, at the white-lead mills, in the parish of Islington, near London, females are chiefly employed.

“Lead is easily calcined, and converted into a fine powder, to which a variety of beautiful colours is imparted, by admixture with other substances, and the management of the heat, from yellow, called *massicot*, to a fiery red, called *minium*, or more commonly *red lead*. It may even be converted into glass, opaque as it is; and is much used in the manufacture of flint glass. *Sugar of lead*, the chemists’ *acetite of lead*, a salt formed by lead and vinegar, is sweet but very poisonous. In medicine, however, it is used externally with great advantage, as a cold astringent. *White lead* is obtained by exposing sheet lead to the fumes of vinegar, and scraping off the oxide, or rust, as it is formed. By the process of calcination, lead is increased in weight one-tenth.

“To make the leadwork of casements, or *lead-*

*lights*, as the glaziers term them, lead is forced through a mill of peculiar construction, so as to produce a groove in each side, for holding the small squares of glass.

“ Shot is made by pouring melted lead through revolving sieves raised to a great height, over a cistern of water. The fused metal passes in small drops through the sieves, as they revolve, and the pressure of the atmosphere makes every drop perfectly round. It cools in falling from so great a height, and by falling into water is preserved from being flattened, as it would be if it fell upon the ground. Sieves of different sizes are used, according as the shot is required to be larger or smaller.

“ As is the case with the discovery of other metals, various legends are recorded respecting lead. From these, I have selected one from ‘ Gilpin’s Picturesque Tour in Scotland :’

“ ‘ A gentleman, named Lothian, had long sought ore in the hills near Corra Lyn, in the valley of the Clyde ; but without success. Often did he resolve to give up the search ; but as frequently was he dissuaded from so doing by his workmen : sometimes, they would represent that the rock, which had frustrated his expectations, was just cut through, and a little more perseverance could not fail to crown their labours with success : sometimes, they would persuade him that the soil bore evident signs of ore ; and sometimes springs were opened, the waters of which, they said, had the genuine mineral tint. Thus, from time to time, they raised his spirits, and deluded him with fictitious tales of impending riches, till he was nearly ruined.

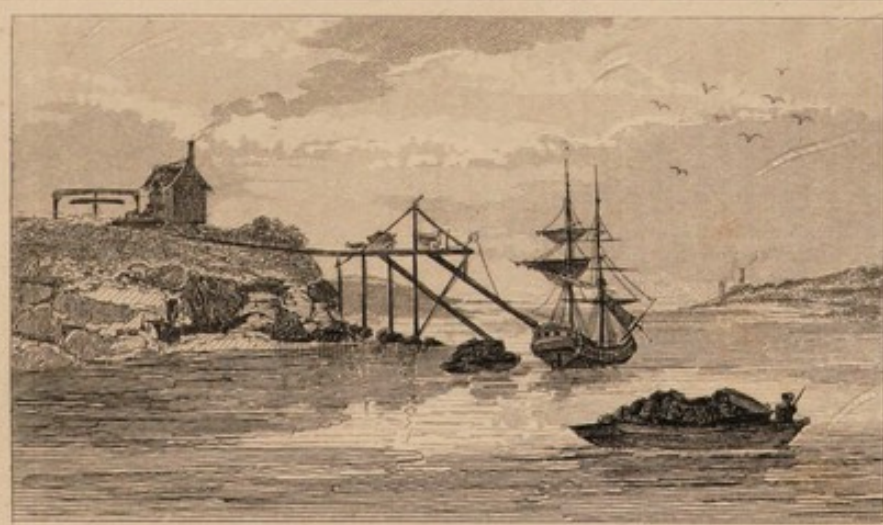
“ ‘ At this crisis, a boy, who was employed in the mine, privately informed him that the men were deceiving him ; that ore had been found, and secreted. He also begged of Mr. Lothian to let no one know that he had given this information ; for if it came to the workmen’s ears, they would certainly murder him. Mr. Lothian, astonished at what he heard, quickly penetrated the depth of the men’s villany ; they intended to ruin him, in the hope they might take the affair themselves at a low rate. He encouraged the boy ; and it was agreed that when he should go, as usual, on the following morning into the mine, he should scold the boy, for being idle ; and the boy, feigning resentment, should throw down his tools as near as possible to the place where the ore had been found. All this was done accordingly : the master scolded, the boy was saucy, and received a blow ; upon which, in an apparent rage, he threw down his tools, declaring he would work no longer for such a master. Mr. Lothian marked the spot, without seeming to notice any thing but the boy’s insolence ; and then began talking with the men, from whom he received the usual assurances of ultimate success. In the course of such conversation, he took up a pickaxe, and began striking here and there, carelessly ; till, by degrees, he came to the marked spot. There he soon discovered the ore ; and, as if greatly surprised, he called all the men to examine if that were not the proper place to work at. They were at first unwilling to own it ; but as he continued picking, they were obliged to see, and, at his command, they dug deeper. Unable longer to resist the truth, they now affected to wonder how they



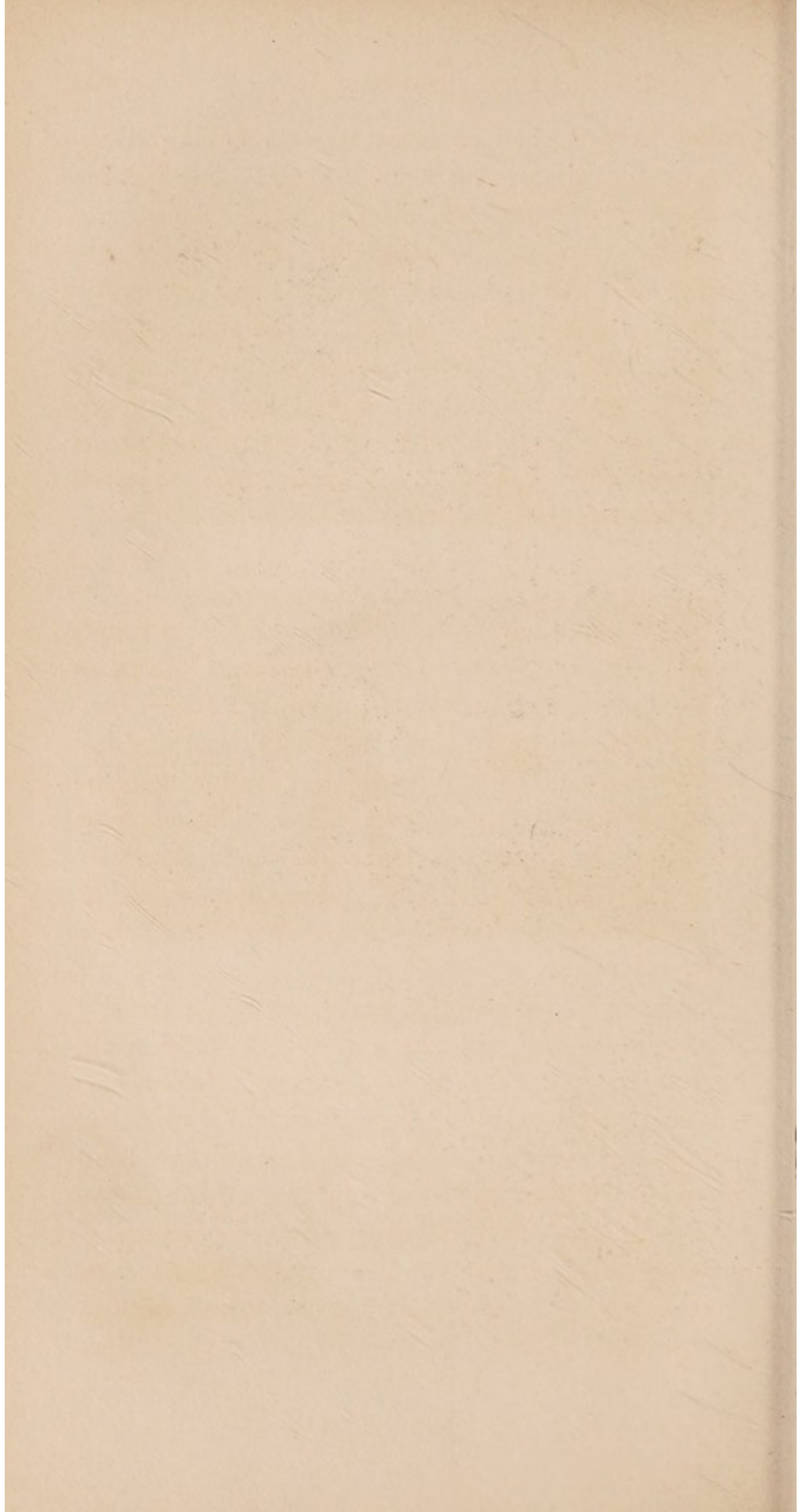
*Page 327.*



*Page 333.*



*Page 333.*



could have worked so near, without finding it before. The ore proved to be very rich, and Mr. Lothian soon recovered his finances.'

"We have now," observed Mr. Paterson, "gone pretty well over the house, internally and externally. Indeed, I recollect but one article in immediate connection, that has not been noticed. It is an article, however, so conducive, or, I may say, so essential, to our comfort, and not less important in a commercial point of view, that I shall make it the subject of our next lecture. The article I allude to is

## COAL.

"Coals are sometimes ironically called *black diamonds*; but those who so call them are seldom aware of their natural affinity to the gem with which they would bring them into sarcastic contrast: the diamond is wholly carbon, or charcoal, and coal is the same in its greatest proportion; and if things must be valued by their utility, a coal mine is more precious than one of diamonds. The one possesses intrinsic worth; the worth of the other depends merely upon opinion.

"Coal has, probably, in all cases, been originally vegetable matter; but, by long burial in the earth, its very substance has been changed. Sometimes, it is met with partially changed, with the fibrous formation still discernible; and specimens have been found, which were coal at one end and wood at the other. Impressions of ferns and other vegetables are sometimes seen in coal; and sometimes the oily part of it seems to have been driven off by some subterranean action, possibly by that of fire. More com-

monly, however, coal appears like an original earthy substance, impregnated and changed by petroleum, or some other oily matter.

“Great Britain is highly favoured by this kind provision of fuel, so well suited to its cold and moist climate, and so especially necessary for its manufactures. For ages, indeed, wood and turf were the only kinds of fuel in use; and as long as the island was well covered with timber, and scarcely any manufactures were pursued, the supply was adequate to the wants of the inhabitants; but as population increased, and corn was wanted, the forests were cut down, that the land might be brought under culture, and in many districts fuel became scarce and dear.

“In countries where coal abounds, it was scarcely possible but that some particles, at least, would be washed out of the earth by floods: this takes place to the present day. That these black stones, as they would be accounted, would burn, was the next discovery; and to search for more would be natural, when wood had begun to fail.

“Newcastle-upon-Tyne, in Northumberland, is a principal coal district. Henry III. gave the inhabitants the first charter for digging coal, about the year 1239. Yet coals were forbidden to be brought to London, till the destruction of the woods about the metropolis rendered the supply of them indispensable. At present, the coal trade from Newcastle is so great, that it employs nearly five thousand ships, with seamen in proportion; and the quantity of coals dug out of about thirty collieries in the vicinity of that town, is stated to be seven hundred and twenty thousand chaldrons every year.

“ I have already given you to understand that the various substances found beneath the surface of the earth, lie in strata, or layers, one below another. Coal forms one of these strata. Sometimes, it is many feet in thickness ; sometimes not more than six inches. When found, the vein, or stratum, is followed ; and, though thin at first, it soon becomes more profitable. In following the vein, the miners are obliged to go far into the interior of the earth, and frequently to great depths.

“ The coal-mines at Whitehaven, in Cumberland, are truly wonderful. The entry, at the bottom of a hill, leads to vast galleries, where the roof is supported by pillars of coal, left for the purpose, nine feet in height, and thirty-six feet in thickness. The mines sink to the depth of seven or eight hundred feet ; and run under the sea, so that large ships sail over the miners' heads. The stratum of coal is generally inclined, or *dips*, as the miners call it ; and frequently the workmen have to sink or rise a hundred feet, or more, to recover the continuation of a broken seam, or vein. These breaks (*faults*, or *dykes*, as they are termed) consist of stones different from those of the strata which they interrupt, and appear to be consequences of some violent concussion of the earth, by which the seam of coal has been cast out of the regular course.

“ At Borrowstowness, in Linlithgowshire, Scotland, was a very remarkable coal mine. The seam of coal went under the Firth of Forth, till it reached a bank half a mile from the shore. This was formed into a quay, for an entrance, as shipping could come close up to take in the coals. Fresh water, which



sprang from the bottom of the mine, was pumped up from a depth of two hundred and forty feet. After it had been worked to great advantage for many years, an extraordinary high tide rose above the entrance to the pit, and drowned the whole concern.

“ The men who dig coal in the pits are called *colliers*; they are a sturdy rough race, fit indeed for an occupation attended with hard labour, great privations, and almost numberless dangers. They work by the glimmer of a small lamp, and rarely enjoy fresh air and sunshine.

“ Besides the general gloominess of working so far under ground, the miners are exposed, as I have hinted, to great dangers. Sometimes, water forcing its way in, drowns them and destroys the works; or the roofs of the pits fall in, and bury them alive; or the chain of the bucket, by which they ascend or descend, breaks while they are in it, and they are dashed to pieces by the fall. They also meet with foul air, called by them the *black damp*, (carbonic acid gas,) which suffocates the instant it is inhaled; and another, which they call the *fire damp*, (carbonated hydrogen gas,) which, if any flame come near it, takes fire, and explodes like gunpowder, killing or maiming all who happen to be within its reach, and even occasionally setting fire to the mine itself, which continues to burn for months, sometimes for years, successively.

“ As the fire-damp is ignited only by actual contact with flame, a machine was invented, which, by means of a wheel of flints striking against steel, gave out a stream of sparks; and this glimmering light sufficed for the workmen. At a subsequent period,

Sir Humphry Davy discovered that the foul air was too thick to pass between close iron wires; he therefore invented a lamp, to be enclosed in a case of wire gauze; so that, although the light passed through this wire work, the fire-damp lodged on the outside, and was perfectly harmless. This is a very important safeguard to the miners; yet, because the light is not so strong when enclosed in this kind of wire lantern as without it, they will frequently lay the safety screen aside, at the hazard of their lives; and dreadful consequences have frequently ensued.

“ After the coal has been brought to the surface in baskets, it must be conveyed to the waterside, for shipping. Frequently, therefore, railroads are constructed, from the mouth of the pit, to the edge of the water. These consist of grooves of wood or of iron, in which the waggon-wheels move so easily, that one horse can draw as much as six without such a contrivance; and if the slope be sufficient, the loaded waggons will run down by themselves, till they come to the appointed place. Then, by the removal of a pin, a trap-door is opened in the bottom of the waggon, and the coals fall out, through a kind of large funnel, into the hold of the ship. The empty waggons are drawn up another railroad, by the side of the descending one, by the weight and force of other loaded waggons that are coming down.

“ Sometimes, large barges called *keels*, are employed to convey the coals from the waggons to the ships, when the latter draw too much water to get far enough up the river to meet the waggons.

“ Besides the coals brought by sea from mines situate near the coast, London receives a large supply

from inland places, by means of the numerous navigable canals, with which England is intersected. The annual supply of coals brought to London, is more than a million and a half of chaldrons: and the quantity used throughout the island, is probably ten times as much as the London consumption.

“ Different mines afford coals of different qualities; some burning with almost the rapidity of pitch, and others requiring to be urged by the continual blast of bellows. Some also furnish pure coal, others a mixture of coals and slaty stone.

“ One sort of coal, known by the name of *cannel coal*, (not *canal* coal, as some people, and even some writers, ignorantly call it,) is so tough and compact as to bear the turner's lathe and tool, by which it is formed into a number of toys, trinkets, snuff-boxes, &c.; and as it is capable of a very high and elegant polish, these articles are frequently made to pass for jet. It is dug in many parts of England; but the finest is obtained in Lancashire and Cheshire. If not wetted before it is put on the fire, it cracks and flies to pieces; but if properly managed, it makes a brisk fire, flaming violently for a time, and afterwards continuing red and glowing a long while, till finally reduced into a small portion of grey ashes.

“ From coals are obtained two articles of considerable importance, the one to the arts, the other to public convenience: these are, *coke*, for the founderies; and *hydrogen gas*, for light by night.

“ Coke is coal baked in a kind of oven, till it becomes charred; after which it will burn without smoke, and give a fiercer heat than in its pristine state. It is much used by founders, and others, who

require great heat in their operations ; and it is sometimes used for domestic purposes. During the process of baking, a kind of *tar* is obtained, which is useful for preserving palings, and other works in wood that are exposed to the weather.

“ But the most important result of baking coal is the *hydrogen gas*, which is disengaged in the process, and being caught in proper reservoirs and purified, is conveyed in iron pipes, under ground, to the lamps and shops in the streets, where it gives a brilliant light.

“ About twenty-seven years ago, when the idea of lighting up the metropolis by means of coal gas was first suggested, it was considered by most people as a visionary impossibility ; and those who had subscribed their money, in order to carry the plan into execution, were laughed at, as credulous adventurers. The projectors, however, persevered in their undertaking, and, 1815, the principal streets of London were illuminated by gas. The convenience it afforded was then generally admired : the minor streets and lanes were successively supplied, till, at length, the whole metropolis partook of the benefit, and the ‘ credulous adventurers,’ as they had been called, reaped a profitable return upon their capital. Since that time, all the provincial cities and large towns have adopted the use of gas, for lighting their streets, their public buildings, and their shops. Large manufactories have been established for making gas, in which the men work in sets, in the midst of large fires, day and night ; one set relieving the other, at stated hours.

“ The gas is forced from the furnace, through

water, which purifies it, into large reservoirs, where it is kept up all day. Towards night, by turning a cock, the gas is let into iron pipes, which convey it, under ground, to the several lamps in the street. Each lamp is furnished with a small cock; and this, on being turned, allows the gas to pass through the brass or iron burner, which supplies the place of a wick, and, upon the application of a light, it immediately blazes with a fine clear flame, which continues as long as the stream of gas continues to flow, or till extinguished by turning back the cock.

#### NAPHTHA.

“ In giving you an account of Asphalte, I alluded to Naphtha, as a species, or modification, of bitumen. Our notice of coal gas, as an article for giving light, brings it again under our observation, as another substitute for oil, recently brought into use.

“ Naphtha seems to be the most spirituous and pure state of bitumen, and is very inflammable. It is of three kinds.

“ The first is *native naphtha*, or, as it is sometimes called, *Italian Naphtha*, from its being brought to us from Italy. It is a bituminous oil, sometimes white, sometimes reddish and green, and sometimes deeply coloured, according to its age and freedom from admixture with other substances. We receive it mostly from Monte Ciaso, near Piacenza, in Italy, where it is skimmed from the surface of the water, in wells purposely dug in the sides of the mountain for its reception. It is also collected in a similar manner in Persia and Media, where it exudes from clays, white, yellow, or black. At

Baku is a spot to which a name, equivalent to *perpetual fire*, has been given, because the naphtha there burns continually. The finest comes from a peninsula in the Caspian Seas, called Okefra. This native naphtha is brought to England only in small quantities; and, on account of its high price, is not in general use; but a product, said to be quite similar to it, is obtained by distilling petroleum, or Barbadoes tar, which usually flows from rocks of the coal formation, and also occurs in large quantities in Barbadoes and Trinidad.

“A second kind of naphtha is obtained by the distillation and rectification of coal tar; and has long been in extensive use for the solution of gum-resins, particularly shell lac, in the manufacture of varnishes. The latter solution is now used for rendering waterproof the shapes of the much-admired gossamer hats. It is also used as a solvent for India rubber, to render cloths waterproof. This is also the naphtha used in lamps, of which several kinds have been invented, for the purpose of obviating the inconvenience arising from the dense smoke and offensive effluvium arising from its combustion. None of these, however, seems to be effectual; for with the best, it is requisite to keep the wick so low, that the flame only hovers upon the burner, yielding a pale white light, which, when compared with the light of a gas lamp, is as moonshine to the brightness of the noonday sun. It is sometimes employed for out-door lamps, with better success, in situations where the coal gas cannot be laid on; but in rooms it is prejudicial to the health, and affects the eyes with inflammation, after a very

short exposure to an atmosphere which has become vitiated by its combustion. A fluid much resembling this coal naphtha, and used for similar purposes, is obtained by distilling Indian rubber: but it is of a very disagreeable odour.

“A third kind of naphtha, much in use as a substitute for spirit of wine, is produced during the distillation of pyroligneous acid, or vinegar distilled from wood; the correct name of which is *pyrolixic spirit*. When sufficiently purified, it is more employed for varnishes than the former kind; and as it burns with a blue flame, without smoke, may be used for spirit lamps.

“The formation of naphtha and petroleum is ascribed by most chemists to the decomposition of solid bitumens, by the action of subterranean fires: naphtha, being the lighter body, is first disengaged; then follows a grosser oil, or petrol; and this, united with earthy substances, or altered by acids, assumes the appearance of mineral pitch. Some naturalists, however, believe that these mineral oils are formed by a combination of vitriolic acid with various oily substances found in the interior of the earth.”

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### THE BANK OF ENGLAND.

A VISIT to the metropolis had been promised; and soon after the conclusion of the foregoing lectures, the promise was realised. Much was to be seen, and much was seen of the almost countless objects of curiosity or amusement with which London abounds. But the attention of the young folks was chiefly di-

rected, on this occasion, to such as were connected with commerce ; beginning with the Bank of England.

“ This establishment,” said Mr. Paterson, as he led his children into the Rotunda, “ is the great centre of all the money transactions of England. The building, which is very extensive, comprises numerous offices, an armoury, a printing-office, strong rooms, in which immense quantities of gold and silver are locked up, besides the open courts, by which some departments are separated from others.

“ A banker originally meant a money-changer : and is of very ancient date. The Lombard Jews were the first persons who, in the market-places of Italy, had benches (*bancs*) for the exchange of money and bills. Some of these Lombards introduced the banking system into England, and gave their name, which is still continued, to the street where they carried on their business. These people were also money-lenders, and fell into disrepute in consequence of their extortions. The goldsmiths of London were afterwards the only bankers, particularly in the time of Charles I, and downward to the Revolution in 1688. But as commerce extended, the necessity of having a more enlarged system of banking was felt ; and in 1694, this establishment of the Bank of England was incorporated by act of parliament. The governors often issue notes to a large amount, generally payable in gold on demand, as you have seen expressed upon bank notes. Paying in gold is called *cash payment* ; and when this is ordered to be suspended by the government, as is sometimes requisite, it is said that cash payments



are suspended. These terms you should understand, as you will frequently meet with them in reading the history of the reigns of George III. and George IV. Bank notes, though only the representatives of value, and not value itself,—for the piece of paper on which they are printed is intrinsically worth little,—are of great convenience to merchants and traders, especially for large payments, and sums that have to be carried to a distance. A note for a thousand pounds weighs only a grain or two, and may be conveyed in a letter through the post-office: but the same sum in gold would weigh about twenty-five pounds; in silver, it would load three or four men; and in copper, many waggons. All this would render the transit of money very inconvenient, and prove a great impediment to trade.”

By favour of a director, related to the family, the party were permitted to inspect the various offices and private rooms, and even to see the treasury of gold and silver, in the strong rooms. The appropriation of the different apartments was explained, as they passed through; and a history was given of the progress the buildings had made, since the first opening of the bank for business. All this was very interesting to young and inquisitive minds; but to the question, “Where does it come from?” when applied to gold and silver, James and his brother found they had no conclusive answer; they, therefore, on returning to their hotel, requested their father to supply their want of knowledge in this respect, which was most readily complied with.

## GOLD.

“Gold is a metal, which has always been highly prized ; partly on account of its scarcity ; partly for its brilliancy ; and much on account of its weight and durability ; for it is the heaviest of metals, and not liable to rust, evaporation, nor to any destruction of its essential substance. It is remarkably compact, and tough ; yet very ductile, and soft enough to be easily worked.

“Gold seems to be very generally found, though Europe has been less favoured with it than other quarters of the earth. Asia has been always rich in this precious metal ; Africa yields it in considerable quantities ; but since the discovery of America, the largest supply has come from Mexico, in the northern continent, and from Chili, Peru, and Brazil, in the southern.

“Gold is sometimes found in mines ; but the getting of it is very laborious. It is also found in particular rivers, mingled with the sands, which are sifted and washed to get out the metal. The people here employed have a long trough, lined at the bottom with flannel, and set in a sloping position. Into this the sand is thrown, and being well saturated with water, and stirred about, the gold dust is retained by the flannel, while the water and sand pass away. When thus separated, the gold is melted, and cast into a lump, or ingot.

“In Guinea, from which country our English guineas take their name, the gold is chiefly found in the sand and mud of rivers. Between two and three

thousand ounces are brought thence annually; as are several hundred ounces from the river Gambia. Much gold dust is also taken from the interior to Egypt, secured in the hollows of ostrich quills.

“ In the streams which drain the mountains of South America, gold is likewise found; and it is separated from the soil with which it is mixed, by washing, at places called *lavaderos*. When the natives have discovered a proper place, they dig a pit, about six feet deep, and endeavour to turn the water of some rivulet into it, in order to wash away the upper soil, and lay bare the stratum of earth which contains the gold. They then dig it up, and carry it off on mules to the washing-places.

“ It is said, that when the Europeans first invaded Brazil, they found the fishing-hooks of the natives made of gold. On inquiring, they learned that the gold was obtained from the sands of the rivers, after violent floods: since then, gold, having been carefully sought for, is found in many streams.

“ Gold obtained from mines is sometimes in small lumps; some pieces have been found of thirty-six ounces, or even of several pounds' weight, but this is rare; in general, the lumps do not weigh more than an ounce.

“ In other places, gold is met with in a kind of stony lumps, or clods, usually at great depths in the mine. These lumps, which are very hard, mostly contain an admixture of silver, or some other metal, with the gold, the last of which is in so small a proportion, that five thousand pounds' weight of lumps, or ore, yield only a few ounces of gold, after an operation at once troublesome and expensive. The



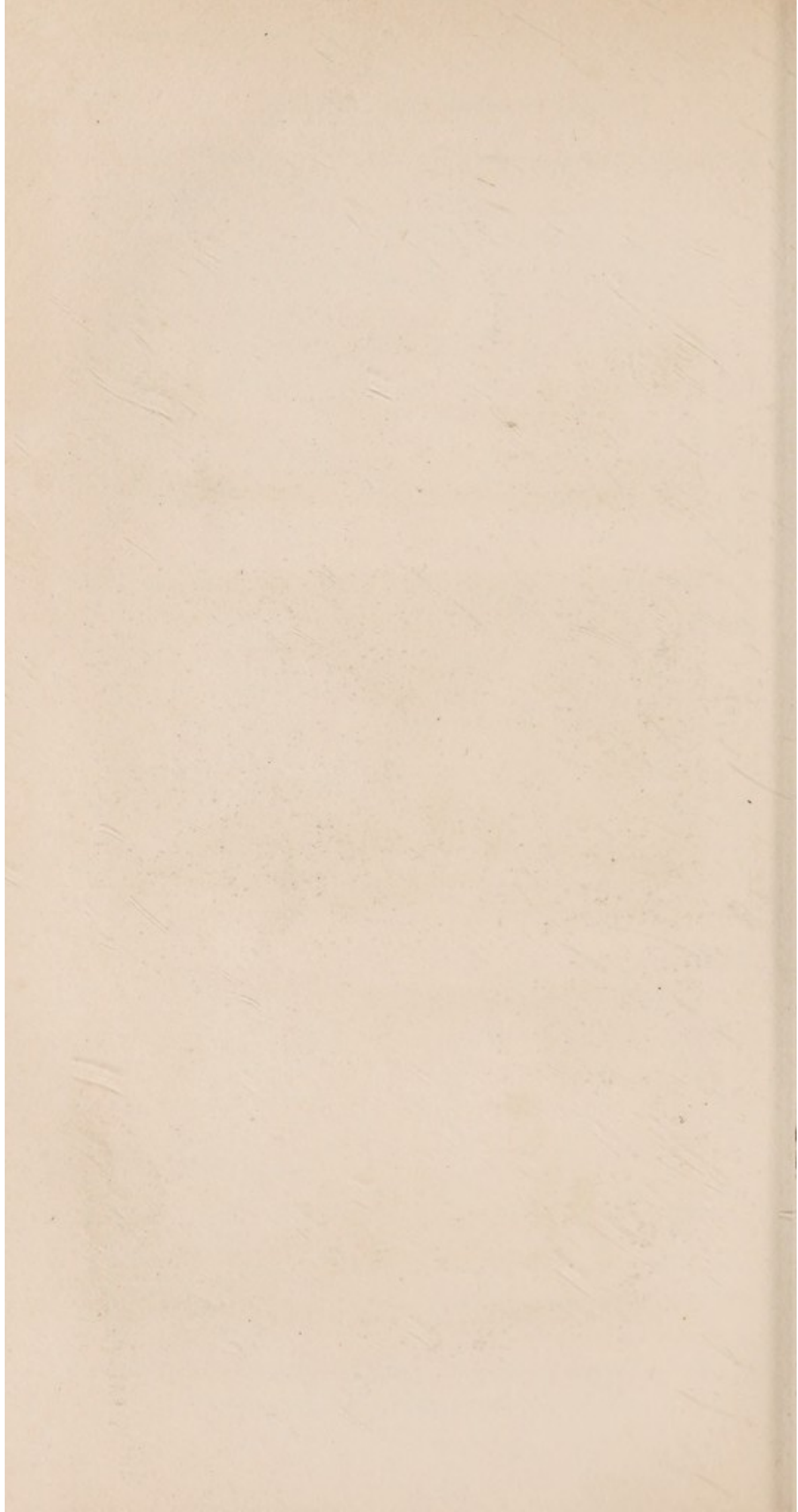
*Page 342.*



*Page 345.*



*Page 349.*



ore is first broken with heavy iron sledges; then it is ground in a mill, and passed through many sieves, each sieve being finer than the one used before it. The fine powder, thus obtained, is first mixed with salt and water, in open troughs, and then a quantity of quicksilver is sprinkled in, in small drops, almost as fine as dew. As the quicksilver unites with gold, or, as a chemist would say, has a stronger affinity for it than for any other metal, the two together form a weighty paste, or amalgam. All the earthy matter and the salt is now easily cleansed away with hot water; after which the quicksilver is separated from the gold, by means of heat, which drives it off in vapour; but as the quicksilver is an expensive article, as much as possible is recovered: and the gold, thus purified, is melted and cast into ingots.

“ In some places, sheep-skins, with the wool on, are laid in the waters where gold is supposed to be, and the grains of the metal are entangled in the wool, while the earthy parts are washed away. Such *golden fleeces* are no fictions!

“ The uses of gold, either for money or for splendid ornaments, are well known. In itself, however, it is too soft for coin, or for the artificer's purposes; to harden it sufficiently, an *alloy*, consisting of a small proportion of copper and silver, is mingled with it when in a state of fusion.

“ It may be remarked, that gold mines do not often make people rich. Those who collect it, as a calling, are among the most wretched of the human race. If they have to get it by washing, they must wash an immense quantity of earth, before they obtain sufficient gold to make even a half-guinea; and

if they dig it from mines, the pits are deep in the ground, and the expense of working them, and separating the gold from the ore, is frequently more than the produce is worth. Gold mines, too, are always in miserable districts. In Chili, where gold, silver, and copper, are found, it is a common saying, that if a man dig for copper, he may become *rich*; if for silver, he may manage to *live*; but if for gold, he must *beg*.

#### SILVER.

“ Silver is much more diffused than gold; mines of it exist in all the continents, though not in equal abundance with mines of some other metals. It has always been more useful, though less splendid, than gold; and we find it in use, in the way of money, so far back as the days of Abraham, when he purchased the field and cave of Machpelah for four hundred shekels of silver. It might not, indeed, be then coined; but its value was ascertained, and though it went by weight, it was the currency of the merchants. In China, and many other eastern countries, it is still the practice to exchange both silver and gold by weight, without coining.

“ In point of purity, lustre, and value, silver is next to gold, though in regard to weight lighter than lead. It is sometimes found in a metallic state, and is then called *native silver*: but more commonly it is mixed with other substances.

“ Norway possesses considerable silver mines, especially at Königsberg, in the southern part of the kingdom, where silver is obtained in greater abundance, and in larger masses, than in any other part of Europe. The veins of ore extend to a considerable

distance, and in several directions, so that new mines are frequently opened. One mine, from which several hundred weight of rich ore has been sometimes extracted in a single week, sinks perpendicularly above a thousand feet, and has a very great breadth at the bottom. Thirty or more fires are kindled in different parts, to soften the rock, and facilitate the working. These fires, in such a deep pit, with swarms of miners, black and grotesquely habited, give the place a terrific aspect; and when they are about to blast any particular part, the horror is increased by a general outcry of "Take care of your lives!" A few years ago, four thousand persons found employment and subsistence from this mine. The ore is usually obtained in lumps of a few pounds weight; and one mass, now in the royal cabinet at Copenhagen, is said to be worth six hundred pounds sterling.

"But the mines most famed, because once most productive, were in the mountains of Potosi, one of the high ridges of the Andes, in South America. The discovery of a mine, as I have once before observed, is frequently owing to what is called chance, and the narrative partakes of the marvellous. On this principle, the history of the Potosi mines may be given. An Indian, named Hualpa, was pursuing some wild goats, and, in climbing after them, laid hold of a shrub on the side of the steep, in order to assist him. The shrub gave way, and, to his surprise, discovered to his view a mass of silver. This he secured, washed, and appropriated to his own benefit. He came again and again, to the same spot, for more, and found plenty. A friend observing him



to grow rich, at last obtained the secret from him. For a time, they became partners in the treasure ; but the friend was not able to refine his silver fit for use, and Hualpa, thinking he had revealed too much already, refused to teach him the process ; which so offended the other, that he went and gave information of the mine, and it was immediately seized for the king's use.

“ The mountain of Potosi, which is about eighteen miles in circumference, was worked for about three hundred years ; and upwards of three hundred pits, or mines, were opened in various parts, so that it might be compared to an immense hive. But the mines are now exhausted ; and the city of Potosi, which owed its foundation to them, and was once large and flourishing, has become a miserable village, in the midst of a desert. Indeed, throughout Peru and Chili, especially in the latter, the silver mines are difficult to work ; and if the Spaniards had not, by the most cruel treatment, compelled the native Indians to work them, they would never have been productive.

“ The mines of Mexico, being free of access, have been more productive. Their annual produce used to be to the amount of four and a half millions sterling : but the mercury used in the amalgamation is imported from other parts, which is a great drawback upon the value. The people, however, have provisions, and timber for fuel, which are wanting in Peru. The principal mines are at Real del Monte, which is about six thousand feet above the level of the sea ; at Zacataens, at Bolanos, and some other places. Some of these mines now belong to British

companies ; but as they were in a bad state when the companies got them, they have not yet yielded much profit to the adventurers.

## QUICKSILVER.

“ Having had occasion to mention quicksilver, and its use in refining gold and silver, you will be naturally desirous to know something about it. This metal is called by the chemists *mercury*, and, besides the uses just adverted to, is of very great importance in the arts. By it our mirrors are silvered, to make their power of reflection more apparent ; it is the basis of many of the painters’ pigments, or colours : and it is used, in various shapes, in medicine.

“ Quicksilver is sometimes found in its fluid state, in the crevices of certain slaty substances, from which, otherwise, it is extracted. In the fluid state, it exists in small quantities, seldom more than a few drops together, which exude from the roofs or sides of the mines : yet sometimes a hollow in the rock has been so situated as to catch a large quantity, before its discovery : this is very pure, and is called *virgin quicksilver*. Sometimes the miners are gladdened with the bursting out of a drop or two, which increases to a stream, like a packthread in size, and will run for several days together.

“ In Europe, the principal mines of quicksilver are in Hungary, Friuli, Venetian Lombardy, and Spain. A considerable store of it exists in Peru, which proves very convenient for the American gold and silver mines.

“ In the most usual form, in which quicksilver is found, it would not be recognised by an inexpe-

rienced person. It is intimately combined with sulphur, and has the appearance of a reddish stone, in which state it is called *cinnabar*. By pounding and washing this ore, the metal is obtained pure.

“The entrance to the quicksilver mines of Friuli is on a level with the streets of the town, from which the descent is by ladders, into pits, ninety fathoms, or a hundred and eighty yards deep. Being so low, they are liable to inundations of water; therefore, powerful engines are constantly at work, to keep them fit for the miners. But the chief evil attendant upon the wretched people employed in them, arises from the mercury, which insinuates itself into the very substance of their bodies, especially by its effluvia, and produces diseases of a dreadful nature, which are often very fatal. Some of the people employed in those mines are condemned to work there for their crimes; and others are hired by the lure of high wages. When the mercury first gains power over their constitution, they are affected with nervous tremblings; then their teeth drop out; violent pains succeed, the quicksilver penetrating even their bones; and then they soon die.

“As it is chiefly from the vapours and fumes of the quicksilver that these effects proceed, the workmen take the precaution of holding in their mouths a piece of gold, which attracts the effluvia, and in some degree prevents the noxious matter from passing into the stomach. Yet cases have occurred, in which the metal had so completely saturated the body, that a piece of brass, rubbed with the finger only, would become white, from the quicksilver oozing out of the man's flesh.

“ In the mine of Juan Cabelaca, in Peru, the ore resembles a half-burned brick. This being broken, and exposed to a considerable degree of heat, the quicksilver is driven off in vapour, which, by passing through several pipes into vessels called *cucurbits*, filled with water, is condensed, and the particles of metal sink to the bottom.

“ Next to gold and platina, quicksilver is the heaviest metal known. It is, as you have seen, very fluid; separating with as much facility as water, and reuniting, as soon as the separated particles are again brought into contact. After having been sublimated into vapour, and condensed in cold water, it re-unites in one brilliant fluid mass, as before the operation.

“ The principal quicksilver mine in Spain, was at Almoden, in the district of La Mancha: it was wrought only on account of the king; and the produce was sent over to Mexico, to assist in working his gold and silver mines there.

“ A considerable mine of this metal is at Idria, a town of Carniola, a province of Austria, not far from the upper part of the Gulf of Venice; the discovery of which, in 1497, is said to have been under the following singular circumstances:—A few coopers inhabited that part of the country, for the convenience of being near the woods. One day, one of them, having made a new tub, and being desirous to prove its soundness, placed it where the water dripping from the rock might fall into it; in the morning, it seemed to stick to the ground; and at first he superstitiously thought it was bewitched; however, on examining it more closely, he found that something fluid, but shining, and very heavy, was at the bottom

of the water in his tub. Not knowing what it was, he took some of it to a neighbouring apothecary, who shrewdly gave the man a trifle, and bade him bring all he could find of that odd stuff. The story, however, soon became public; and a company was formed for searching the mountain, and working the mine."

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### THE EXCHANGE.

As they left the Bank, the attention of the young people was attracted by an immense pile of ruins, on the opposite side of the street; and as the elegance of some of the remains could not fail to excite their curiosity, they inquired of what building they had formed a part, and how it came to lie in such a state.

"Those ruins," said Mr. Paterson, "are the remains of the late Royal Exchange, a place of general meeting for merchants; as well those of London as others from almost all parts of the world. Prior to its erection, the merchants used to meet, and transact their business in the open air, in Lombard-street: but in 1556-7 Sir Thomas Gresham, citizen of London, built them a *bourse*, for so are such places called on some parts of the Continent, on this spot. In 1570 Queen Elizabeth paid it a visit, and commanded a herald to proclaim it, by sound of trumpet, *The Royal Exchange*. The building, which was of brick, was destroyed by the great fire in 1666; but, being rebuilt of stone, it was re-opened for business in 1669. It was a magnificent structure, as the relics you see can testify, being ornamented with columns and sta-

tues: it enclosed an open rectangle, measuring 203 feet from east to west, and 71 feet from north to south, with covered piazzas around, to shelter the visitors from rain and inclement weather. In the centre of the quadrangle was a noble statue of Charles II. who laid the foundation stone of the new building; and in niches over the piazza, were statues of most of the sovereigns of England, from Edward I. to George IV. inclusive. On the outside of the walls were shops, let to different tradesmen; and over these, as well as over the piazzas, were galleries, laid out in apartments, and let for various purposes: among these, the most considerable establishment was Lloyd's Coffee-house, the resort of *Underwriters*, or insurers of ships. To this Coffee-house, the building owed its destruction; for, in the night of the 10th of January, 1838, through the negligence of a servant, a fire broke out in the kitchen, and in spite of every exertion used to check its progress, reduced the whole building to a ruin before daylight on the following morning.

“ By this disaster, the merchants and others resorting to the Exchange have been put to much inconvenience. At first, the Lord Mayor granted them the use of Guildhall; but they have since obtained from government the temporary occupation of the area of the Excise Office, in Broad-street, over which they have erected a wooden covering, one hundred feet in length, and forty feet broad. Measures are, in the mean time, being taken for the restoration of the Royal Exchange; but it is expected that three or four years must elapse ere the new edifice will be ready for public business.

“The meeting on *'change* (the commercial contraction of *exchange*) saves the man of business a vast deal of trouble, and enables him to do what otherwise ten men could scarcely accomplish. Every one who has much business, may need to speak personally to ten or perhaps fifty persons: to go to each of them would occupy much time, and, perhaps, require thirty or forty miles' walking, which might be to no purpose, as the parties he went to, at least some of them, might be out on a similar errand. But by meeting on *'change*, all this is prevented; and if subsequent interviews be requisite, the time and place are then settled. The Exchange is the place for making the bargain; the business itself is transacted elsewhere.”

#### LLOYD'S COFFEE HOUSE.

“The establishment known by this designation, is the place of meeting for men of property, called *Underwriters*, who agree with merchants and ship owners to insure their ships and goods from all losses that may occur during a voyage; or, rather, to make good such losses, on being paid beforehand a certain premium, proportioned to the value of the cargo and the risk of the voyage. The deed of agreement is called *a policy of insurance*; and as many insurers are frequently concerned in it, each writes his name at the bottom, with the amount of risk he is willing to undertake: hence, all so subscribing, are called *underwriters*, as being the parties referred to by the term *underwritten* in the body of the deed.

“The underwriters usually obtain the first intelligence of events connected with the shipping interest,

which is regularly entered in their books. And when you read in the newspapers of ‘intelligence received at Lloyd’s,’ you may understand that it is extracted from these books, and is deemed authentic. *Lloyd’s List*, which you may see quoted in the same daily vehicles of information, is a list of the arrivals and departures of all British ships on voyages of importance.

“The insuring of ships is a very great advantage to all parties. As losses do not occur in anything like a proportion to voyages free from them, the underwriters are benefitted; and when a loss does happen, being divided among many, that is but little felt, which would have proved ruinous to the individual owner.”

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## THE DOCKS.

THE next commercial visit of the family was to the Docks, where the young folks found abundant matter to excite their admiration, and to gratify their spirit of inquiry.

“What is a dock, papa?” inquired Louisa.

“A dock,” replied Mr. Paterson, “is a place made for the reception of ships, for safety, for repairs, or for receiving and discharging their cargoes; and, according to the intention of its use, its formation is various.

“One kind is the *graving-dock*, so called from the seaman’s term, *graving*, or smearing the bottom of the ship with tallow, oil, and pitch, to preserve it from decay; an operation usually performed in such



a dock, which among landmen passes under the title of *dry dock*.

“Docks of this kind are enclosures, strongly built of stone, rarely of brick, on the bank of a river, or on the sea-shore, with the bottom on a level with the low-water mark, or perhaps rather below it. It is sufficiently capacious to hold one ship, or more, as circumstances require. The entrance, which is just wide enough to admit one ship at a time, is defended by a pair of gates, which, when shut, are water-tight; and, being very heavy, are moved by machinery concealed in the walls of the dock. Each gate has also a small trap-door, or sluice, at the bottom, which can be opened or shut by means of an iron rod, reaching from the top of the gate, and working a screw attached to the sluice. The bottom of the dock is furnished with a row of blocks, for the keel of the ship to rest upon, when brought in; and if the dock be intended for two or more vessels, it has an equal number of these rows of blocks, one row serving for each ship. Now, if the gates be left open, the tide will flow in and out, as it rises and falls in the river, or sea; but if the gates be shut at the time of low water, they prevent the tide from passing inwards, and it will rise against the outside of the gates, which, meeting each other at an angle towards the water, are kept firmly closed by its weight. When a vessel is to be admitted into a dock of this description, the gates are opened at low-water; and, as the tide rises, the dock is filled. When the water is high enough for the vessel to enter without hazard of grounding, she is hauled in with ropes, and made steady over the row of blocks on which she is intended to stand.

The gates being then closed, and the sluices opened, as the tide ebbs, the water flows out, leaving the ship dry upon the blocks; after which, the sluices are shut; or, sometimes, the water is pumped out by a steam-engine. Large props, or *shores*, as they are called, are applied to the sides of the ship, to keep her upright, the ropes which at first held her are removed, and the hull, or bottom, is in every part left free for the workmen. By this ingenious contrivance, the ship may be repaired much better, than in the common way of laying her upon her side on the beach, which strains her timbers, and leaves her open for the workmen only during the short recess of the tide; while, in the dock, which occasions little or no strain, they may continue their operations day and night, if requisite. When the repairs are finished, the sluices are again drawn up, the rising tide fills the dock, the ship floats, the gates are opened, and she is hauled out. This kind of dock, you will perceive, is for repairs, and not for the immediate purposes of commerce, as are the *wet docks*, to which I shall next draw your attention.

“The object of wet docks is to keep ships always afloat, which cannot be done in natural harbours, on account of the rising and falling of the tide, which in Britain makes a difference, on an average, of about fifteen feet in height; so that a ship not in dock, is sometimes too high, sometimes too low, to be got at with convenience; besides which, she is alternately aground and afloat, which is very injurious to her hull, especially if she ground upon a gravelly or rocky bottom.

“A wet dock means an enclosure, in which, by

means of gates, the water is always kept at one level. The gates are opened only at high water ; but there is generally a receiving dock, between the main dock and the river, or sea, into which small vessels may enter before it is high water, to wait there till they can be received into the principal dock.

“ Such docks are what merchants mean, when they speak of them in an absolute way, without any qualifying term of *dry* or *wet*. They possess the farther advantage that they can be surrounded with warehouses, for depositing the cargoes of ships, when unladen ; and the whole may be enclosed with walls and gates, to the exclusion of improper persons. Since docks were constructed in London, the plundering from shipping has been much less than when vessels were obliged to lie in the river : it then amounted to many thousand pounds in a year.

“ The principal docks in and near London, are : 1. The *East-India*, between Blackwall and Poplar, opened in 1806, originally intended for the reception of East-India produce ; but now open to vessels from all parts. They extend over almost thirty acres of ground, and comprise two docks, one for loading outwards, and one for unloading inwards, besides an entrance dock, or basin. 2. The *West-India*, situate across the narrow part of what is called the Isle of Dogs, with entrances from the Thames, by one end at Limehouse, and by the other at Blackwall. They were begun in the year 1800, and completed in 1805 ; and, as their name imports, are used for West-India shipping. Besides two entrance basins, here are two docks, one for loading outward-bound ships, the other for unloading such as return : the



*Page 356.*



*Page 361.*



*Page 79.*



former comprises twenty-four acres ; the latter, thirty. Both docks are surrounded with extensive ranges of warehouses, in which the goods are lodged till the duty is paid. 3. The *London Docks*, at Wapping, opened in 1805, for general use, covering about twenty acres, and capable of accommodating five hundred ships. An addition has been since made at Shadwell, where the dock covers about fourteen acres. These docks have three entrance basins, which hold a great number of small vessels. They are enclosed within brick walls, which are lined with extensive warehouses : those for tobacco alone measuring upwards of a thousand feet in length. 4. *St. Catherine's Docks*, near the Tower, opened in 1828, for general use, occupying twenty-one acres, and affording accommodation for one hundred and twenty-five ships, with ample warehouses for receiving their cargoes. Besides these, London has some smaller establishments of a similar kind. The trade in all these is immense, and the value of goods in their warehouses almost incredible.

“ At Bristol and Liverpool are excellent docks ; and, indeed, they exist at most of the great shipping ports of the country. The making of them is very expensive ; but, perhaps, they have done more to promote industry and wealth than anything besides that could be named.”

Just then the party were joined by Mr. Silverkey, by whose influence they were introduced within the gates of the London Docks ; a privilege formerly but seldom granted to strangers. As the young folks had been told that these docks covered about twenty acres of ground, they had stretched their imaginations to a

pitch, which led to disappointment; for, being full of shipping, they could scarcely discern a breadth of water worthy of consideration, as they thought. They found, however, they had a long way to walk, in order to reach the farther end of the quay, it being one thousand two hundred and sixty-two feet in length, and ninety-nine feet wide: so they were convinced it must be a very large place.

They viewed the different warehouses, and were particularly pleased with the wine-cellars beneath, and the ingenious contrivance for throwing light upon any particular cask, by the powerful reflectors placed at the entrances, which turned any way, and illuminated a place where no candle is ever admitted. In the upper apartments, they saw large quantities of cotton, done up in huge bales, piled to a great height, corded and cross-corded, just as they came from Egypt and the Levant. In other parts, were packages of wool, from Spain, imported to improve our native wool, in the manufacture of superfine cloths; also bales of silk, just as they came from Italy, carefully wrapped up, on account of their great value.

In one place, they paused, to watch the slow motion of a huge crane, by which some very heavy packages were hoisted out of a vessel: and the father explained, as well as the bustle of the place permitted, the principle of the machinery, shewing them how it was that one man, working to all appearance very leisurely, could raise such heavy weights, hoist them up so high, and then lower them into a cart, which groaned beneath the ponderous burden.

When shewn the tobacco warehouses, they were

much surprised at seeing a building seven hundred and sixty-two feet in length, and one hundred and sixty feet in width, filled with hogsheads containing an article, of which, though they had heard, they knew so little, that they could scarcely believe it could ever be all wanted. And, notwithstanding all Mr. Silverkey's assurances that the warehouses would shortly be emptied, and filled again on the next arrivals from the plantations, their incredulity was such, that the father, on their return to the hotel, deemed it necessary to make tobacco a subject of conversation, to give them some idea of its extensive use, and its value as an article of commerce.

## TOBACCO.

“ Tobacco is an American herb ; our first knowledge of it was through the Spaniards, about the year 1560, which, as you are aware, was in the beginning of Queen Elizabeth's reign. They brought it from Tobasco, a small province of Mexico, and from that circumstance it derives its European name. Sir Walter Raleigh introduced the use of it into Britain ; and a pleasant story is told, that, having sent his servant to draw a jug of ale, he, in the interim, lighted his pipe of tobacco ; and the servant returning, and seeing smoke issue from his master's mouth, threw the ale over him, not doubting but his head must be on fire ! This same Sir Walter Raleigh, in 1584, obtained of his royal mistress a charter, for colonizing a part of North America, which he called Virginia, in her honour, as a virgin queen. Here tobacco was extensively cultivated, and the best sort still bears the name of the colony, which



is now an extensive province of the United States. In the same reign, the spirit of enterprise, which was then pushing in every direction, led other Englishmen to form settlements in America; and it continued for some years after her decease. This disposition to emigrate to America was considerably promoted by the religious persecution which broke out under her successors. In 1617, Mr. Robinson and his congregation left their native country, and established themselves in what was then a dreary wilderness, but now contains the six states of New Hampshire, Massachusetts, Rhode Island, Connecticut, Vermont, and Maine, collectively called New England. This was in the reign of James I; and in that of his grandson Charles II, that is, in the year 1682, William Penn, a celebrated member of the Quakers' persuasion, passed over to America, and purchased of the native Indians the territory since called Pennsylvania, where he founded an asylum for his persecuted brethren, built the city of Philadelphia, and established the whole as a wise legislator.

“ In these and other colonies, tobacco became a staple article; and as its use began to be adopted in Europe, it progressively became an extensive subject of commerce between the Old and New Worlds.

“ Tobacco is of some use in medicine; and James I. endeavoured to restrict it to that science, but in vain. Its beneficial effects in this respect are few; and it must be classed as among the mere luxuries of life. As such, it is now very general among all nations; and, moderately used, may possibly be an excellent preservative from the ill effects of cold and damp. Many persons, especially such as are exposed to the

weather, chew it : a sailor without his *quid* of tobacco could not undergo half so much fatigue as with it ; and, in cases of extreme necessity, a morsel of tobacco in the mouth will prevent a man from fainting through hunger for a considerable time. Another mode of using tobacco is smoking it, in a pipe, or in the form of a cigar, which is the leaf rolled curiously up in the form of a lozenge, about four inches in length, and being lighted at one end, and drawn by the mouth at the other, answers the twofold purpose of tobacco and pipe. A third method of consumption is as snuff, which is, or ought to be, the tobacco leaf reduced to powder ; but, to evade a heavy duty, as well as to please the noses of their customers, who delight in a variety of flavours, the genuine powder is much adulterated with other matters. Few snuff-takers but are aware of this ; yet so fascinating is the stimulus which it gives, or so powerful the force of habit upon enervated minds, that the absurd and filthy practice of taking snuff up the nose is more extensive than even all the consumption of tobacco by other means ; and the snuff-takers of England alone would probably empty all the hogsheads, which you saw in the tobacco warehouses, in much less than twelve months.

“ The tobacco plant, when fully grown, rises six feet in height, with a stem pretty straight, and rather clammy. The leaves are of considerable length, of a yellowish green : those nearest the ground are the largest, but make the coarsest tobacco. The blossoms are abundant, and in the Virginia sort are of a delicate pink hue ; those of the Oroonoco are of a pale green colour, approaching to white. As

the plants grow, they require much attention, to keep the ground between the rows clear from weeds; and to pull off all the lowest and coarsest leaves, to strengthen the plant. When the leaves turn brown, the plants are cut down, and laid in heaps, to heat; after which they are hung up separately to dry, in houses built on purpose. When thus prepared, the leaves are stripped off the stalks, and sorted out; the finer, or those growing towards the top, being kept by themselves. They are then packed up in hogsheads, and shipped off for Europe.

“ Virginia and Maryland are celebrated for the cultivation of the tobacco plant. It is said, that above two hundred sail of shipping are employed solely in bringing this plant to England. Indeed, Virginia alone has in some years exported seventy thousand hogsheads. The duties in Britain have of late been much reduced; but the consumption of tobacco is so great that they still produce a considerable revenue to the government.”

#### QUAYS AND WHARFS.

A conversation between James and Richard was overheard by the father, as to the difference between a quay and a wharf. They had heard the terms used at the docks, but were unable to discriminate the difference. Indeed, what one person spoke of as a *quay* another called a *wharf*. They referred to their dictionary; but there they only found that “ a quay is a wharf,” and “ a wharf is a quay.” Mr. Paterson interposed, to explain. “ I do not wonder,” said he, “ at your dilemma; for, notwithstanding the distinction of terms, or names, there is scarce-

ly a shade of difference in the things. A *quay*, or *key*, is the name given to the broad area formed by the embankment of a river or canal, for the convenience of delivering or receiving the cargoes of vessels lying against its side : and a wharf is precisely of the same nature ; only, it seems, to become a wharf, the quay should be covered over. In this view of the case, the quay is fit only for such goods as may lie exposed to the weather without injury, as stone, marble, slates, iron, lead, &c. while the wharf should be reserved for articles that require to be kept dry, as silks, cottons, groceries, &c. Very often, however, the terms are confounded ; so that, as you observed at the docks, they may both mean the same kind of place, or they may respectively mean places just the reverse of what I have described.”

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### THE CUSTOM-HOUSE.

“ The *customs* are the duties customarily paid to the government upon merchandise, coming into or going out of the country ; and they constitute a very important branch of the public revenue.

“ The progress of their increase is rather curious, as furnishing a means of comparing modern times with ancient days. In the time of Henry III. the customs on foreign merchandise did not amount to more than 75*l.* for the whole summer of the year 1268. During the reign of Elizabeth, great exertions were made upon the seas ; and the customs amounted to 50,000*l.* per annum. In 1641, in the middle of the reign of Charles I. they were in-

creased tenfold, even to 500,000*l.* At the beginning of the reign of George III. their produce at all the ports of England was 1,969,933*l.* And in the year 1838, they amounted to the surprising sum of 19,504,628*l.*; which was an increase upon the preceding year of 1,053,179*l.*

“ The history of the building itself, where these customs are paid, is worth attention. In early times, the customs were taken on the quay, chiefly at Billingsgate, amid all the hurry and bustle of that noisy place. A custom-house was at length reared, for this increasingly important purpose; but this was destroyed by the great fire in 1666; and the building, which was erected in its place, also perished by fire in 1814, when great confusion was occasioned by the burning of books and papers; much loss was also sustained by the destruction of valuable property, consisting of pearls, and other costly articles, which were deposited in the cellars and store-rooms. A new and much larger building was then raised. Many houses were purchased to obtain room, at the expense of more than 40,000*l.* the whole cost of the building being 255,000*l.* The front measures about four hundred and eighty-eight feet, and its depth is one hundred and seven feet. This building was opened for business in May 1817. But in 1825, the central part of the building gave way, not having been properly supported; and the *Long Room*, as it is called, fell in. It has since been rebuilt, as you see.

“ The Long Room is the principal public room for business; it is one hundred and ninety feet long, sixty-six feet wide, and fifty-five feet high. The

floors are now of stone, and the doors, which separate it from other apartments, are of iron, to prevent, in future, accidents by fire.

“ Entering by the grand staircase at the end, you pass through the lobbies, to this busy Long Room. Here are numerous clerks, employed in keeping account of every vessel coming in or going out of the port ; reckoning up the amount of the various duties to be paid ; signing and delivering documents to authorize the landing and examining of the cargoes of the ships of which a due report has been made, in order to distribute their contents to the various merchants ; or of such ships as are clearing outwards, having paid all their dues, and intending to depart for their several foreign destinations.

“ The customs are not gathered without a great number of officers and assistants. As soon as a vessel enters the river from abroad, it is visited by a Custom-house officer, called a *Tide Waiter*, who continues on board till the ship arrives at its moorings. His business is, to see that no commodities are parted with, till all has been properly entered at the Custom-house, in order to the duty being paid.

“ Indeed, the endeavour to prevent smuggling occasions great numbers of officers and sailors to be kept on the constant look-out. This is called the *Preventive Service*. They have fast-sailing cutters, in which they go in pursuit of vessels they suspect to be loaded with contraband goods ; and they have many a battle by land, too, with the smugglers, or people who make it their business to import goods without paying the duties.

“ I see you do not know what smuggling is. Let

me inform you then, lest you should at any time be tempted, by the supposition of getting a cheap bargain, to incur penalties, and all the guilt of helping to support such a nefarious practice.

“The case is this: in order to carry on the concerns of the kingdom, taxes are laid upon various articles, usually brought to England from foreign countries. We might mention anything which pays a shilling a yard duty at the Custom-house. Some things pay much more. Now, if persons can secretly bring over a large quantity of these articles, without paying duty, they save all that money. A thousand yards, so brought over, saves fifty pounds. This is cheating the revenue, which obliges others to pay more; and is also very injurious to the morals of those who practise it: for, being habituated to fraud, and compelled at times to defend their fraudulent purpose by acts of violence — sometimes of murder — they become reckless of consequences, and are gradually hardened in guilt.

“The practice is also detrimental to the fair trader, who, having paid the duty, cannot afford to sell the article so cheap as the smuggler can. Indeed, the smuggler can have no hope of disposing of his contraband goods otherwise than by underselling the legal tradesman. A young lady, therefore, who, at some of the gay watering-places, buys, in an underhand manner, a few yards of foreign silk, a shawl, or a piece of lace, quite cheap, should reflect that by so doing she is supporting a system of fraud, and encouraging immorality in its most odious character.”



*Page 366.*

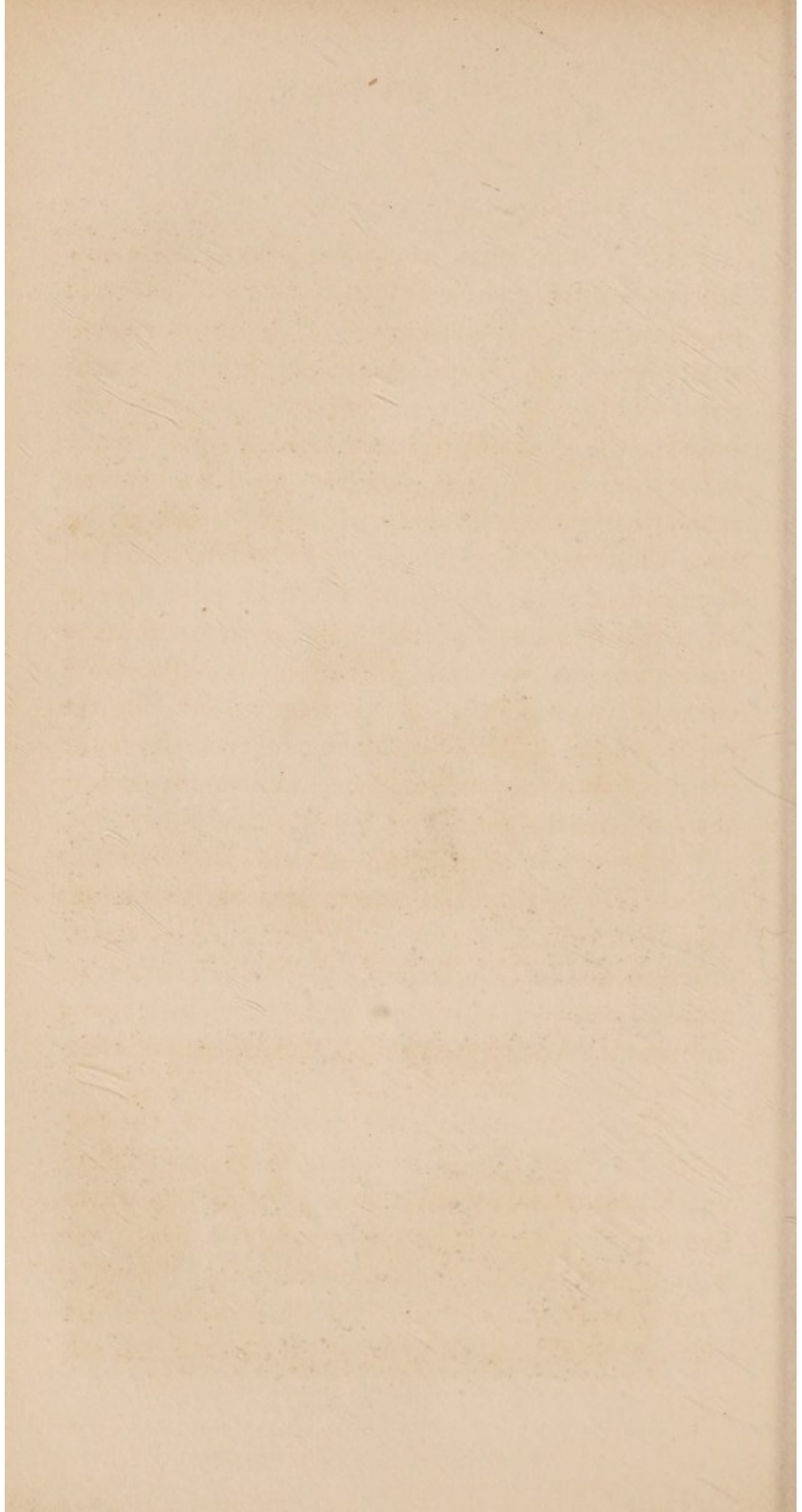


*Page 373.*



*Page 360.*





### MODES OF CONVEYANCE.

“The circumstance of articles coming from distances almost incredible, and being nevertheless sold so cheap as to constitute part of the ordinary consumption of the people of Britain, is very remarkable. Their abundance and cheapness may be attributed to the means of conveyance, as much as to any other cause. If men were left to their natural strength only, the bringing of a few pounds of tea from China would be the labour of years; and if all the goods that are moved in England only, were to be carried by men, the whole population would prove inadequate to the task. Indeed, it would be a tiresome, as well as a very laborious work, for the people of London to fetch their provisions from the places whence they are obtained, and would occupy their whole attention.

“The incapacity of man to do all this was felt in the earliest ages of the world; and various means have been resorted to, in different countries, and at different periods, to facilitate the work; some account of a few of which may be at once entertaining and profitable; beginning with the *caravan* of Eastern climes.

“The most ancient mode of conducting the traffic of distant nations, with which we are acquainted, was by *caravans*, or companies of merchants, travelling together, for mutual protection, with their goods bound on the backs of camels, or other beasts of burden. Of this character was the company of Midianites and Ishmaelites, to whom Joseph was sold

(*Genesis*, xxxvii. 28). Such caravans are still in use in the East, and sometimes consist of as many as forty thousand persons, or even almost double that number, besides six or seven thousand camels, and some hundreds of horses and asses. These are called *heavy caravans*, on account of the multitude of people concerned in them; and, at times, they have elephants with them.

“ In countries where this mode is in use, any one who wishes to travel, may collect a caravan; but they are seldom made up by private persons. Most commonly, they are public concerns, gathered and regulated by authority; they set off on a fixed day, and are under a sort of military discipline. Four caravans go every year to Mecca, with the Mohammedan pilgrims, to the tomb of the Prophet. One from the Northern provinces, which sets out from Damascus; one from the Barbary states and Egypt; a third from Arabia; and a fourth from the parts about Babylon, with which come the Persian devotees.

“ There are four officers to such a company. One has supreme command; a second is the guide, who regulates the march; a third rules when the caravan stops to rest; and the fourth regulates the distribution of provisions. Almost all the commerce of those countries is conducted thus. Merchants take the opportunity of so large a body, under the escort of regular troops, to travel in safety, through the deserts especially, where the wandering Arabs think they have a right to plunder all whom they can overcome.

“ The *camels*, on those occasions, have rich fur-

niture ; those which carry the presents made by the princes to the tomb of Mohammed, are magnificently accoutred. The various stages for the caravans, in the journey, are regulated ; as they must arrive at Mecca by a certain day. They continue only twelve days there ; during which short period, a very extensive and profitable trade is carried on, in the exchange of the most precious productions of India, Persia, Egypt, Barbary, and Europe.

“ As those Eastern countries have not roads like ours, nor inns to accommodate travellers, they must take with them all they want. In many places, buildings are erected for their use, called *caravanse-rais* ; but these only afford shelter ; for no food, beds, or servants, can be had.

“ The *caffila* is somewhat similar to the caravan. In the East Indies, it always belongs to some prince ; whereas, a caravan is an association of various persons. But in Africa, the term intimates generally, a company of dealers, who thus convey their slaves for sale, with gold-dust, salt, and other valuable commodities ; travelling together for greater security and mutual assistance. They go from the centre of Negroland, sometimes eastward, towards Egypt, and sometimes westward, towards Senegal. In those countries, it is frequently called a *coffle*.

“ Something akin to this *coffle*, was once common in England, when whole trains of *pack-horses* used to travel, loaded with woollen goods, over the hills and moors of Yorkshire ; led by the foremost horse, old, steady, and well accustomed to the road ; and regulated by only one man, who brought up the rear.

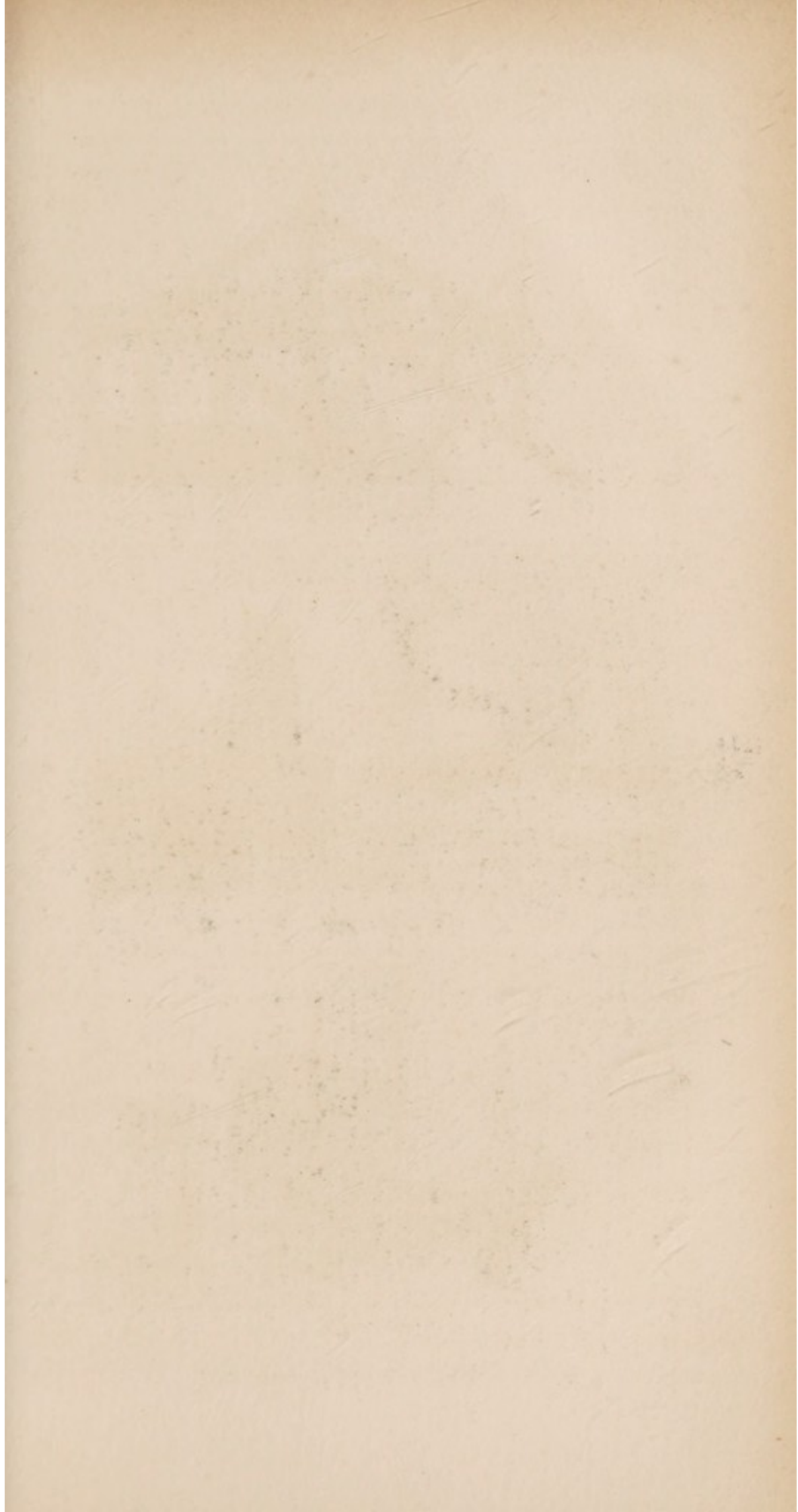
“ Even now too, in Spain, strings of *mules* are employed in the same way; sometimes richly caparisoned. And in Spanish America, the produce of the silver mines is thus conveyed; though sometimes the *guanaco*s, a smaller and inferior sort of camel, are employed as beasts of burden.

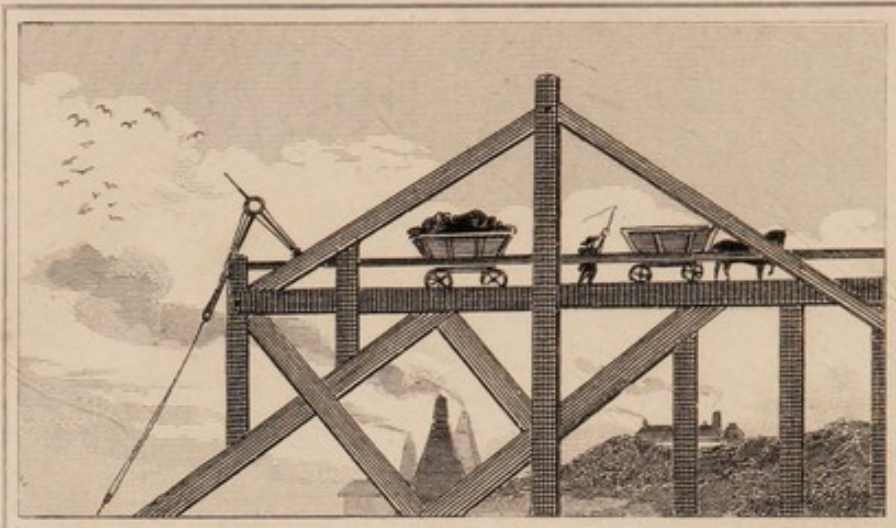
“ *Pack-horses* were used with us, when the roads were narrow and difficult for carriages; but now, the excellent condition of the roads has put them out of use. *Waggons* and *carts* pass everywhere, loaded to a height and with a weight, which would be surprising, were it not customary.

“ There are a few more modes of conveyance, highly important to commerce; especially where the transit is short, as in the collieries.

“ To bring coals from the mines to the shipping, in carts with horses, as goods are taken from town to town, would be so very expensive, that the coals would be too costly for the consumers. Advantage, therefore, is sometimes taken of a slope from the hill to the water side, so as to form a *waggon-way* of timber, on which the wheels move so easily, that one horse will draw five or six times the weight that he could on a common road. In some cases, when the slope is steep, the weight of the loaded waggons is sufficient of itself to impel them down, and, at the same time, to wind up such as have been emptied, on a parallel waggon-way, ready for use again.

“ Of late, the invention of *railroads* seems most to obtain, where they are practicable. Iron rails are fastened to sleepers of wood, iron, or stone; and the carriages are furnished with iron wheels, which run on these rails with very little friction. Railroads





*Page 370.*



*Page 372.*



*Page 372.*

now exist between London and Birmingham, Manchester and Liverpool, and indeed between all the principal towns of England, on which goods and passengers pass and repass, by means of steam-engines, at from twenty-five to thirty miles in an hour. This, indeed, is but the ordinary rate; in certain cases, the steam carriages have been propelled at the rate of forty-six miles in an hour.

“ In some cases, heavy goods are laid upon *sledges*, a sort of carriage without wheels, but running on two smooth iron surfaces, one on each side, which raise the body of the carriage only enough to keep it from rubbing against the ground. These are very frequent in northern climes, where there is ice or frozen snow, to afford a smooth surface. In Petersburg they abound; as they also do in Canada, and all northern countries.

“ In commercial situations, *trucks* are very useful, to take goods to and from the quays. These are like small carts, with two wheels, and are drawn by a man, who is sometimes assisted by a large dog harnessed beneath the carriage. They convey a tolerably heavy load, with much less trouble than by horse and cart.

“ Of conveyances by water, that by the ocean first claims attention. There go the great ships; and the principal portion of all merchandise is transported by them from one country to another, at much less expense, and with far greater convenience and expedition, than would occur to caravans traversing the same distance.

“ A *ship* is a wonderful contrivance, although, being now so common, it excites no surprise. That



a body so large and so heavily laden should float on the water; that it should be so well balanced as not to tilt over; that man should be able to command the winds to move it, and also guide its movements to any quarter, and in any manner he pleases, are all circumstances of great importance, and exhibit human ingenuity to considerable advantage.

“A single ship is a beautiful object; when in full sail, she glides majestically along, cutting the waves with her sharp prow, and dashing them behind in her streaky wake. The eye is never weary in watching her steady and graceful motions.

“A fleet of ships coming into port, to the amount of one hundred and fifty sail, perhaps, of West-Indiamen, is certainly a grand sight; all under regulated movements, dictated by the convoy; bearing rich treasures, to the amount of some millions of money; the harvests of warmer climes, brought to comfort and gratify us, with fruits and conveniences which cannot be produced in our own land. The feelings, as well as the eyesight, are delighted. Man, as it were, shakes hands with his brother man, across the wide ocean, and constrains those waters to be means of union between distant nations, which seemed destined to keep them for ever separated. The communication is mutually beneficial; the interchange of commodities is advantageous; and the comforts of both regions are more than doubled by the traffic.

“East-India ships are often of twelve hundred tons burden. Their value, when richly laden, is immense.

*Galleons*, of which you have perhaps heard the

name, but which have now 'passed away, as things of nought,' were very large ships, employed by the Spaniards, in their time of prosperity, to convey the treasures of the East Indies, across the great Pacific Ocean, to Acapulco; or, in the Atlantic, to bring the produce of the gold and silver mines of America to the mother country. Those which came to Europe, were collectively called the *Flota*. But these no longer exist, the Spaniards having lost both their navy and their colonies.

“The discovery of the polarity of the loadstone, or magnet, which, about the year 1200, led to the invention of the MARINER'S COMPASS, has given wings to commerce, so that she is enabled to fly across wide and trackless oceans, instead of wending a slow and toilsome course along the coast. Before that time, if a ship were accidentally blown out of sight of land, the mariners endeavoured to recover it by means of birds, which they had on board for the purpose; and for which crows were found to be very useful. If the bird, after being let loose, returned to the ship, it was a token that no land was near; but, if it darted away, the sailors steered in the same direction, and generally found land. All this trouble and anxiety was rendered unnecessary when the magnetic needle was applied to purposes of navigation. At first, the method of using it was rather clumsy; the needle was made to float on a bit of straw, in a basin of water; then a candle was set up, in the direction of the needle, to represent the north pole; and by this the ship was steered. I need scarcely add, that a method so vague led to many mistakes, and some disasters. At the present day, the needle,

kept in a box, is fixed upon a card, on which are drawn the points of the compass, and, being nicely balanced on a point, turns with great facility, by the mere power of magnetic attraction ; shewing the north and other points as well by night as by day.

“ As ships, from their size and draught of water, cannot, in many cases, be brought up to the shore, a number of smaller vessels are used to convey their merchandise, or their passengers, to and from the land : such as *boats*, *barges*, and *lighters*, which are moved with oars ; or *hoys*, *smacks*, *cutters*, &c. which have masts and sails.

“ The Chinese vessels are called *junks* ; some of them are small, compared with our ships ; but others exceed six hundred tons’ burden. They are innumerable on the canals of China.

“ The *proas* of the Malays are made very sharp at the ends, both of which are alike ; so that they can proceed either way, without the trouble of turning about.

“ A *canoe* is a sort of boat, not usually built up with ribs and planks, but hollowed out of one single log, or trunk of a tree, and shaped for the purpose ; thus they are constructed in the tropical parts of the Atlantic and Pacific Oceans. . The war canoes, in some instances, consist of two such, placed side by side, with a platform of boards upon both ; those of the New Zealanders are very handsome. In more northern and southern latitudes, canoes are formed with pieces of bark, ingeniously sewed together. The Greenlander’s canoe is made with very slender laths, held together with whalebone, and covered with seal-skins.

“ Inland commerce is carried on by water, in a great measure, in most countries. England is well supplied with *canals* for the purpose; Holland has long been remarkable for such conveniences; and China is intersected by them to a very great degree. In that country, many of the labouring classes have their houses upon floats, scarcely ever going ashore; and it is said that as many Chinese are born and die upon the water as upon land.

“ In connection with canal navigation, the idea of a *lock* presents itself; and it is requisite that you should understand the principle of a contrivance, by which boats are made to ascend and descend hills, over which the canal is conducted. Now you can easily conceive how the vessel passes along the level canal; but when it comes to a hill, the means by which the canal can mount up, carrying the vessel with it, and descend on the other side, without forming a cascade, are not so obvious. The most familiar method by which I can elucidate this is, by supposing the hill to be cut into long steps, or stairs, with the canal level a little way, and the front of each step defended by very large folding gates. At a short distance back is another pair of similar gates; and the space between them, being filled with water, forms a kind of pond, which may be opened or shut at pleasure. This is the lock; and having seen the flood-gates, with their sluices and apparatus for opening them at the London Docks, you are at no loss to conceive what sort of gates I mean. Now suppose a barge to be coming down the hill: it swims as far as the canal is level, and gets into the lock. The gate behind it is then shut, to prevent the upper

water from flowing farther; and by opening the sluices of the gates in front, the water in the lock is gradually let out to a level with the next step in the canal: after which the gates are opened, and the barge moves forward till it reaches the next lock, when a similar process takes place; the upper water being always kept back, while that in the lock is reduced to a level with the lower part of the canal. In ascending, the mode is reversed: the barge gets into the lock at the low level of the canal; the gates behind it are shut, and the sluices of the upper gates are opened, so as to let in water sufficient to raise the vessel to the height of the upper part of the canal, and then, the upper gates being opened, it pursues its way, repeating the process as often as it comes to a lock, till it gains the summit of the hill.

“ Sometimes, impediments, not to be overcome by locks, lie in the way of canals, and these are surmounted by other means; of which the tunnel and the aqueduct are two of the principal. The *tunnel* is neither more nor less than a passage bored through a hill, to make way for the canal. If, before we leave London, we can procure a ride in a barge along the Regent's Canal, you will have an opportunity of passing through some of the best-constructed locks in the kingdom, and also through two tunnels; one at Maida Hill, near Paddington, which passes under the turnpike road and some houses and gardens; the other at Pentonville, about three-quarters of a mile in length, and going under several streets and roads, and under the New River. The canal itself is about eight and a half miles in length, with a descent, or difference between its upper and lower extremes, of

ninety feet, down which it is lowered by means of twelve locks, besides the tide-lock at its communication with the Thames. It cost more than half a million of money, and was seven years in hand.

“ The *aqueduct*, or rather the *aqueduct-bridge*, is a bridge thrown over a hollow place, generally where a river crosses the direction of the canal, and, instead of having a road for carriages in the centre, it has a hollow channel, through which runs the water of the canal, of depth sufficient for barges to pass. The aqueduct bridge connected with the Clyde canal, which opens a communication between Edinburgh and Glasgow, crosses the river Kelvin at an elevation of seventy feet, and is about four hundred feet in length. You would think it very droll to be sailing along this aqueduct, and to see the vessels in the river so much below you.

“ Our *canal-boats* are of very peculiar dimensions, but suited to their purpose. They are sometimes as much as seventy feet in length, with no greater breadth than six feet; being thus made that they may pass each other without requiring the canal to be of an inconvenient width. They are capable of containing a very large quantity of goods; yet may be drawn by a single horse with tolerable ease; a towing-path being made on the side of the canal for him to walk on.

“ One modern invention, the *steam-vessel*, is making rapid strides towards perfection. Many experiments were tried, and failed, before anything effective could be produced. The principle is, by a steam-engine of considerable power, to work two wheels, one on each side of the vessel, which, being

furnished with paddles, push against the water, and thus impel the vessel forward. At first, they were used only in coasting navigation; and for the conveyance of passengers, they are a great improvement; as they keep their time, without much reference to wind or tide; but now they venture out to sea, cross the Atlantic, to and from America; pass through the strait of Gibraltar, to visit the ports of the Mediterranean; and even form a communication, by the Red Sea, with the East Indies; and one has even gone to the East Indies by the way of the Cape of Good Hope. They are furnished with masts and rigging, and hoist their sails when the wind is favourable; but if it turn against them, the sails are taken down, and they go by steam only. You recollect your excursion to Richmond: but the boat you went in was only a steam-vessel in miniature.

“ I have one or two sorts of water conveyance yet to notice, which, though very ancient, are in some places still in use; namely, the *timber-float*, and the *raft*. I must then conclude my lectures descriptive of ‘Scenes of Commerce,’ as our stay in London will in a few days terminate, and more important studies will require your particular attention on your return home. You have probably derived amusement from the account I have given of many very common things, sufficient to leave with you a disposition in future to seek from books, or to obtain from well-informed persons, the information you need relating to numerous articles which have not happened to come under our present consideration.

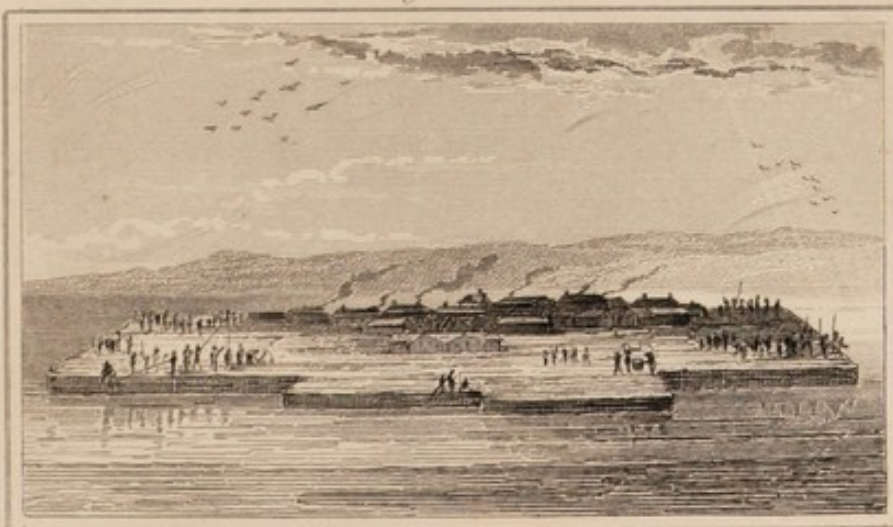
“ In speaking of timber, I have stated that, after it is felled, a great deal is floated down rivers to the



*Page 377.*

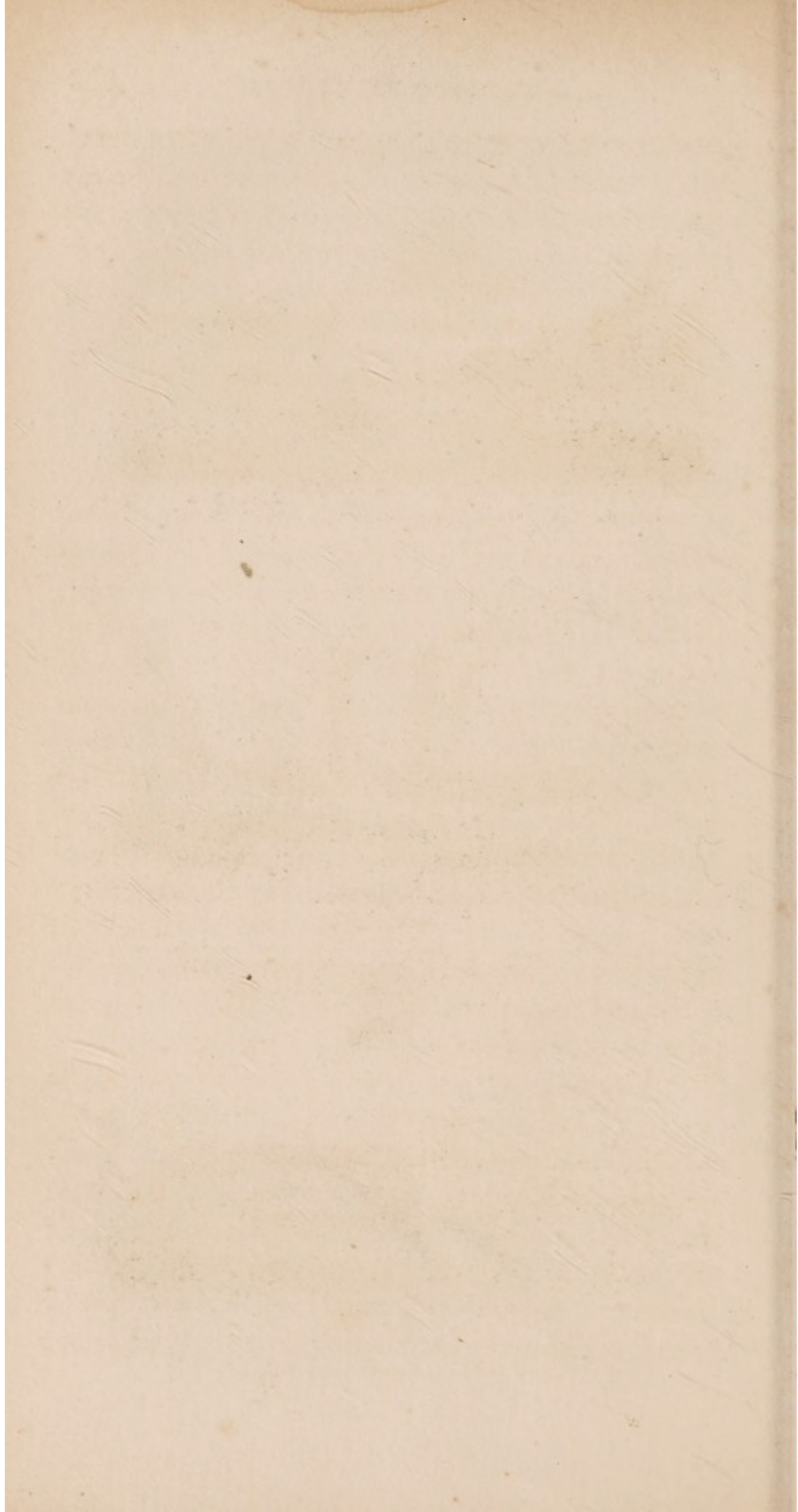


*Page 377.*



*Page 379.*





harbours, whence it is to be exported to other countries. Such is the case in Norway, in New Brunswick, and, indeed, in most places that supply timber. Sometimes, it is split, shivered, or otherwise damaged, in its adventurous voyage: yet, upon the whole, this is the cheapest mode of transit; and, in some cases, owing to the ruggedness of the country, it is the only method by which such bulky materials could be conveyed to the place of export or of sale.

“The grand timber floatage of the present day takes place on the Rhine. On its broad stream floats of timber trees, to the value of thirty thousand pounds sterling, or upwards, compacted in one mass, proceed every year from the forests on the upper river, to the cities of the Netherlands, where they are taken to pieces, and sold. One mass is often a thousand feet in length, and nearly a hundred in width, with a thickness sufficient to raise the upper part seven feet above the water. The trees are all firmly pinned and bound together. Several hundred men are requisite to navigate so unwieldy a concern; and these live on the float, in two rows of huts, built upon it, with a regular street between them. Several smaller floats go in front, by means of which the great body is towed along, clear from obstructions.

“A *raft* is a small flooring of timber, such as comes to hand in case of shipwreck, which, being fastened together, will float passengers and goods safely, though with much inconvenience, to the shore. The Chinese bring their timber from the interior of their country upon very ingeniously-contrived rafts. The corn produced in the upper provinces of Poland is also floated down the Vistula on rafts; and it is so

long on the journey, that it is often in a sprouting state before it reaches the port. And in the Baltic, the raft is the form in which timber is conveyed to the shipping in waiting to transport it to foreign parts."

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### BASKET MAKING.

A day or two after the foregoing conversation, Mr. Paterson and his happy family left London, to return home.

The conversation during the journey naturally turned upon the places they had visited, and the instruction afforded by what they had seen in the great metropolis; when an extensive plantation of osiers, where a number of men were employed in cutting, gave it an unexpected turn.

"For what purpose," inquired Richard, "are those men occupied in cutting such a number of small twigs, in such a swampy place, where the water rises half way up their legs?"

"That swampy place," replied Mr. Paterson, "is an *osier-bed*; that is, a plantation of willows, which is cut at stated periods, for making baskets, hurdles, and other similar articles.

"These plantations are not the result of accidental growth, but are regularly formed of such species of willows as are adapted to the uses for which the plantation is intended. Sets, or cuttings, each about half a yard in length, are planted in marshy situations, in rows about two or three feet asunder. They soon take root, and from their tops arise bunches of

young shoots, such as you see them now cutting, and which, if intended for basket making, are gathered every year; but if wanted for hurdles, or other strong work, they are allowed three, four, or even five years' growth, before they are cut. These shoots are called *osiers*; and, when cut, they are tied up in bundles, called *boults*, the bulk of which is regulated by an iron hoop, forcibly twisted around them, so as to have them as nearly as possible of equal dimensions. Six score of these boults are accounted a load.

“ For white basket work, the osiers are peeled; for which purpose, they are soaked in water, and then drawn between a pair of iron rods, so adjusted as to press upon them just sufficiently to strip off the bark. For common baskets, hampers, &c. they are used as they are cut from the bed.

“ When the osiers get into the hands of the basket maker, he first soaks them, to make them pliable: then he lays some of the stouter sort, cut in lengths to the intended width of the basket, by twos, all one way, for the bottom. He next lays a couple of long osiers across them; and, holding them steady with his foot, interlaces them with the former, over and under, so as to form the *slat*, or central foundation, for the basket. He then turns the ends of the long osiers round and round, weaving them over and under the shorter, and adding other long osiers, till the bottom is completed. A number of stout osiers, with sharp ends, are then thrust into the work already done at the bottom, and bent nearly upright, so as to form a sort of skeleton of the sides. Between these, other osiers are interlaced horizontally

around, till the sides are of proper height; each osier being beaten closely down to the one beneath, as the work proceeds. The rim of the basket is then formed by bending down the ends of the ribs, and twisting them together; the last few inches being forced down, in and among the work already done. It only now remains to make the handles, which is done by thrusting some osiers down the sides, between the work done, and pinning them in, by turning the ends upward into the former work; then the upper parts are twisted together, and similarly forced in and pinned, on the other side of the handle.

“ For finer works, as small baskets, table-mats, and similar articles, the osiers are split; each split being the quarter of an osier. A cross cut is made with a knife at the end of the osier, into which is introduced a boxwood cleaver, with four sharp angles, which being forced up to the other end, splits it into four regular sections, or quarters. These are made finer still, by being passed through a tool, which, shaving off the inner edge, makes the cut osier a kind of flat strap, like a piece of narrow riband. Thus reduced, the material is called a *skain*, which is sometimes dyed, of different colours, so as to give a beautiful variety to the work.

“ Great Britain has for ages been celebrated for its basket work: even so long ago as when the Romans had dominion here, British baskets were among the luxuries of the grandees of imperial Rome.”

The young people thanked their indulgent father for this amusing account of basket making: and, shortly afterwards, they entered their home, where reflection upon what they had seen and heard during

their short visit to London, not only afforded them gratification, but enabled them to understand and to join in conversations with persons far above their years. Having their minds stored with useful knowledge, they were happy in themselves, and respected by all their connections. May the young reader emulate their example!

## INDEX.

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### A.

Air Mattresses, 168.  
Alcohol, 108, 109.  
Ale, 57.  
Alençon diamonds, 260.  
Allspice, 26.  
Almonds, 115.  
Amalgam for looking-glasses, 133.  
Ambergris, 277.  
American copper mines, 318.  
——— deals, 290.  
——— iron mines, 303.  
Amethysts, 250, 260.  
Anchovy fishing, 97.  
Anglesea copper mine, 313.  
Angora goat's hair, 224.  
Aqueduct bridges, 377.  
Ardent spirits, 108.  
Argus pheasant, 226.  
Arkwright's cotton machines, 183.  
Arrack, 111.  
Arrow-root, 153.  
Artificial pearls, 267.  
Ash timber, 289.  
Asphalte, 294.  
Axminster carpets, 138.

### B.

Bacon, 49.  
Baizes, 229.  
Ball tea, 13,  
Banca tin, 319.  
Bank of England, 338.  
Bankers, their origin, 339.  
Bark of the oak, 238.  
Barley, 54.  
Barm, or Leaven, 34.  
Basket making, 380.  
Bath free-stone, 281.  
——— waters, 160.  
Beaver fur, 217.  
——— hats, 192.  
——— leather, 224.  
Beavers, 222.  
Bed furniture, 188.  
——— linen, 177.  
Bedroom, the, 164.  
Beds, feather, 168.  
——— down, 169.  
Bedsteads, 165.  
Beech timber, 289.  
Beer, 57.  
Bell metal, 312.

- Beryl, 259.  
 Birch brooms, 60.  
 Birds used in navigation, 373.  
 — of Paradise, 226.  
 Biscuits, 34.  
 Bitter almonds, 115.  
 Bitumen, 294.  
 Black cattle, 46.  
 Black damp in coal mines, 332.  
 Blacklead, 66.  
 Blacksmith, the, 305.  
 Blankets, 171, 229.  
 Bleaching, 176.  
 Blood-stone, 261.  
 Blubber, or fat of whales, seals,  
 &c. 79.  
 Blue-and-white pottery, 149.  
 Bobbinet, 215.  
 Bohea tea, 12.  
 Bombasine, 209, 229.  
 Bone, or pillow lace, 212.  
 Book muslin, 210.  
 Bordeaux wine, 106.  
 Borrowstowness coal mine, 331.  
 Bottle glass, 129.  
 Brandy, 110.  
 Brass, 312.  
 Bread, 32.  
 Breakfast, the, 6.  
 Brewhouse, the, 53.  
 Brewing, 57.  
 Bricks, 283.  
 Bricklaying, 284.  
 Brilliants, 253.  
 Brimstone, 314.  
 Bristles, 225.  
 Bristol Hotwell water, 160.  
 — stones, 260.  
 Britain famous for its tin at an  
 early period, 319.  
 British coal mines, 330.  
 — copper mines, 313.  
 — iron mines, 303.  
 — lead mines, 325.  
 — tin mines, 320.  
 — woollen trade, 228.  
 Broad cloths, 229, 231.  
 Brocades, 206.  
 Bronze, 312.  
 Brown pottery, 148.  
 Brush tea, 13.  
 Brussels carpets, 137.  
 Bullocks, 46.  
 Buntine, 232.  
 Burgundy wine, 106.  
 Burslem pottery, 147.  
 Butter, 44.  
 Butter-milk, 44.  
 Buxton waters, 160.  
  
 C.  
 Caffila, in India, 369.  
 Calicoes, 186.  
 — printed, 189.  
 Calimancoes, 231.  
 Cambric muslin, 211.  
 Cambrics, 178, 179.  
 Camels, 368.  
 Camels' hair, 224.  
 Camphor, 155.  
 Canada wheat, 36.  
 — fur trade, 219.  
 Canal boats, 377.  
 Canals, 375.  
 Candles, 86.  
 Cannel coal, 334.



- Cannon boring, 310.  
 Canoes, 374.  
 Cantaleupe melon, 119.  
 Canton, 13.  
 Caoutchouc, or Indian rubber, 67.  
 Cape wine, 102.  
 Carat, method of estimating the value of diamonds by the, 254.  
 Caravans in the East, 367.  
 Caravanserais, 369.  
 Carding of cotton, 182.  
 Carnelian, 251, 261.  
 Carpets, 135.  
 Carrara marble, 287.  
 Carron iron foundry, 310.  
 Carts, 370.  
 Casement lead, 326.  
 Cassia, or base cinnamon, 31.  
 Cast steel, 306.  
 Casting of iron, 308.  
 Cattle, 46 ; various breeds of, 47.  
 Cement, 286.  
 — asphaltic, 294.  
 Ceylon pearl fishery, 265.  
 Chair bottoms, 139, 224.  
 Chalcedony, 261.  
 Challi, 209.  
 Champagne wine, 106.  
 Charcoal, 293.  
 Cheese, 45.  
 Cheltenham water, 160.  
 Chester mart for linen, 177.  
 Chestnut timber, 289.  
 Chili copper mines, 318, 344.  
 — silver mines, 344, 346.  
 China closet, 140.  
 — crape, 208.  
 — oranges, 117.  
 Chinese junks, 374.  
 Chintz, 189.  
 — curtains, 139.  
 Chrysolite, 250, 261.  
 Chrysoprase, 261.  
 Chulau tea, 13.  
 Churns, 44.  
 Cigars, 361.  
 Cinnamon, 30.  
 Citrons, 118.  
 Civet, 277.  
 Claret, 106.  
 Clocks, 69.  
 Clothing, various articles of, 191.  
 Cloves, 28.  
 Coal mines of Britain, 330.  
 Coals, 329.  
 Coatings, 231.  
 Cock and hen feathers, 169.  
 Cocoons of the silkworm, 199, 202.  
 Cod-fish, 93.  
 Cod fishery, 84.  
 Coffee, 15.  
 Coffeehouse, the first opened in Europe, 16.  
 Cofle, in Africa, 369.  
 Cognac brandy, 110.  
 Coke, 334.  
 Colebrook Dale, 305, 308.  
 Coleraine linens, 178.  
 Colliers, 332.  
 Coloured stones, 258.  
 Colours, original, 235.  
 Congo tea, 12.  
 Constantia wine, 102.  
 Conveyance, modes of, 367.  
 Copper, 311.  
 — mines, 313.  
 Coral, 251, 268, 270.  
 — fishery, 271.

- Corallines, 270, 273.  
 ——— classification of, 273.  
 Corduroys, 186.  
 Corinthian brass, 318.  
 Cork celebrated for salted provisions, 51.  
 Corks, 112.  
 Corn, 34.  
 Cornish diamonds, 260.  
 ——— copper mines, 316.  
 ——— tin mines, 320.  
 Corra Lyn lead mine, 327.  
 Cotton, 179.  
 ——— packing of, 180.  
 ——— printing of, 185, 189.  
 ——— spinning of, 182.  
 ——— thread, 187.  
 Coventry ribbon manufacture, 207.  
 Coverlets, 188.  
 Counterpanes, 187.  
 Cow, the, 46.  
 Crape, 208.  
 Crockery, 140.  
 Crystal, rock, 260.  
 ——— glass, 131.  
 Cumberland coal mines, 331.  
 Curtains, 138.  
 Custom duties of England, 363.  
 Custom House, the, 363.  
 Cut glass, 132, 140.
- D.
- Dalecarlia, copper mines of, 316.  
 Damask curtains, 139.  
 Damory's oak, 299.  
 Davy, Sir H. his safety lamp, 333.  
 Deal timber, 289.  
 Delft ware, 140, 147.  
 Derby silk mills, 203.  
 Dessert, the, 113.  
 Diamond mines, 254, 256.  
 Diamonds, 251.  
 ——— false, 260.  
 ——— remarkable, 255.  
 ——— how to estimate their value, 254.  
 Dimities, 186.  
 Dinner, the, 88.  
 Distilling, 109.  
 Dock, principle of its construction, 353.  
 Docks, the, 353.  
 Down beds, 169.  
 Drawing-room, the, 120.  
 Dressing woollen cloths, 234.  
 Drontheim, copper mine of, 317.  
 Dry dock, 354.  
 Dublin linen-hall, 178.  
 Duck feathers, 168.  
 Duties on goods, 364.  
 Dyed wool, seat of the manufacture of, 228.  
 Dyeing in grain, 236.  
 ——— woollen cloths, 234.
- E.
- East-India Docks, 356.  
 Ecton Hill copper mine, 316.  
 Edward III. founder of the English woollen trade, 227.  
 Egrets' feathers, 226.  
 Egyptian gourd, 119.  
 ——— papyrus, 61.  
 Eider ducks, 170.  
 Elm timber, 288.  
 Emeralds, 250, 259.  
 Emery, for polishing, 259.

- Enamels, 134, 251.  
 English porcelain, 142.  
 ——— pottery, 144.  
 Ermines, 218, 223.  
 Essences, 78.  
 Etruria, village of, 148.  
 Exchange, Royal, 350.
- F.
- Fairlop oak, 299.  
 Feathers, for beds, 52, 168.  
 ——— for dress, 225.  
 ——— plucked from the living  
 birds, 52, 168.  
 ——— cock and hen, 169.  
 ——— duck, 168.  
 ——— goose, 52, 168.  
 ——— turkey, 169.  
 Felt, 193.  
 Fermentation, 58, 108.  
 Figs, 116.  
 Firedamp in coal mines, 332.  
 Fire-stone, 283.  
 Fir timber, 289.  
 Fish for the table, 89.  
 Fishery, cod, 84.  
 ——— coral, 271.  
 ——— herring, 96.  
 ——— pearl, 265.  
 ——— whale, 82.  
 Flannels, 229, 230.  
 Flax, 172.  
 Fleecy hosiery, 231.  
 Flint glass, 130.  
 Flints, 282.  
 Float of timber, 378.  
 Flocks for mattresses and beds,  
 168.  
 Flos silk, 202.
- Flour, 34.  
 Forbidden fruit, 118.  
 Formation of coral islands, 269.  
 Fourpost bedsteads, 165.  
 Frame-knitting, 184.  
 Frame net lace, 215.  
 France, wine districts of, 106.  
 Free-stone, for building, 281.  
 French bedsteads, 166.  
 ——— brandy, 110.  
 ——— cambrics, 179.  
 ——— plums, 117.  
 ——— silks, 209.  
 ——— wines, 106.  
 Friuli, quicksilver mines of, 348.  
 Fruits, uses of, 113.  
 Fulling, 234.  
 Furs, 216.  
 Fur trade of Canada, 219.  
 Fustians, 186.
- G.
- Galena, 325.  
 Galleons, 372.  
 Gani, diamond mine of, 256.  
 Garnet, 262.  
 Gas lights, 335.  
 Gauze, 208.  
 Geese, 51.  
 Gelatine, 238.  
 Gems, 250.  
 Geneva, or Gin, derivation of the  
 term, 111.  
 Gin, 111.  
 Ginger, 31.  
 Gingham, 189.  
 Glasgow mart for linen, 177.  
 Glass, 125.  
 ——— blowing, 130.

- Glass cutting, 132.  
 — discover of, 126.  
 — furnace, 129.  
 — grinding and polishing, 132.  
 — silvering, 132.  
 — imitations of porcelain in, 133.  
 Gloves, 240, 243.  
 Gold, 341.  
 — imitative, 319.  
 Golden fleeces, 343.  
 Goose feathers, 52, 168.  
 Goual, river mine of, 258.  
 Gozzard, the, 52.  
 Grains, 58.  
 Granite, 281.  
 Grapes, 113.  
 — extraordinary, of Syria, 105.  
 Graving-dock, 353.  
 Greenland whales, 79.  
 Grinding glass, 132.  
 Gros de Naples, 206.  
 Guineas, origin of their name, 341.  
 Gunpowder tea, 13.  
 Gustavus Vasa, 302, 317.
- H.
- Hag, a species of worm, 90.  
 Hair of animals, 224.  
 Half-tester bedsteads, 166.  
 Hamburgh grapes, 114.  
 Hargrave's invention for spinning cotton, 182.  
 Harpoon, 83.  
 Harrowgate water, 160.  
 Hat-making, 192.  
 Hats, 192.  
 Hearth-rugs, 138.  
 Hearth-stone, 283.  
 Heliotrope, or blood-stone, 261.  
 Hemp, 174.  
 Herring fishery, 96.  
 Herrings, 95.  
 Hindoo cotton manufacture, 181, 185.  
 — pottery, 144.  
 Hogs, 50.  
 Hogs' bristles, 225.  
 Holland linen, 179.  
 Honduras mahogany, 123.  
 Honiton lace, 215.  
 Hops, 56.  
 Horsehair bottoms for chairs, 140, 224.  
 — cloths, 139, 224.  
 Horsham stone, 283.  
 Hothouse grapes, 114.  
 House, the, 279.  
 Hudson's Bay fur trade, 219.  
 Hungary water, 275.  
 Hyson tea, 13.
- I.
- Iceland crystal, 260.  
 Idol's eye stolen, and now in the Russian imperial sceptre, 255.  
 Idria, singular discovery of quick-silver at, 349.  
 Imitative gold, 319.  
 Imperial purple, 227.  
 Indian corn, or Maize, 39.  
 — rubber, 67.  
 — weavers, 181, 185.  
 Insurance of ships, 352.  
 Irish linen trade, 178.  
 Iron, 300.  
 — casting, 308.

Iron mines, 302.  
 — ore, 303.  
 — works, 304, 308.  
 Ishmaelites, 367.

## J.

Jaconot muslin, 210.  
 Jamaica pepper, 26.  
 Japan ware, 74.  
 Japanese copper, 318.  
 Jar raisins, 115.  
 Jasper, 251, 261.  
 Jeans, 186.  
 Jewellery, 250.  
 Jordan almonds, 115.  
 Junks of the Chinese, 374.

## K.

Kali, or kelp, 125.  
 Keels, or barges, for conveyance of  
 coals, 333.  
 Kerry stones, 260.  
 Kerseymeres, 231.  
 Kerseys, 231.  
 Kidderminster carpets, 137.  
 King wood, 125.  
 Kitchen, the, 25.  
 Köngsberg silver mine, 344.

## L.

Lace, 212.  
 Lamp black, 293.  
 Lapidary's profession, 251.  
 Lapis lazuli, 251.  
 Lavender water, 276.  
 Lavenham yarn spinners, 232.  
 Lead, 324.  
 — deleterious effects of, 326.  
 — lights, 326

Lead mines of Britain, 325.  
 Leather, 237.  
 ——— dyeing of, 241.  
 Leaven, 34.  
 Leeds, a mart for linen, 177.  
 Lemons, 118.  
 Lergan mart for linens, 178.  
 Lime for building, 285.  
 Limes, 118.  
 Limestone, 282.  
 Linen, 172.  
 Lloyd's Coffee-house, 352.  
 Lobsters, 91.  
 Locks in canal navigation, 375.  
 Lombardy, vineyards of, 105.  
 London docks, 357.  
 ——— markets, 48.  
 Long pepper, 27.  
 Long room, Custom House, 365.  
 Looking-glasses, 132.  
 Lothian's story, 327.  
 Lustres, woollen, 229.  
 Lustrings, 206.

## M.

Macao, 14.  
 Mace, 29.  
 Mackerel, 97.  
 Mackintosh waterproof cloth, 236.  
 Madeira wine, 102, 104.  
 Mahogany, 121.  
 Maize, 39.  
 Malaga raisins, 115.  
 ——— wines, 105.  
 Malay proas, 374.  
 Malt, 54.  
 Maltese oranges, 117.  
 Malt liquors, 57.  
 Manchester cotton trade, 184.

- Marble, 287.
- Mariners' compass, 373.
- Markets of London, 48.
- Marseilles quilts, 187.
- Matlock waters, 160.
- Mattresses, 167.
- Mechlin lace, 215.
- Medicines, use of, 156.
- Melons, 118.
- Mercury, the chemical name for quicksilver, 347.
- Merino stuffs, 231.  
—— wool, 230.
- Mexican silver mines, 346.
- Milk, 43.
- Mineral pitch, 294.  
—— waters, 158.
- Mines, coal, 330.  
—— copper, 313.  
—— diamond, 254, 256.  
—— gold, 341.  
—— iron, 302.  
—— lead, 325.  
—— quicksilver, 347.  
—— silver, 344.  
—— tin, 320.
- Mirrors, 131.
- Mode, silk, 207.
- Modes of conveyance, 367.
- Mordant, in calico printing, 190.  
—— dyeing, 235.
- Moreen curtains, 139.
- Mortar, 285.
- Mother-of-pearl, 268.
- Mountain wine, 105.
- Mousselin de laine, 211.
- Mules, in Spain, 370.
- Musk, 276.
- Muslins, 186, 210.
- N.
- Naphtha, 295, 336.
- Narrow cloths, 231.
- Needles, 246.
- Newcastle coal trade, 330.
- Newfoundland fishery, 84.
- Nootka Sound fur trade, 221.
- Norway deals, 290.  
—— iron mines, 302.  
—— silver mines, 344.
- Norwich manufactures, 230.
- Nottingham bobbinet, 215.
- Nutmegs, 29.
- O.
- Oak bark, 238.  
—— timber, 288, 297.
- Og, king of Bashan, 165.
- Oil, 76.
- Oil of almonds, 116.  
—— olives, 78, 120.
- Oils, vegetable, 77.  
—— animal, 79.
- Olives, 78, 120.
- Opal, 251, 261.
- Oranges, 117.
- Organzine, or Thrown silk, 203.
- Or-moulu, 319.
- Ornaments, universality of the love of, 249.
- Osiers, 380.
- Ostrich feathers, 225.
- Ottar of roses, 276.
- Otter fur, 217.
- Oxen, 46.
- Oysters, 94.
- P.
- Pack-horses, 369, 370.

- Packing of cotton, 180.  
 Paillasses, 167.  
 Paisley mart for linen, 177.  
 Pantiles, 285.  
 Pantry, the, 43.  
 Paper, 61.  
 Papyrus, the, 61.  
 Paradise, birds of, 226.  
 Parchment, 65.  
 Parian marble, 287.  
 Parys copper mine, 313.  
 Pastes, imitative of precious stones,  
     251, 262.  
 Patchwork counterpanes, 188.  
 Paving tiles, 285.  
 Peacocks' feathers, 226.  
 Pearl fisheries, 264.  
 Pearls, 94, 251, 263.  
     ——— artificial, 267.  
 Pebble crystal for spectacles, 260.  
 Peltry, 218.  
 Pencils, black-lead, 66.  
     ——— camels' hair, 224.  
 Pepper, 25.  
     ——— long, 27.  
 Perfumes, 275.  
 Persian carpets, 138.  
     ——— silk, for linings, 207.  
 Petit-or, 319.  
 Petroleum, 295.  
 Pewter, 323.  
 Pheasants' feathers, 226.  
 Philosopher's stone, 142.  
 Phœnicians trading to Britain for  
     tin, 319.  
 Pillow lace, 212.  
 Pimento, 26.  
 Pinchbeck, 319.  
 Pine-apples, 119.  
 Pine timber, 289.  
 Pins, 242.  
 Pitch, 294.  
     ——— mineral, 294.  
 Pizé, a method of building, 280.  
 Plaiting straw, 195.  
 Plate glass, 128.  
 Plush silk, 202.  
 Point lace, 212.  
 Poland wheat, 36.  
 Polishing glass, 132.  
 Poplar timber, 289.  
 Poplins, 229.  
 Porcelain, 141.  
     ———, imitations of, in glass,  
         133.  
 Pork bones, 50.  
 Portland stone, 281.  
 Portugal grapes, 114.  
 Port wine, 104.  
 Potatoes, 52.  
 Potosi, mines of, 345.  
 Pottery, 143.  
 Precious stones, 250.  
 Press bedsteads, 167.  
 Preventive service, 365.  
 Printing of cotton, 185, 189.  
 Proas of the Malays, 374.  
 Proof spirit, 110.  
 Provisions, salted, 50.  
 Prunes, 117.  
 Pulled figs, 116.  
 Purbeck stone, 282.  
 Pyrope, 262.  
  
     Q.  
 Quays and wharfs, 362.

Queen's ware pottery, 148.

Quilts, 187.

Quicksilver, 347.

### R.

Rabbits' fur, 192.

Raft, 379.

Railroads, 333, 370.

Raisins, 114.

Raolconda, diamond mine of, 256.

Reaping, 37.

Reaumur's improvement in the fabrication of porcelain, 133, 142.

Rectifying spirituous liquors, 110.

Red lead, 326.

Reigate fire-stone, 283.

Rennet, 45.

Rhine, grand timber float on the, 379.

Ribbons, 207.

Rice, 40.

Rock crystal, 260.

Roman woollen manufactures in Britain, 227.

Rose diamonds, 253.

Roses, ottar of, 276.

Rose water, 276.

Rose wood, 124.

Rosin, 293.

Rotherham iron works, 308.

Royal Exchange, 350.

Rubies, 250, 259.

Rugs, 188.

Rum, 110.

Rushes used instead of carpets, 136.

Russia, iron mines of, 303.

—— sheeting, 178.

### S.

Sables, 216, 222.

Safety lamp for coal mines, 333.

Sago, 150.

St. Austel's tin mines, 322.

St. Catherine's Docks, 357.

St. Michael's oranges, 117.

Salmon, 91.

Salt, 31.

Salted provisions, 50.

Sapphires, 250, 259.

Sarcenets, 207.

Satin, 207.

Saxony wool, 230.

Scottish carpets, 136.

—— linen, 177.

—— coal mines, 331.

—— lead mines, 325.

Scouring woollen cloths, 236.

Sea bathing, 162.

Seal fur, 217.

Seville oranges, 117.

Shaddocks, 118.

Shag, silk, 202.

Sheep, 48.

Sherry wine, 104.

Shetland wool, 230.

Ships, 371.

Shoemaking, 240.

Shot, manufacture of, 327.

Shrimps, 92.

Shrouds, 232.

Siberia, iron mines of, 303.

Sick chamber, the, 150.

Sienna marble, 288.

Silk, 196.

—— hats, 194.

—— weaving, 204.

—— winding, 203.



- Silkworms, 197.  
 Silver, 344.  
 Silvering looking-glasses, 132.  
 Singlo tea, 13.  
 Skate, 95.  
 Skewers used for pins, 242.  
 Skins appropriated to various purposes, 223.  
   — how distinguished from leather, 217.  
 Slate for building, 282.  
 Sledges, 371.  
 Smithery, 305.  
 Smithfield Market, 48.  
 Smuggling, 366.  
 Smyrna raisins, 115.  
 Snuff, 361.  
 Soap, 87.  
 Soles, 95.  
 Souchong tea, 13.  
 Spanish mahogany, 122.  
   — wines, 105.  
   — wool, 230.  
 Spars, for chimney ornaments, 135.  
 Spermaceti whale, 82.  
 Spices, 25.  
 Spinning of cotton, 182.  
   — flax, 174.  
   — hemp, 175.  
   — worsted, 232.  
 Spirit of wine, 108, 109.  
 Spirituous liquors, 107.  
 Sponge, 278.  
 Sprats, 97.  
 Spun, or flos silk, 202.  
 Staffordshire pottery, 148.  
 Statuary marble, 287.  
 Steam vessels, 377.  
 Stearine, or spermaceti, 82.  
 Steel, 306.  
 Stockings, 231.  
 Stone for building, 281.  
 Stone ware, 147.  
 Stones, coloured, 258.  
 Store-room, the, 76.  
 Straw bonnets and hats, 194.  
 Stream tin, 322.  
 Stroud woollen trade, 229.  
   — its superior dyes, 229.  
 Stucco, 286.  
 Study, the, 61.  
 Stuffs, woollen, 229, 231.  
 Suffolk hemp, 177.  
 Sugar, 19.  
   — refining of, 23.  
   — maple, 24.  
 Sugar of lead, 326.  
 Sun raisins, 115.  
 Swansdown, 231.  
 Swedish copper mines, 316.  
   — iron mines, 302.  
 Syria, grapes of, 105.
- T.
- Tallow, 86.  
 Tamarinds, 154.  
 Tannin, 238.  
 Tanning, 239.  
 Tan-yard, 238.  
 Tapioca, 152.  
 Tar, 293.  
 Tea, 2, 7.  
   — said to be gathered by monkeys, 11.  
 Teazels, 234.  
 Teneriffe wine, 103.  
 Tent bedsteads, 166.  
 Tent wine, 105.

- Thornbacks, 95.  
 Thread of flax, 174.  
 ——— cotton, 187.  
 Threshing, 38.  
 Thrown silk, or organzine, 203.  
 Tick, or Ticken, for beds, 168.  
 Tide-waiters, 365.  
 Tiffany, 207.  
 Tiger skins, 223.  
 Tiles, 285.  
 Timber, 288.  
 ——— floats, 378.  
 Tin, 319.  
 ——— plate, 324.  
 ——— mines of Cornwall, 320.  
 Tobacco, 359.  
 Toga of the Romans, 227.  
 Toilet, the, 248.  
 Tokay wine, 102.  
 Topaz, the, 259, 260.  
 Tourmaline, 261.  
 Tow, 174, 175.  
 Truckle bedsteads, 166.  
 Trucks, 371.  
 Tunnels, 376.  
 Turbot, 90.  
 Turkey carpets, 138.  
 ——— coffee, 16.  
 ——— figs, 116.  
 Turkey's feathers, 169.  
 Turpentine, 292.  
 Turtles, 98.  
 Twankay tea, 13.  
 Tyrian purple, 227.
- V.
- Vellum, 66.  
 Velvets, 208.  
 Velvetens, 186.  
 Venice turpentine, 292.  
 Verdigris, 312.  
 Vintage in France, 106.  
 ——— Lombardy, 105.
- U.
- Underwriters, 352.  
 Use of medicines, 156.
- W.
- Waggons, 370.  
 Waggon-ways, 333, 370.  
 Walnut-tree timber, 289.  
 Wardrobe, the 191.  
 Warehouses for tobacco, 358.  
 Warp and Woof, 233.  
 Watches, 72.  
 Waterproof cloth, 236.  
 Waxed leather for shoes, 240.  
 Weaving of carpets, 135.  
 ——— linen, 176.  
 ——— silk, 204.  
 ——— woollen cloths, 233.  
 Wedgwood's improved potter  
 148.  
 Welding of iron, 305.  
 Welsh flannels, 230.  
 ——— ware, 148.  
 West-India Docks, 356.  
 Wet docks, 355.  
 Whale fishery, 79, 82.  
 ——— oil, 79.  
 Whalebone, 81.  
 Wharfs and quays, 362.  
 Wheat, 35.  
 Whiskey, 111.  
 Whitehaven coal mines, 331.

- White woollen cloths, 229.  
White lead, 326.  
Whitesmith, the, 306.  
Whitings, 97.  
Wilton carpets, 138.  
Wines, 102.  
Winding of silk, 203.  
Window-glass, 127, 130.  
Witney blankets, 171.  
Wool, 227.  
Wools of England, 228.
- Woollens, 227.  
Worsted, spinning of, 174, 233.
- Y.
- Yarn, 174, 233.  
Yeast, 34, 58.  
Yorkshire linen, 177.
- Z.
- Zinc, 312.

THE END.

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