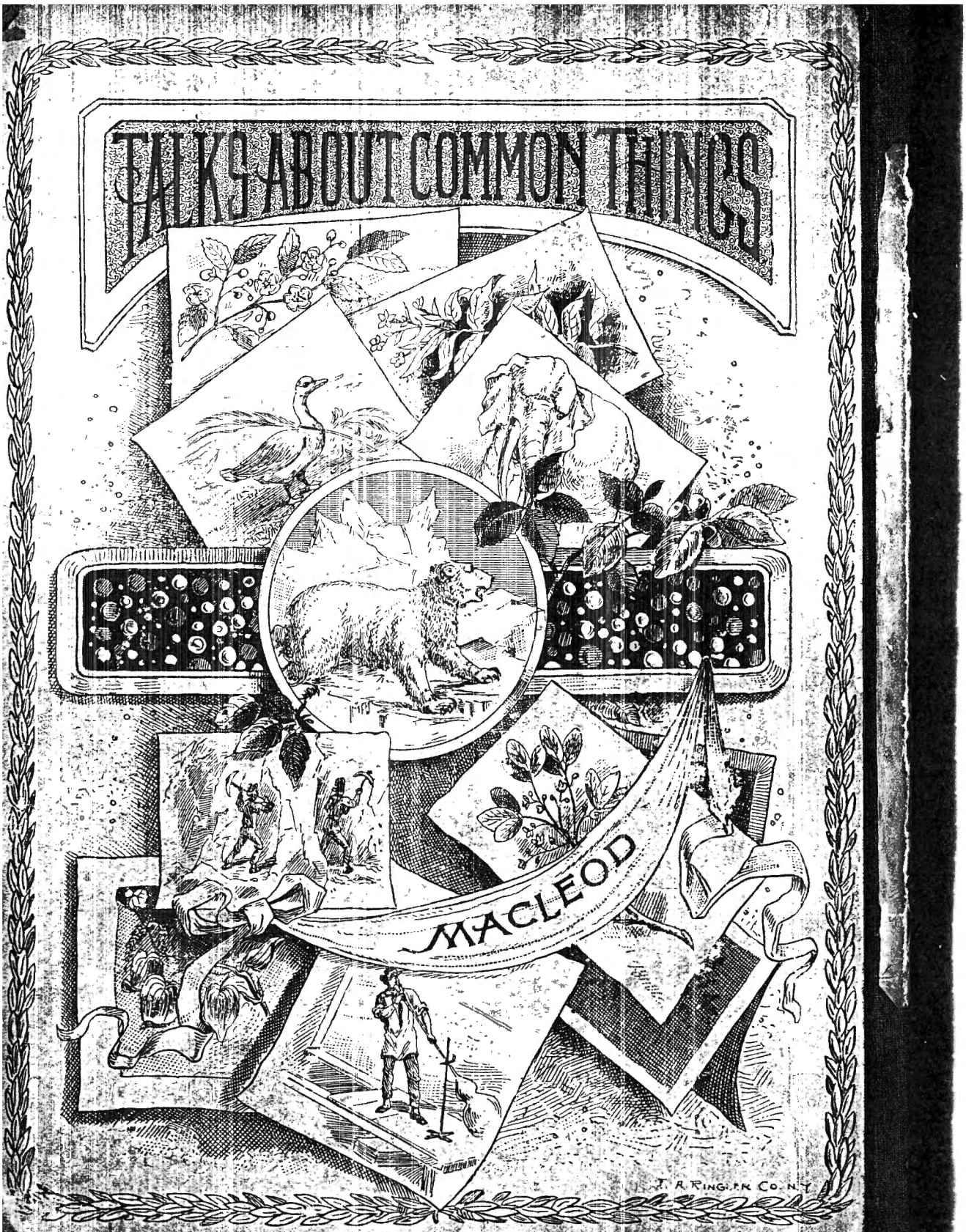
TALKS ABOUT COMMON THINGS
MACLEOD
J. A. RINGLER CO. N.Y.

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COMMON THINGS.

BY

MacLEOD.

Author of MacLeod Reproduction Stories, MacLeod Composition Outlines, Lessons on Common Minerals, etc.

NEW YORK:
TEACHERS PUBLISHING COMPANY,
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INTRODUCTION.

The aim of this book is, as the name implies, to give information about the familiar objects around us. The work is especially prepared for the school-room.

As a supplementary reader it may be placed in the hands of the pupil, and as a book of reference for the teacher in preparing oral lessons, it will be found appropriate and useful.

THE AUTHOR.

TABLE OF CONTENTS.

Where found.—The cotton plant is cultivated in almost all warm countries. It is found in the region of the Mediterranean Sea, in Europe, China, India, South America and the West Indies, but that of the best quality is raised in the southern portions of the United States.

Name countries which produce cotton.

Where does best quality grow?

Appearance of Plant.—The plant grows to various heights in the different countries, in our own country being from five to six feet high, occasionally reaching the height of nine or ten feet. The seeds are sown in the spring-time, in rows about five feet apart, and soon the small shoots appear above the ground. The leaves of the plant are dark green, and the flowers are large, and usually bright yellow.

What is usual height of plant?

When and how are the seeds sown?

What color are the leaves and flowers?

Growth of pods.—As each flower drops from the plant, a seed-pod takes its place. These pods are three-sided, and are about the size of a walnut. When ripe, these pods burst open, showing the cotton stored within. A field of cotton in this stage is remarkably beautiful, the dark, glossy leaves, and snowy balls of cotton forming a decided contrast.

What shape are the pods?

Where is the cotton?

How does it look?

What is in the cotton?

Gathering the Cotton.—Now commences the process of making these downy balls into useful articles for mankind. The pods are gathered, and the cotton taken out and spread out to dry in the sun. It is full of seeds, and before it can be of any use, these must be removed. For many years this was done by hand, and was a very tiresome process.

What is done with the seeds?

What machine is used for cleaning cotton?

The Cotton Gin.—Now a machine is used, called a cotton-gin, which was invented by a Connecticut man, named Eli Whitney. The cotton is passed between revolving cylinders, which are covered with sharp teeth. These teeth tear the seeds from the cotton, and leave it soft and smooth. Horse-power is used to work the machine and so time and strength are saved.

Who invented it?

Find out all you can about him.

Getting ready for the factories.—The cotton is pressed into large bundles or bales, each weighing several hundred pounds, and these bales are sent to the different factories to be made into the various cloths we use so commonly.

How is the cotton sent to the factories?

Manufacture of Cotton.—The manufacturing of raw cotton into cloth is now done entirely by machinery. The cotton is thoroughly cleaned, and then is spun into long, fine threads.

Which is done first, spinning or weaving?

The Spinning-wheel.—Formerly a spinning-wheel, such as may often be seen now in country houses, was used, and in this way but *one* thread could be drawn out at a time.

How was spinning done many years ago?

More than a hundred years ago a machine was invented, by which eight threads could be produced at the same time.

What was the "jenny?"

The "Jenny."—The people, however, were afraid that this new machine, called the "jenny," would deprive them of work, and they drove Hargreaves, the inventor, from the town, and destroyed his machine. Later on, the "jenny" was improved upon, and became very generally used. Continued improvements have made the machinery in use now so perfect as to render the process of spinning very easy and rapid.

How were the invention and the inventor treated by the people?

Find out the names of those who improved the "jenny."

Spool-thread.—When several of the fine threads are spun and twisted together, they form our strong sewing-cotton, and the manufacture of spool-thread is of itself an important industry.

What is in common use, that is made of cotton?

The Weaving.—The weaving follows the spinning and threads are crossed and recrossed, and so woven into cloth. The threads which extend the length of the cloth form the *warp*, and the threads crossing these threads from side to side form the *woof* or *weft*. As it leaves the *loom*, as the weaving machine is called, the cloth looks like the unbleached muslin, sold in the stores, and is used for many purposes. Most of it is bleached or whitened and is of course, much nicer.

What follows the spinning?

What is warp?

Woof?

What is the weaving-machine called?

Fabrics made of Cotton.—Various names are given to the different goods made of cotton. Gingham, cambric, muslin, and lawn, are familiar to all. Calico is printed with colored figures, and is named from the city of Calicut, in India, where it was first made.

Name kinds of cloth made of cotton.

Where was calico first made?

Chintz is a kind of calico, heavy in texture, and gay in coloring.

In contrast to this thick material, very delicate lace is also manufactured from cotton.

What delicate fabric is made of cotton?

In addition to these fabrics, there are many made of a mixture of cotton with silk or wool.

What is cotton often mixed with?

BLACKBOARD OUTLINE

COTTON.

1. WHERE CULTIVATED?
2. DESCRIPTION OF PLANT.
3. APPEARANCE OF PODS.
4. GATHERING PODS.
5. DRYING AND CLEANING COTTON.
6. THE COTTON-GIN.
7. THE SPINNING.
8. THE "JENNY."
9. THE WEAVING.
10. KINDS OF COTTON CLOTH.

OBJECTS TO AID IN TEACHING COTTON.

1. A REAL COTTON BLOSSOM; IF NOT OBTAINABLE, THEN A PICTURE OF ONE (SHEPARD'S SCHOOL-ROOM STENCIL OF COTTON.)
2. MAPS OF HEMISPHERES — (STENCIL MAPS, WITH COTTON BELT INDICATED).
3. SPOOLS OF THREAD.
4. LOOSE PIECES OF COTTON.
5. SAMPLES OF GINGHAM, MUSLIN, LACE, ETC.

From what source obtained.—The term *wool* is applied to the fleece of common sheep, such as are found in the mountainous regions of many countries, also to the silky covering of the llama and alpaca, and the fine hair of the Cashmere goat. The llama and alpaca are natives of Peru, and the goat is found in the hilly portions of Thibet and Tartary.

What is wool?

Where is the llama found?

Where is Thibet? Tartary?

We will first consider the process of changing the covering of common sheep into a useful article of commerce.

The first step.—The first thing to do, is to wash the sheep. In their wanderings over the hills, thorns and thistles, and quantities of dust gather in their fleece.

In what condition is the wool before washing?

The washing.—The sheep are driven into a shallow stream, on a warm day in June or July, and thoroughly washed, a process to which they strongly object.

At what season does the washing occur?

The sheep are then allowed to run around in a clean place until their fleece is dry.

What are shears?

The shearing.—The fleece is then cut off with large shears.

How does the hair look?

Appearance of fleece.—When examined closely, it is found that this fleece is composed of hairs of different lengths, each hair somewhat curly, and having uneven edges. The irregularity of the edges of these fibres is one of the chief reasons why wool is such an important material of manufacture. The little rough projections which you will find on wool fibres, if you examine them through a microscope, cause these fibres to attach themselves to each other very firmly.

Are the rough edges of the fibres of any use?

Are the hairs all the same length?

The sorting. The fleece is carefully sorted, the long hairs being separated from the short ones. Hairs of various lengths are found on a single sheep. The fleece is then cleansed again, for the first washing is not sufficient to remove all impurities.

How are the hairs straightened?

The wool-comber.—Next, to straighten the hairs, and lay them all out in the same direction, an iron comb is used, called a *wool-comber*. It has sharp pointed teeth.

What two processes convert the raw wool into cloth?

Manufacture.—The wool fibres are then spun and woven into cloth, the same kind of machinery being used as in the manufacture of cotton cloth.

What is yarn?

Worsted?

Yarn and worsted.—Some of the wool is not woven, but after being spun into threads, several threads are twisted to make *yarn*, which is used for making stockings. When the threads are twisted very firmly, *worsted* is made, from which so many beautiful fancy articles are fashioned.

The cloth.—Woolen cloth as it comes from the loom is very soft and flexible. It is sometimes colored before being woven, but usually is dyed

after being made into cloth. Woolen cloth is especially adapted for making clothing to be worn in cold weather.

What season of the year do we wear woolen clothing?

Where manufactured.—France and England manufacture a large quantity of woolen cloth every year.

Where is woolen cloth made

In the New England section of our own country are many mills which produce a very fine grade of goods.

Varieties of cloth.—The cloth receives different names, owing to slight differences in texture or width.

What is broadcloth?

Broadcloth is a finely finished goods, very wide. It is used principally for gentlemen's clothing.

Merino?

Merino is made from the fleece of a species of sheep of that name. Flannel is a heavy material used for blankets and underclothing.

Name some garments always made of flannel?

Shoddy is a coarse goods used for rugs, carpets and rough cloth for overcoats. It is made of old woolen rags which are cleaned and softened by machinery, and spun and woven over again. Sometimes a little fresh wool is added to the old stock.

What use is made of old woolen rags?

Many of the beautiful table-covers and carpets we see, are made of old soiled woolen rags discarded as unfit for use.

What is felt used for?

Is this goods spun or woven?

How is it made?

Felt is a thick cloth used for making hats and floor-covering. It is made of wool and hair mixed together, but not woven. Layers of wool and hair are spread on top of each other, then dampened and submitted to great pressure. The rough edges of the wool fibres, before spoken of, make this process possible, for the little projections interlace and

take firm hold of each other, so that after the pressing it is impossible to separate the fibres.

Describe the llama?

The Llama.—This animal is somewhat like a camel in shape, only it has no hump. It is sometimes called the Peruvian camel. Its hair is long and silky and is much used for fringes and ornaments.

Where is Peru?

Where were Indian shawls first made?

How does the fleece of this goat grow?

The Cashmere Goat.—This goat is so called because its hair was first made into beautiful shawls in the city of Cashmere, in India. They are now made also in some parts of France. The outer hair of the animal is stiff and coarse, while under this is a layer of fine silky fleece. The latter is used for the shawls. These shawls are elaborate in design and coloring, and are very expensive.

What other animal produces material for woolen clothing? Describe it.

The Alpaca.—This is a smaller animal than the llama, and has a long neck and handsome head. Its wool is long and glossy. The material made of it bears the name, *alpaca*, and retains the silky gloss, peculiar to the hair of the animal.

Is woolen manufacture a new industry?

Tell where each of these nations lived?

How was a Roman toga made?

Early history of wool.—The manufacture of wool into cloth dates back to a very early period in the history of the world. From the Bible we learn of the flocks of sheep which constituted the chief wealth of the patriarchs of olden time. The Hebrews, Greeks, Egyptians and Romans all used clothing woven of this material. Their garments were loose and flowing, and they were very particular about the fineness and beauty of the material of which they were made.

BLACKBOARD OUTLINE.

WOOL.

1. WHAT IS IT?
2. WASHING THE SHEEP.
3. SHEARING THE SHEEP.
4. SORTING THE HAIRS.
5. APPEARANCE OF FIBRES.
6. COMBING THE WOOL.
7. MANUFACTURE.
8. YARN AND WORSTED.
9. VARIETIES OF CLOTH.
10. THE LLAMA.
11. THE ALPACA.
12. THE CASHMERE GOAT.
13. WOOL IN ANCIENT TIMES.

OBJECTS TO AID IN TEACHING WOOL.

1. PICTURES OF SHEEP, ALPACA, LLAMA, AND CASHMERE GOAT.
2. SAMPLE OF FLEECE.
3. SAMPLES OF YARN AND WORSTED.
4. PIECES OF FLANNEL, MERINO, FELT, &c.
5. MAPS OF THE COUTRIES MENTIONED IN THIS ARTICLE.

What insect produces silk?

The Silk-worm.—Silk is obtained from small caterpillars about two inches long, and light colored. The leaves of the mulberry tree are the principal food of these worms and they eat greedily of them.

On what does it feed?

How is the cultivation of the worm conducted?

Method of cultivation.—The worms are placed on shelves in a room which is kept at summer heat. The insects are then supplied with mulberry leaves, of which they partake eagerly for several weeks. They grow very stupid and increase to double their original size.

How are the cocoons made?

The cocoons.—When the worms can eat no more, they commence spinning two silken threads from two compartments in their wonderful little bodies. They unite these threads by means of a gum, secreted in their mouths, and envelope themselves in the silk until entirely hidden. The shelves are then covered with these balls of silk called cocoons. They are light colored, and the size of a pigeon's egg.

Describe their appearance?

Destroying the moths.—The silk cultivator selects a number of perfect cocoons, and puts

them away as a supply for the next season. The moths in these cocoons are allowed to work a passage out. The other cocoons are heated in an oven until the moths are dead, then the outer floss, which is coarse and rough is removed. The inner balls are thrown into hot water to loosen the silken threads, which are then carefully unwound. The thread in a single cocoon generally measures about six hundred yards. Occasionally one is found twelve hundred yards long. The threads are so fine, that several cocoons are untwisted at the same time, and the threads wound on a reel. In this state the silk is called *raw-silk*. These threads go through the processes of spinning and weaving, that the cotton and woolen threads do, and finally we have the beautiful silken textures so much used.

What transformation occurs within the cocoons?

How is the silk procured from the cocoons?

What is the usual length of one thread?

What is raw silk?

What processes convert raw-silk into silken materials?

Kinds of silken-fabrics.—*Dress-silk* is woven like plain cloth, and has a lustrous appearance. It varies in color and quality and is often named after the manufacturer or the city in which it is made.

Satin is a very elegant material. The woof or cross-wise threads pass over several threads of the warp at a time. The fabric is then passed between heated iron rollers, which impart a smooth and glossy appearance.

How is satin woven?

Velvet has a silky pile on its surface formed by short pieces of thread which are crowded together so closely that they stand up and hide the warp and woof.

How is velvet made?

Gauze is a thin material, woven in a peculiar manner which gives firmness without thickness. It is used for making veils.

What is gauze?

Besides these plain materials, there are some

that are brocaded, or ornamented with figures and flowers.

What is silk sometimes mixed with?

Silk is often mixed with wool, as in bombazine and poplin.

Where silk is produced.

Where did the silk-worm first assume importance?

The cultivation of silk-worms was first attempted in China, and for a long time was not introduced in any other country. China still takes the lead in silk manufacture, but it is now made in France, Italy, Persia and India. The city of Lyons, in France, produces some of the richest silk fabrics in the world.

What countries manufacture silk?

Where is Lyons?

Introduction of Worms into Europe.—The first silk-worms were taken from China to Europe by two Persian monks. They had great difficulty in obtaining worms, for the Chinese were opposed to having any other nation cultivating them. and used every effort to keep their methods of making silk a secret.

How was the silk-worm carried to Europe?

At last these monks succeeded in procuring a few eggs, which they hid in their clothing and carried to Constantinople, where they hatched them.

Where is Constantinople?

Method of hatching eggs.—I have told you that out of every collection of cocoons, a number of perfect ones are retained for future supply. The moths crawl out and lay quantities of tiny eggs. The moths then die.

What is necessary to hatch the eggs of silk-worms?

Care must be taken that these eggs do not become heated which would cause them to hatch at once. The cultivator does not wish them to hatch until the mulberry leaves are again plentiful. The eggs are placed in glass bottles, and all air and heat excluded.

Is it wise to hatch them at any season?

When it is desired to hatch them, heat is all that is necessary.

Different ways of heating eggs.—In some countries the warmth of the sun is sufficient. The usual method is to place the eggs in heated rooms until hatched.

Tell some of the different methods of heating eggs?

In other places they are placed in small paper packages and the peasants wear them in their bosoms, until the warmth of their bodies makes the eggs ready to hatch.

The insects are very small and dark colored when they first appear.

How do the insects look when first hatched?

They grow rapidly, changing their skins four or five times.

BLACKBOARD OUTLINE.

SILK.

1. THE SILK-WORMS.
2. CULTIVATION OF WORMS.
3. THE COCOONS.
4. THE MOTHS.
5. OBTAINING THE SILK.
6. MANUFACTURE.
7. SILKEN FABRICS.
8. SILK PRODUCING COUNTRIES.
9. INTRODUCTION OF SILK INTO EUROPE.
10. METHOD OF HATCHING EGGS.

OBJECTS TO AID IN TEACHING SILK.

1. SILK-WORM, OR PICTURE OF ONE.
2. COCOON, OR PICTURE OF ONE.
3. MOTH AND EGGS, OR PICTURES OF THEM.
4. RAW-SILK.
5. SPOOLS OF SEWING-MACHINE SILK, FLOSS Etc.
6. SAMPLES OF VELVET, SATIN, GAUZE Etc.

From what source is flax obtained?

The plant.—Flax is a plant from two to three feet in height, with small pointed leaves and blue flowers. The stems are very peculiar, being hollow and covered with fibrous material. The flowers grow in clusters at the top of the stalks, and when they fall off, are succeeded by round seed-vessels, the size of a pea. Each seed-vessel contains ten flat seeds of a brown color.

Where are the seeds found?

Where does flax grow?

Where raised.—Flax is cultivated in most parts of the world. It was first known in Egypt. A fine species of the plant is now found in Holland and Belgium, and is also raised in Ireland. In Belgium the women work in the flax fields. This useful plant was introduced into America in 1629 from England, which country owes its knowledge of the plant to the Romans.

When was flax first seen in America?

It is now extensively cultivated in the United States.

When is the flax ripe?

How cultivated.—Flax thrives upon a rich, moist soil. The seeds are sown early in the spring and the crops are gathered in July and August. Sometimes a second crop can be obtained later on. In June, when the delicate blue flowers

How does a flax field look?

are in bloom, the flax fields present a beautiful appearance. When the plants are thoroughly ripe, the leaves drop off, and the stems turn yellow.

How the flax is prepared.—The stalks are pulled up and tied in bundles to dry. The seed-vessels are taken off and put away in bags for future use. The stalks are steeped in water until softened so that the fibres of the outside covering or bark can be separated. After being dried in the sun, any woody portion of the plant which may adhere to the fibres is removed by an instrument called a *brake*. To prepare the flax for the spinning machine, the fibres must be laid out straight. This is done with a *hatchel*, a contrivance resembling a brush, with sharp pointed needles on it where the bristles are usually found. The flax is drawn over these points, and the long fibres become straight. The short, uneven ones are left, and make a substance called *tow*.

How are the fibres separated?

How cleaned and straightened?

What is a hatchel? What is tow?

Manufacture.—The processes required to convert these fibres into cloth are the same that are necessary in the manufacture of wool and cotton. The spinning and weaving are now done entirely by machinery. Flax fibres are of a brownish color, and have to be bleached before the beautiful white color of linen can be obtained. The quickest way to accomplish this is to use chloride of lime.

What is done to make flax into cloth?

How is flax sometimes whitened?

How linen is used.—Various qualities of linen are manufactured, which are used for making sheets, handkerchiefs and underclothing. From linen thread we make lace and fancy edgings.

What is linen used for?

Damask.—A rich variety of linen cloth, woven with figures, is called damask. Ireland manufac-

What is damask?

tures a fine quality of this material. It is used for tablecloths, napkins and towels.

Lawn is a very fine material, first made in France. It is now made in Belfast and other cities of Ireland.

Lawn?

Linen manufacture in Egypt.—The spinning and weaving of flax into linen is a very old industry. Egypt was noted for the fineness of the linen made there, thousands of years ago. Some of this linen is on exhibition in museums in our large cities, forming the wrappings of Egyptian mummies. Many yards of these goods were used for that purpose and examination shows that it was of a very fine quality.

What country first engaged in linen manufacture?

How was much of it used in that country?

The Greeks and Romans also used large quantities of linen in the early ages.

Where do the Greeks and Romans live?

The seeds.—The seeds of the flax plant are very valuable. They are ground and pressed and yield a useful oil known as *linseed oil*. This oil is used for mixing paints and varnishes.

Of what use are the seeds?

What is linseed oil used for?

Flax seeds are also used as a medicine for colds and lung trouble. They are often made into poultices.

BLACKBOARD OUTLINE.

FLAX.

1. THE FLAX PLANT.
2. CULTIVATION.
3. PREPARATION OF FIBRES.
4. MANUFACTURE.
5. USES OF LINEN CLOTH.
6. LINEN IN OLDEN TIMES.
7. FLAX SEEDS.
8. LINSEED OIL.

OBJECTS TO AID IN TEACHING FLAX.

1. PICTURE OF PLANT.
2. SAMPLES OF FLAX FIBRE.
3. SPOOL OF LINEN THREAD.
4. PIECES OF LINEN, DAMASK, &c.
5. BOTTLE OF LINSEED OIL.
6. SEEDS AS PREPARED FOR POULTICE.

Its source.—The skins of horses, cows, calves and oxen are converted into leather, also the skins of the wild herds of cattle found in South America, Switzerland and Mexico.

What is leather made of?

Several processes are necessary to change the hides into the durable, useful material known as leather.

Preparation.—The raw hides are cleaned to remove the fat that may be on them, and then they are soaked in lime and water. This liquid loosens the hair so that it can be pulled out.

What is the first step in the preparation of the skins?

The clean hides are again soaked in water mixed with barley, or some substance of an acid nature. The pores of the skins become open, and they are ready for the next operation called *tanning*.

How are the pores opened?

Tanning the hides.—The bark of the oak or hemlock tree is dried and ground into a coarse powder. This powder is mixed with water and put into large vats. The skins are soaked in this liquid for many months. The action of the bark

What substance is used for tanning?

How does the leather appear after tanning?

How is the leather made smooth?

causes the skins to shrink in size, and become very strong, while at the same time they are flexible.

After remaining in the tan-pits until thoroughly tanned, the skins are taken out and dried, and then passed between rollers to make them smooth.

Varieties of leather.—The above operations are necessary to convert the raw hides into leather. Slight variations in the manner of treatment produce the different kinds of leather. The skins of calves and sometimes those of cows are used for the uppers of boots and shoes, and the hides of oxen are made into the soles.

What skins are used for shoes?

What is seal skin used for?

The latter animals also furnish the leather for straps and harnesses. Seal skin is converted into a firm leather used for the tops of hunting boots, and for the manufacture of bags and pocket-books.

Morocco leather.—The skins of goats found in Switzerland are used for making Morocco leather. After the tanning, for which sumach is used instead of oak-bark, the leather is rubbed with a ball with a ribbed surface, so that it will have a grained appearance. It is used for covering chairs, books, &c.

What is Moroco leather?

Is there any peculiarity in the appearance of Morocco leather?

Sheep skin forms a cheap leather which is used for pocket-books, lining bags and covering books.

Name a cheap leather.

Kid.—The skins of lambs and young goats are used for making gloves and ladies' shoes. They are not soaked in tan-bark and water, but alum is used instead of the bark. This renders the skins very soft and flexible. The leather so made is known by the general term of *kid.*

What is kid?

What is it used for?

The manufacture of shoes is extensively engaged in throughout the New England States. In England and France also this is an important industry. Fine leather gloves are obtained from Germany.

Where are shoes made?

Materials for writing.—Parchment is a material made from the skins of sheep or goats. The skins are soaked in water mixed with lime, salt and alum, then they are scraped smooth and stretched until they are very thin. This kind of leather was first made in Asia, many years ago. It was used for writing upon, and it was upon this material that the first copies of the Bible were made.

What is parchment made from?

Of what use is it?

Vellum is made from the skins of calves treated to the same process. It is strong and delicate, and was used in olden times for the leaves of books. Some of these books are yet in existence, and are very curious and beautiful.

What other writing material is made of leather?

Glue.—The small pieces of leather which are left after the various articles have been manufactured are not wasted. They are boiled until they form a jelly-like substance. This, when it hardens, is the glue so useful in many ways.

Of what use are the small pieces of leather?

BLACKBOARD OUTLINE.

LEATHER.

1. WHERE OBTAINED.
2. PREPARATION.
3. TANNING.
4. VARIETIES OF LEATHER.
5. ARTICLES MADE OF LEATHER.
6. KID.
7. PARCHMENT.
8. VELLUM.
9. GLUE.

OBJECTS TO AID IN TEACHING LEATHER.

1. SKINS IN RAW STATE.
2. PIECES OF TAN-BARK.
3. SAMPLES OF LEATHER
4. ARTICLES MADE OF LEATHER AS SHOES, POCKET-BOOK, STRAP, BAG, &c.
5. KID GLOVES.
6. GLUE.
7. PIECE OF PARCHMENT.
8. PICTURES OF ANIMALS NAMED.

Source.—Fur is a name applied to the fine, hairy covering of certain animals. The animals producing the finest fur are found in cold regions. The largest number come from countries bordering on the Arctic Ocean. The most well-known fur-bearing animals are the seal, beaver, sable, fox, mink, marten, otter, ermine and muskrat.

What is fur?

Name some animals that furnish fur.

Preparation of skins.—After the skins have been removed from the animals and before they are cleaned, they are called *pelts*. The pelts are cleaned and dried and then placed in tubs, where they are subjected to a treading process. Men trample on them until they are soft and flexible. Before the pelts are trampled on, they are greased with lard, which adds to the softness. They are next placed in tubs and covered with saw-dust and the treading is repeated. This operation is repeated a third time with plaster of Paris or whiting laid between the pelts. The skins are then vigorously beaten, and the hair combed until it is smooth. Furs are frequently dyed to make them of a richer color.

What are pelts?

What is done to soften them?

What different substances are used on the pelts?

What is fur used for?

Uses of fur.—Fur forms the principal clothing of the inhabitants of very cold regions. The Esquimaux and inhabitants of Greenland and Iceland depend entirely upon fur-bearing animals for the warm clothing so necessary in the countries in which they live. In the temperate regions, furs are used as ornamental additions to the toilet and are very costly.

Where do Esquimaux live?

Name some countries bordering on the Arctic Ocean.

The seal.—This animal is found in the countries bordering on the Arctic Ocean. It spends most of its time in the water. In appearance it is awkward, about five or six feet in length, with a small head and brown fur. The under layer of fur is composed of short, fine hair. Beyond this, long, coarse hairs extend. These are removed and the short fur is used. The fur is slightly curly, but after dyeing it becomes straight. Seals are caught in this manner. The hunters wait until a large number are asleep on the rocks near the water. They then surround them and drive them to the killing ground which is at some distance. The men then gather around the herd and beat them to death with heavy clubs. The seals are so crowded together and so tired from their long journey on land, that they offer but little resistance. The fur of the seal is very valuable. It is used for making overcoats, sacques, muffs and trimmings.

Describe the seal.

How are seals killed?

For what is seal-skin used?

The beaver.—North America is the home of the beaver. So many of these animals have been killed to furnish fur, that they are becoming very scarce. The fur is a dark, rich color and is used for muffs, collars, capes and trimmings. Beaver is also extensively used for making hats. When made into material for hats, the hair is removed

What is beaver used for?

from the skin. This hair has the same property of *felting* that wool has, and is treated in the same way.

How is it prepared for hat-making?

The sable.—This animal is a native of Siberia, but like the beaver, is rapidly disappearing. The sables vary somewhat in color. Some have long, dark brown hair; others have dark hair with white points. The most valuable are all black, but these are very scarce. The process of catching sables is a difficult one. In the autumn the hunters travel in sleds to where the sables abound and erect huts in which they live several months. It is extremely cold and the hunters suffer many hardships. The sables are caught in traps, which are scattered over a large extent of land. The fur is very expensive.

Where are sables found?

How are sables captured?

Describe the various kinds of sable fur.

The ermine.—The fur of this animal used to be the favorite material for the robes of kings and queens. It is not so fashionable now, and therefore not so expensive. The animal is found in the Arctic regions of Europe and Asia and is a little over a foot long. In summer the fur is a reddish brown, but in winter it becomes pure white except the tail, which is pale yellow with jet black tip. The tails are used to decorate the muffs, collars, etc., made of the ermine.

How was ermine formerly used?

Describe the ermine?

What use is made of the tails?

The marten.—This animal is found in North America and possesses valuable fur. There are several species of martens. The *mink* belongs to this family, and has beautiful brown fur, with stripes of a darker shade. Mink is used for muffs and capes, also for lining outdoor garments.

What family does the mink belong to

The otter.—Russia is the home of the otter. It is three or four feet long and has glossy brown

How does the otter look?

How does it carry its young?

fur. It lives in the water and swims very rapidly. It has extraordinary love for its young and when moving from place to place will carry the little ones in its mouth. The otters frequently lie on the rocks in the sunshine, and it is while they are asleep in this way, that the hunters kill them. They are either shot or caught in nets. A species of otter is found in Alaska and in nearly all the States and Territories.

How are otters killed?

The muskrat.—The muskrat resembles a small beaver. Its habits resemble those of the beaver. It has its home near the water and spends much time swimming. It builds a little hut in which it lives during the winter. Early in the spring the Indians kill the muskrats by spearing right through the huts. The fur is reddish brown and very soft. It is used for making hats.

Tell some of the habits of the muskrat.

How are muskrats killed?

What species of fox furnishes valuable fur?

The fox.—The fur of the most common species of this animal is a reddish color. The Arctic fox has fur of a blue-white color, which is very valuable.

What skins are used for carriage-robes?

The skins of the bear, buffalo, leopard and tiger are made into mats and carriage robes.

BLACKBOARD OUTLINE.

FUR.

1. ITS SOURCE.
2. PREPARATION.
3. USES.
4. SEAL.
5. BEAVER.
6. SABLE.
7. ERMINE.
8. MARTEN.
9. OTTER.
10. MUSKRAT.
11. FOX.

OBJECTS TO AID IN TEACHING FUR.

1. PICTURES OF ANIMALS NAMED.
2. SAMPLES OF FUR, BEAVER, SABLE, &c.
3. COLLARS, MUFFS, &c., MADE OF FUR.

From what are feathers obtained?

Source.—The plumage of various birds forms an important article of commerce. Not only do we use the feathers as articles of trimming and ornament, but for the stuffing of beds and pillows. The quills of feathers were formerly made into pens, but the extensive manufacture of steel pens has made this unnecessary at the present time.

Of what were pens formerly made?

Tooth-picks are often made of the quills.

For what are geese-feathers used?

Useful feathers.—Beds and pillows are stuffed with the feathers of geese. In many sections of Great Britain, and in our own country large numbers of geese are raised.

Their feathers are picked several times a year. The feathers so picked are called "live geese feathers."

What other birds supply stuffing for beds?

Those taken from dead geese are not as valuable. The feathers of the swan and duck are used for the same purpose.

Where do eider-ducks live?

Eider-ducks.—These birds furnish a very valuable article known as *eider-down*. In Scotland, Norway, Greenland and other cold countries, there are large flocks of these birds. They live on small

islands and build nests very close together. The down grows on the breast of the duck and after she has laid her eggs, she plucks out the down to cover them. The collectors of this down watch the ducks and take away the down. Both the male and female bird continue the process of lining the nest, and covering the eggs with down, until their breasts are entirely deprived of this beautiful covering. The down is light and soft and is used for stuffing bed covering. It is especially adapted to this use as it gives warmth without weight.

Where does the down grow?

For what is the down used?

Eider-ducks in Iceland.—In Iceland these ducks are very plentiful and at the season of nest-building, many of the small islands and sections on the coast are almost impassable. The nests are so close together that they form a solid flooring. The birds are quite large, the female being a brown color, and the male much lighter.

How do eider-ducks build their nests?

What color are the ducks?

Swan's-down.—The soft feathery substance found on the breast and under the wings of a swan is also much used, both as a stuffing for coverlets, and as dress trimming. For the latter purpose the bird is killed and the skin taken off, and the down left on the skin and cut in strips. It is very soft and pure white in the natural state, but is often dyed delicate colors.

What is swan's-down?

For what is it used?

Ornamental feathers.—Feathers which are only adapted for ornamental purposes are obtained from the ostrich, marabout, peacock, pheasant, bird of paradise, heron, osprey, egret and many other birds.

Name birds whose plumage is used for ornament.

The ostrich.—The largest number of feathers used for ornament is furnished by the ostrich. This

Describe the ostrich.

Are the feathers valuable?

How are they used?

bird is a native of Africa, and is very large, being from six to eight feet in height. Its plumes are thick and valuable, varying in color from white through different shades of gray to jet black. The pure white feathers are very scarce. Ostrich feathers are used for head dresses, and trimming for hats, and dresses. They are dyed any desired color.

What bird found in India furnishes feathers?

Marabout feathers are procured from the marabout-stork, a native of India. They are white and grey, and very light and soft.

They are used for trimmings and head-dresses.

Of what are military plumes made?

Osprey and egret feathers are used for the plumes of military hats.

Name a very handsome bird from which we obtain ornamental feathers.

Bird of Paradise feathers present a variety of rich colors and are in demand as ornaments for hats.

For what are birds' wings used?

Hat decorations.—The wings of many small, gayly colored birds are used to trim ladies' hats, and sometimes the head, or the entire bird is used for the same purpose.

BLACKBOARD OUTLINE.

FEATHERS.

1. FROM WHAT OBTAINED.
2. GEESE FEATHERS.
3. EIDER-DUCKS.
4. SWAN'S-DOWN.
5. ORNAMENTAL FEATHERS.
6. THE OSTRICH.
7. MARABOUT FEATHERS.
8. OSPREY AND EGRET.
9. BIRD OF PARADISE.
10. HAT TRIMMINGS.

OBJECTS TO AID IN TEACHING FEATHERS.

1. GEESE FEATHERS.
2. PILLOW STUFFED WITH FEATHERS.
3. QUILL PEN.
4. QUILL TOOTH-PICK.
5. EIDER-DOWN.
6. STRIP OF SWAN'S DOWN.
7. OSTRICH FEATHERS.
8. MARABOUT FEATHERS.
9. WINGS OF BIRDS
10. PICTURES OF VARIOUS BIRDS.

Where does tea grow?

Appearance of plant.—The tea-plant is cultivated in China and Japan, and in some parts of India. It is an evergreen shrub, its height varying from three to eight feet. Its leaves are numerous and grow on short thick stalks. The flowers are large and white.

How does the plant look?

How is tea raised?

How cultivated.—The plants are raised from seeds, which are planted in holes about four feet apart. The leaves are not gathered until the plant is three years old.

When is the best tea gathered?

Varieties of tea.—In China the first picking occurs in March, when the leaves are small. These leaves are considered the best, and supply the finest and most expensive variety of the class of tea known as *green* tea. A month later, a second crop of leaves is gathered, and these leaves furnish the kinds of tea known as "*imperial*" and "young hyson."

When is "imperial" tea picked.

Which crop is the most valuable?

Early in summer, the third and last collecting of leaves takes place.

This gathering of leaves gives the black teas known as "souchong" and "bohea," much inferior

to those already mentioned, as the leaves of this crop are large and coarse.

How long are the plants of use?

Age of a plantation.—When the plants are nine or ten years old they are cut down and a new plantation made.

How are the leaves picked?

Preparation of the leaves.—The leaves are picked by hand, one at a time, great care being taken to have the hands of the pickers very clean. In China, the nobility are supplied with tea from the first crop of leaves, and the gatherers of these leaves have to be extra particular. They are obliged to eat certain kinds of food, and to take a bath two or three times a day. This great precaution is taken to prevent the leaves from injury and to preserve their fine flavor.

Tell some of the precautions required of pickers?

How is the tea dried?

The leaves are then dried. This is done by throwing them into a shallow pan and roasting them, stirring them all the time so that they will not scorch. They are then rolled in the hands, when they present the appearance of the tea sold in the stores, so familiar to us all. The tea is then packed in chests, lined with a thin layer of lead to exclude the air.

How is the tea packed for exportation?

These chests are then sent to various parts of the world and sold.

How is tea sometimes adulterated?

Impurities in tea.—Tea is so generally used now that it forms a very important article of commerce. It is often impure, owing to the dishonesty of the exporters. The usual method of cheating is either to mix dried leaves of other plants with the tea leaves, or to dye an inferior crop of leaves with Prussian blue, a poisonous dye, which gives

How colored to deceive purchasers?

the leaves the rich coloring that distinguishes those of the first gathering.

What country consumes the most tea?

Consumption of tea.—The greatest quantity of tea is exported to Great Britain. The people of that country are very fond of this drink and consume it at the rate of from two to two and a half pounds to each person, annually. The United States also consume a large amount of tea each year, averaging about a pound to each inhabitant.

What is the average in the United States?

How is tea used?

Tea as a drink.—Tea is prepared as a drink by steeping it in boiling water. In a few minutes the water is colored, and has the flavor of the leaves. It is sweetened with sugar and diluted with milk to suit the taste of the drinker.

What effect has tea on the health?

Which kind is most harmful?

Effects of tea-drinking.—The effect of tea upon those consuming it, has long been a matter of discussion. It is exhilarating without being at all intoxicating. It causes the brain to grow active and induces wakefulness. It is therefore taken by persons who are obliged to write at night. The best green tea, being made of the first crop of leaves, which possess the strongest flavor, is the most injurious. It is very apt to cause extreme nervousness. Black tea is not so harmful, as it is made of the last collection of leaves, which are not so strongly flavored.

In what country is tea of great consequence?

Tea-drinking in China.—Tea is an article of great importance in the Chinese Empire. The inhabitants are very particular and only use the best varieties. At all the festivals and holiday celebrations, this drink is plentifully supplied and is partaken of by young and old.

How do the Chinese drink it?

It is served very hot in thin China cups, and taken without milk or sugar.

BLACKBOARD OUTLINE.

TEA.

1. THE TEA-PLANT.
2. ITS CULTIVATION.
3. KINDS OF TEA.
4. PREPARATION.
5. IMPURE TEA.
6. USES OF TEA.
7. EFFECTS OF ITS USE.
8. TEA IN CHINA.

OBJECTS TO AID IN TEACHING TEA.

1. PICTURE OF TEA-PLANT.
2. TEA-LEAVES.
3. SAMPLES OF DRIED LEAVES.
4. CUP OF TEA PREPARED AS A DRINK.

Describe the coffee-tree.

Growth.—The coffee-tree is an ever-green, growing in its wild state to be from twenty to thirty feet high. The cultivated tree is not allowed to grow more than eight or ten feet in height. The leaves are dark green, pointed in shape and the flowers are small and white, and grow in thick clusters. They have a fragrant smell. The fruit looks like a cherry. Each berry contains two seeds or beans as they are called, their flat sides pressed tightly together. The pulp that surrounds these seeds is sweet and pleasant to the taste.

Describe the fruit.

What part do we use?

Cultivation.—Coffee is raised from seed which is sown in carefully prepared ground. The plants are kept in nurseries until they are a year old. Then a plantation is formed, the young trees being placed in rows a short distance apart. The first crop of fruit appears when the trees are three years old. The plants bear fruit for many months so that several crops can be gathered in a year. The plantation lasts twenty years or more.

How is coffee raised?

How old is the tree before it bears fruit?

Preparation.—The berries are placed in the sun and turned often until thoroughly dry. The pulp which surrounds the beans is removed by passing the berries between wooden rollers. The raw coffee-seeds are light in color and hard and tough. It is necessary to roast them before they are fit for use. After this operation the beans are a brown color and have an aromatic odor. Coffee is packed in large sacks for exportation.

How is the pulp removed?

What is done to the beans?

How is coffee sent to other countries?

Coffee-producing countries.—Coffee thrives in a moist, warm climate. It grew first in Arabia and Abyssinia. It is now also cultivated in Brazil, India and the West Indies. Brazil produces the largest amount of coffee, Rio Janeiro being an important coffee market. The island of Java furnishes the next largest supply. Mocha coffee, from Arabia is considered to have the finest flavor.

Of what countries is coffee a native?

Name other countries supplying coffee.

Adulteration of coffee.—Coffee is often mixed with other substances, chicory being most used for adulterating it. This is a powder prepared from the roots of a wild plant found in most parts of Europe. It is so much cheaper than coffee that dealers save money, when they cheat the public by selling a mixture of chicory and coffee for pure coffee. Carrot and dandelion roots are sometimes used for the same purpose.

Name substances used to adulterate coffee.

Why is this done?

Use of coffee.—Coffee is used as a drink and large quantities are consumed in the United States, Germany, England, France and most European countries. It is prepared for drinking in a very simple manner. The roasted beans are ground to a fine powder, over which boiling water is poured.

How is coffee used?

What nations use it?

Where are the countries named?

After steeping awhile, a dark liquid is the result, possessing the flavor of the beans. Milk and sugar are added to suit the taste of the drinker.

What effect has coffee upon those drinking it?

Physical effects of coffee.—Taken in moderation, coffee operates in a healthy manner on the system. It exhilarates and allays hunger. Taken in excess its action is harmful, and it produces nervousness, indigestion and wakefulness.

What part of the tree is used in Arabia?

Use of leaves.—In Arabia the leaves are used in preparing a drink instead of the beans. They are dried and rolled and used as tea leaves are used. They have the taste of the beans.

Relate an incident connected with the discovery of coffee.

Story about coffee.—This story is told of the discovery of the power coffee possesses of stimulating and causing wakefulness. The keeper of a number of goats was much annoyed by their playfulness at night. After close watching he noticed that they were always wakeful after they had eaten many of the coffee plants so plentiful around them. An Arabian priest (Mohammedan) hearing this story, determined to make a drink of coffee and give it to the monks of his convent, who were often so sleepy that they would fall asleep at morning prayers. He did so and found it successful in keeping them awake during prayer time.

BLACKBOARD OUTLINE.

COFFEE.

1. THE COFFEE-TREE.
2. CULTIVATION.
3. PREPARATION.
4. WHERE IT GROWS.
5. ADULTERATION.
6. USE OF COFFEE.
7. EFFECTS OF USE.
8. STORY ABOUT COFFEE.

OBJECTS TO AID IN TEACHING COFFEE.

1. PICTURE OF TREE.
2. COFFEE BERRY AND BEANS.
3. GROUND COFFEE.
4. CUP OF COFFEE PREPARED AS A DRINK.
5. MAPS OF COUNTRIES NAMED.

Describe the cocoa-tree.

The cocoa tree.—The tree from which we obtain cocoa or chocolate is known by the names, cocoa, cacao and coco tree. It is handsome, from ten to twenty feet high, and is like a cherry-tree in appearance.

What tree does it resemble?

What shape is the fruit?

The fruit.—The tree has cucumber shaped fruit, consisting of a hard outer part, six or eight inches long, and a soft, white substance within. This soft pulp surrounds and protects seeds about as large as an almond. Many seeds are contained in each fruit. These seeds are the source of the cocoa or chocolate we use.

What part is used?

Where does the tree grow?

Where cocoa grows.—The cocoa tree can only be raised in warm countries. It is a native of Mexico, but is cultivated in South America, Africa and the West Indies.

Do the trees need much attention?

Cultivation.—The trees are extremely tender and require a great deal of care. To protect them from the hot rays of the sun, large plants with much foliage are planted between the rows of cocoa trees. These serve as a shield, and screen the

plants from the glaring sunlight.

How are they protected?

The flowers are red, and grow from all parts of the tree. The tree is considered full-grown when about six years old, but it commences to bear fruit in the third year.

When does the fruit appear?

Preparation of seeds.—After the fruit is ripe, it is picked and the seeds taken out. They are cleaned and spread out to dry in the warm sunlight. To make the chocolate with which we are familiar, the seeds are ground into paste by pounding with heated stones or passing between hot rollers. It is then made into little cakes, mixed with sugar and spices. It is sold in this state. It is much used by confectioners in making candy, and by bakers in making fancy cakes.

How are the seeds prepared?

For what is chocolate used?

Chocolate as a drink.—To make the drink which is such a favorite with many people, the chocolate cakes are ground and mixed with boiling milk and water.

How is it prepared for drinking?

It is delicious in taste but is so rich, owing to the oily matter contained in the cocoa-beans, that it is not considered very healthy. Cocoa seeds are sometimes simply ground to a powder, and sold in this state, unmixed with any spices.

Is chocolate healthy?

What makes it so rich?

This powder is made into the drink of the same name, *cocoa*, and is not nearly as rich and indigestible as chocolate.

What plainer drink is made of cocoa?

Other ways of using seeds.—In the countries where the cocoa-tree grows, the seeds are eaten as an article of food.

Where are the seeds eaten?

A kind of liquor is also obtained by the fermentation of the fruit.

What else is obtained from the seeds?

BLACKBOARD OUTLINE.

CHOCOLATE.

1. SOURCE.
2. DESCRIPTION OF FRUIT.
3. CULTIVATION.
4. PREPARATION OF SEEDS.
5. USE OF SEEDS.

OBJECTS TO AID IN TEACHING CHOCOLATE.

1. PICTURE OF TREE.
2. SPECIMEN OF FRUIT.
3. CUP OF CHOCOLATE PREPARED AS A DRINK.
4. CANDY, CAKE, &c. CONTAINING CHOCOLATE.
5. CAKE OF SOLID CHOCOLATE.

The plant.—Rice is a kind of grass, resembling wheat in size and manner of growing. It grows to be about four feet high and has a long central stalk. At the top of the stalk, several stems are formed, each stem bearing a cluster of the rice.

Describe rice.

Where found.—This grass is found principally in China and Japan, but it grows to some extent in all warm countries. Heat and moisture are necessary for its culture. The seeds are planted and then the ground is flooded with water.

Where is rice found?

What are necessary for its growth?

Preparation for use.—When the grain is ripe it is cut down with a sickle, and bound into sheaves to dry. The rice is separated from the straw in mills, and the operation is called *threshing*.

What is threshing?

The kernels of rice are inclosed in rough yellow husks and these are taken off by pounding them between two stones. At one time this process was performed by hand, but now there are machines for this purpose. In these machines there are revolving stones which rub off the husks without

How are the husks removed?

How do the kernels look?

crushing the rice. The kernels of rice then appear round and pure white.

Sometimes the husks are not removed but the rice is packed with them on, and sent to other countries, where the shelling is performed.

Are all the rice kernels the same size?

Which are the most valuable?

The kernels.—The kernels of rice vary in size and must be sorted so that all of the same size will be together. The large, perfect kernels are of the greatest value. There is a medium size called "*middling rice.*" The broken kernels are ground into flour.

Where is rice of great importance?

How is it eaten by the Chinese?

Importance of rice in China and India.—India and China produce immense quantities of rice, and it forms the principal food of the inhabitants of these countries. In the latter country it is eaten with chop-sticks. These are small, pointed pieces of wood or ivory, with which the Chinese carry the rice to their mouths. It would be a slow process to any one not familiar with the method, but the Chinese are so dexterous in the use of the sticks that they can consume a large quantity of rice in a short time.

Where is rice cultivated?

General cultivation.—The warm countries of Africa also furnish rice. It is thought it was first introduced into the West Indies by Columbus, on one of his early voyages. It is now extensively cultivated in North and South Carolina, and other southern states. Formerly large portions of these states were swampy and apparently of little value. This boggy ground was just the right soil for the growth of rice, and now in place of the wet, worthless regions, are found fields of this grass.

Are the southern bogs of any use?

Difficulties in cultivation.—The cultivator of rice finds his chief difficulty in the raids of the sparrows and rice-birds. These birds evidently like rice as well as the human race does, and they do great damage by biting off the heads of the grass, just as it is ripening. The usual method of frightening these little thieves is to put a scare-crow in the field. A scare-crow is a post or rail dressed in old clothes, so that it bears some resemblance to a man. It deceives the birds and keeps them at a respectful distance.

What interferes with the growth of rice?

What is a scare-crow?

Rice as an article of food.—Rice is a very healthy and nutritious article of food. It is usually prepared for the table by boiling it in water. During this process, the kernels swell to more than double their original size.

The *rice-flour* is made into cakes and there is a solution called *rice-water*, which is used for medical purposes.

BLACKBOARD OUTLINE.

RICE.

1. DESCRIPTION OF GRAIN.
2. HOW PLANTED.
3. PREPARATION FOR USE.
4. THRESHING.
5. HUSKING.
6. VARIETIES OF KERNELS.
7. RICE IN CHINA.
8. GENERAL CULTIVATION.
9. RAIDS OF THE BIRDS.
10. RICE AS AN ARTICLE OF FOOD.

OBJECTS TO AID IN TEACHING RICE.

1. SAMPLES OF THE GRAIN.
2. RICE IN THE HUSKS.
3. KERNELS OF RICE.
4. RICE-FLOUR.
5. CHOP-STICKS.
6. MAPS OF COUNTRIES NAMED IN THIS ARTICLE.

Where found.—Salt is a mineral substance which is obtained in different ways. It is found in a rocky state in salt-mines, or it is procured from the water of salt springs, seas, lakes and oceans.

Where is salt found?

How obtained from water.—When obtained from water, the salt is separated from the liquid by allowing the water to evaporate. The water is put in shallow vessels and exposed to the heat of the sun. In very warm countries, the sun's rays are sufficient to dry up the water and leave the salt in the bottom of the pans. The salt grows solid and crystallizes in cube-shapes. Where the climate is cool, artificial heat is used to cause evaporation. The salt is made finer and purer by boiling it.

How is salt procured from salt water?

What shape are salt crystals?

Salt-springs.—The principal salt-springs are in England, Prussia and the northern part of Italy. Russia derives much salt from salt lakes, and the countries bordering on the Mediterranean Sea, obtain large quantities of the mineral from that sea.

Where are the most important salt springs?

Salt in the United States.—Quantities of salt are obtained from springs in New York, Virginia, Pennsylvania and Michigan. The most productive one is near the city of Syracuse, in New York. The salt is procured by boring wells, two or three hundred feet deep, and the salt water is pumped into tanks prepared for evaporating purposes. After the water has disappeared, the salt is allowed to drain for a couple of weeks, and is then packed in barrels to be sold.

What large spring in New York?

How is this spring worked?

What are salt mines?

Salt mines.—Salt mines are found in Russia, Germany and Poland. They consist of vast quantities of rock-salt, extending hundreds of feet below the surface of the earth.

Where found?

Where are these countries?

They are entered by means of passages from the surface called shafts, and many men are employed in *working* the mines.

How is the salt obtained?

They cut out pieces of the salt and load little cars with them, which carry the salt to the open air.

Preparation of rock-salt.—Rock-salt is treated very much in the same manner that salt from springs is. It does not dissolve as easily and is often mixed with impure matter. This must be removed, and the salt boiled until it becomes the fine, white, glistening substance we are so familiar with.

How is rock-salt prepared for use?

The famous mine of Poland.—In Poland there is a very wonderful mine, over a thousand feet deep. It is divided into many floors, galleries and passages, all of solid salt. One of the divisions of this mine resembles a church so much that it is called St. Anthony's Chapel. The altar, pulpit and statues are all of salt and are as perfect as if

Where is there a remarkable mine?

Describe the chapel.

carved from marble. The royal families sometimes visit this mine, and the chapel is then brilliantly lighted up. The crystals of salt glisten beautifully and the scene is a dazzling one.

How are royal families received in it?

In this same mine there is a very large room, called the *reception* room, and festivals are sometimes celebrated here. Rows of seats are arranged around the room, and there is a raised platform of salt, for the musicians. On one of the upper floors of this wonderful mine there is a lake eighty feet long and little rafts are employed to float noted visitors on its surface.

Describe the reception room.

Describe the lake.

One of the rooms on the third floor contains a tomb made of salt, erected in memory of one of the Austrian Emperors. It is estimated that in order to visit every portion of this immense mine, one must walk at least three hundred miles.

Is the mine very large?

Uses of salt.—Salt is *absolutely necessary* as an article of food. It forms a part of most everything prepared for the table. It enters also into mixtures which are used as medicines. Meat is kept from spoiling by packing it in salt, when it will remain pure for a long time.

For what is salt necessary?

How does it taste?

For what purposes is it used?

Religious importance of salt.—The Hebrews use salt in the observance of all their religious ceremonies. It is considered by them, an emblem of purity.

How is salt used by the Jews?

BLACKBOARD OUTLINE.

SALT.

1. WHERE PROCURED.
2. HOW OBTAINED.
3. PREPARATION FOR USE.
4. SALT-SPRINGS.
5. SALT MINES.
6. THE GREAT MINE OF POLAND.
7. USES OF SALT.
8. SALT AS AN EMBLEM OF PURITY.

OBJECTS TO AID IN TEACHING SALT.

1. SPECIMENS OF ROCK-SALT.
2. SALT-WATER.
3. BAG OF REFINED SALT.
4. PIECE OF MEAT PRESERVED IN SALT.
5. MAPS OF ALL COUNTRIES NAMED IN THIS ARTICLE.

From what obtained.—The principal source of sugar is the sugar-cane, a plant which grew first in Asia, but now grows in all warm regions. The plant consists of a thick, jointed stem, which varies in height from three to twelve feet. The stem is over an inch in diameter. The outside of it is thick and fibrous, and encloses a sweet, juicy substance. Flowers grow from the top of the stem, and from each joint there grows a leaf.

Where does sugar-cane grow?

Where is the juice stored?

Where are the flowers?

Cultivation.—The sugar-cane is a perennial plant, that is, it does not require planting every season, but lives on from year to year. The canes of a plantation are arranged in rows. The plantations supply a good quality of sugar until the plants are from six to ten years old.

How are the canes planted?

A new plantation is then formed by cutting off the tops of the old canes and planting them.

How is a new plantation made?

Where sugar-canes grow.—The best canes are raised in the West Indies. There are also large sugar plantations in Louisiana and other Gulf States.

Where are the best sugar-canes raised?

Where are the West Indies?

How is the juice obtained?

Procuring the sugar.—In March the canes are cut down and the leaves stripped off. The stems are crushed between iron rollers, and the juice is squeezed out and flows into vessels ready for it. It is then boiled and strained several times and placed in shallow vessels to cool. It commences to crystallize as it cools. The sugar is now of a yellowish brown color, and is called *raw* or *brown* sugar, and the liquid that is still surrounding it is called *molasses*.

What is raw sugar?

What is molasses?

How is sugar refined?

What is loaf sugar?

Granulated sugar?

Powdered sugar?

The refining process.—To make the raw sugar pure and white, it is melted again and certain chemicals are mixed with it which cause all impure matter to separate from the sugar. The sugar hardens and is poured into molds. It is known as loaf-sugar. Some of it is cut into cube shapes and sold in that way. The remainder is ground into *granulated* sugar, and when ground very fine it is called *powdered* sugar.

What tree furnishes sugar?

How is it procured?

What is maple-syrup?

Maple-sugar.—A kind of sugar is obtained from the maple tree. In the spring-time a hole is bored through the bark of the tree and a tube inserted. The sap flows out into vessels placed to catch it. It is then gathered, poured into large pans and boiled over a slow fire until it assumes the consistency of thin molasses, when it is called maple-syrup. To make sugar, the syrup is carefully strained and then boiled again until it becomes thick, when it is poured into moulds and allowed to harden into cakes. Both maple sugar and maple syrup are of a rich brown color. Maple sugar is very sweet and delicious to the taste, and is often made into little cakes and eaten as candy.

How does maple-sugar taste?

What vegetable supplies sugar?

Other sources of sugar.—Sugar is also procured from beets, and from the date-palm. France produces much beet sugar. It is obtained by crushing the juice out of the beets. It is boiled and crystallized much as cane-sugar is prepared. In India sugar is obtained from a tree called the date-palm.

What country furnishes this sugar?

What country obtains sugar from a tree?

How is molasses made?

Molasses.—After the sugar has been boiled and strained, it is placed where it will cool. The sugar forms into solid loaves, and the water in which it has been boiled is by this time much thickened by the mixture of the sugar with it. This liquid is drawn off and is called molasses. It is dark and thick and is very sticky. It possesses a sweet taste and is much used in cooking.

How does it look and taste?

For what is sugar used?

Uses of sugar.—Sugar is very extensively used. It is needed in the preparation of many kinds of food. Fish, ham and fruits preserved in it will keep for a long time. Quantities of sugar are used in making candy.

What effect does sugar have on people?

Effect on the health.—Sugar is considered healthy and has a fattening effect. The negroes on the sugar-plantations of the South are said to grow fat during the season when they gather the canes.

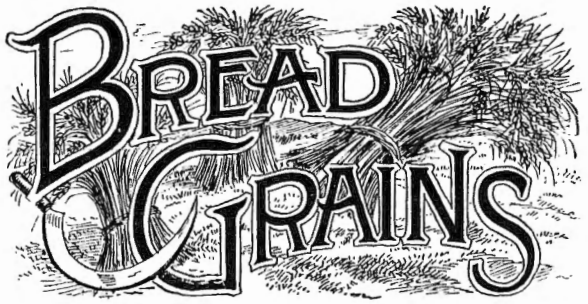
BLACKBOARD OUTLINE.

SUGAR.

1. PRINCIPAL SOURCE.
2. CULTIVATION.
3. WHERE IT GROWS.
4. HOW PROCURED.
5. REFINING.
6. MAPLE SUGAR.
7. BEET-SUGAR.
8. MOLASSES.
9. USES OF SUGAR.
10. EFFECT OF USING IT.

OBJECTS TO ASSIST IN TEACHING SUGAR.

1. PIECE OF SUGAR-CANE.
2. PICTURE OF SUGAR PLANTATION.
3. SAMPLES OF RAW, LOAF, GRANULATED AND POWDERED SUGAR.
4. MOLASSES.
5. MAPLE SUGAR AND SYRUP.



Wheat.—This grain is supposed to have grown first in Persia. It is now cultivated in all temperate climates.

Of what country is wheat a native?

Growth.—It grows very rapidly, and presents a fine appearance. When ripe it is cut down and submitted to the processes of bolting and grinding. The former operation consists in separating the coarser from the finer portions of the wheat and the machine used is called a "bolter." The wheat is then ground into flour, and is used for making bread, rolls, biscuits, cake &c. It is pure white in color and very healthy. Macaroni and vermicelli are made of wheat paste. The best qualities are made in Naples, Italy, and the Italians are exceedingly fond of these articles.

How is it prepared for use?

For what is it used?

What Italian city is first in the manufacture of macaroni?

Wheat in America.—The introduction of wheat into America is said to be due to an accident. Rice was brought over and particles of wheat were found with it. It was planted and spread rapidly and now a large surface of this hemisphere is devoted to the culture of this grain.

How was wheat introduced into America?

What grain is a native of America?

Indian corn.—Unlike wheat, this grain is a native product of America and was called *Indian Corn* by the Spaniards when they came to this country, because they thought the new world was a part of India. The natives or Indians called it *mahiz* and it is now often called *maize*, the English translation of their word. Columbus took samples of the corn back to Spain after his discovery of America, and Spain then cultivated this grain and it was soon introduced into other portions of Europe. A field of maize presents a beautiful appearance. Its culture requires considerable care. It is planted in hills, and the soil must be of good quality and free from weeds. The kernels differ somewhat in shape and size and the names *white-corn*, *sweet-corn*, *pop-corn*. &c., have been given to the various kinds.

By whom was it first cultivated?

What name did they give to it?

What do we call it?

What European country first raised it?

How is it cultivated?

What are some of the names applied to different varieties?

Ground into meal, Indian corn is made into bread, biscuits, rolls &c. It is also used for fattening poultry and feeding animals.

For what is Indian meal used?

Sweet corn, boiled on the cob is used as an article of food. Hominy a popular breakfast dish is a preparation of maize.

How is corn prepared as an article of food?

Where do oats grow?

Oats are cultivated in more northern climates. They are used mor_ as food for animals than for the human race.

What is oatmeal?

Oatmeal and other preparations of this grain are healthy breakfast relishes.

For what is barley used?

Barley also grows in a cooler climate than wheat. It is not very important as an article of food, but is used extensively in making ale, porter and beer.

The barley is steeped in water until it sprouts then it is dried quickly in a kiln. It is then called

malt and is the principal ingredient in the above named drinks.

What is malt?

Rye is cultivated in Europe and in this country. A kind of coarse bread is made of the rye meal. Rye is used in making whiskey.

What liquor is made of rye?

BLACKBOARD OUTLINE.

USEFUL GRAINS.

1. WHEAT.
2. USES.
3. INDIAN CORN.
4. EARLY HISTORY.
5. USES.
6. OATS.
7. BARLEY.
8. RYE.

OBJECTS TO AID IN TEACHING USEFUL GRAINS

1. SAMPLES OF WHEAT, CORN, OATS, BARLEY AND RYE.
2. WHEAT FLOUR.
3. BREAD, ROLLS &c. MADE OF WHEAT FLOUR.
4. CORN MEAL.
5. SPECIMENS OF POP-CORN, SWEET CORN &c.

The tree.—The clove tree is a native of the Spice Islands and is now cultivated in the West Indies and other tropical countries. It is beautiful in appearance, resembling the laurel-tree and grows to a height of from fifteen to forty feet. The leaves are large and oblong, the flowers small and dark red. The fruit resembles an olive in shape, and is the same color as the flowers. It is dried and used to some extent being known in commerce by the name "mother cloves."

Where do cloves grow?

Describe the clove-tree.

What is the fruit called?

Cloves.—The cloves as used by us for flavoring consist of the unopened flower buds. They are gathered from the tree in a green state and dried thoroughly, first by artificial heat, then by the sun's rays. The buds become of a dark brown color, and look very much like nails. Because of this resemblance, the name cloves is given to them, the word *clove* being derived from the French word *clou* which means a *nail*.

What are cloves?

How are they prepared for use?

What is the name derived from?

The little ball which seems to form the head of

How can you prove that a clove is a flower-bud?

the nail is in reality composed of the petals of the flower, and if you soak a clove in water for a while, you will see the petals soften and unroll.

What properties have cloves?

For what are they used?

Uses of cloves.—Cloves possess a spicy, biting taste and strong, aromatic odor. They are used for flavoring food, particularly pies, puddings, cakes and preserves.

What is oil of cloves?

Oil of cloves.—By distilling the cloves in water, an oil is obtained which is found useful in medicine.

How is it used?

It is also employed to scent soap for toilet use.

BLACKBOARD OUTLINE.

CLOVES.

1. THE CLOVE-TREE.
2. THE BUDS.
3. PREPARATION.
4. USES.
5. OIL OF CLOVES.

OBJECTS TO AID IN TEACHING CLOVES.

1. PICTURE OF CLOVE-TREE.
2. SAMPLE OF CLOVES.
3. ARTICLE OF FOOD FLAVORED WITH CLOVES.
4. BOTTLE OF OIL OF CLOVES.

Where does pepper grow?

The plant.—Pepper is a native of the East Indies, but is now cultivated in many tropical countries. It grows wild in China and India.

Describe the plant.

It is a climbing shrub, with smooth, spongy stems, and thick, ivy-shaped leaves. It is trained over poles and supports, and increased in size by frequent cutting of slips. The plant grows ten or twelve feet high. In three or four years the fruit appears. The flowers are small and white. The fruit is round and red when ripe, and about the size of a pea.

What color and size are the berries?

When is the fruit gathered?

Preparation.—Just before the fruit is ripe, it is gathered and dried in the sun. If allowed to fully ripen before being picked it loses much of its pungent taste. As the berries dry, they become black and wrinkled. Reduced to a powder, they form the "*black* pepper" of commerce. Black and white pepper are procured from the same plant. White pepper is obtained from the seeds of the berries. They are removed from the pulp of the fruit and

How do the berries look when dry?

What is *black* pepper?

bleached. They are in reality not white, but light gray in color. Black pepper is much more spicy than the white variety.

How is *white* pepper obtained?

Which variety is the more spicy?

Uses.—No spice is so universally liked as pepper. It is used by all nations in cooking and pickling. It is employed somewhat in medicine. An ointment prepared from this spice is used as a remedy for ringworm.

What is the common use of pepper?

How else is it used?

Effects of pepper on the health.—As a flavoring for food, in small quantities, pepper acts as a pleasant stimulant. When very much of it is taken, its effects are irritating and injurious.

How does pepper act on the health?

Cayenne pepper.—A variety of pepper is shipped from Cayenne in South America, which is particularly pungent and is greatly used in a green state for pickling. The berries are bright red when ripe.

From where do we obtain Cayenne pepper?

For what is it used?

Early use of pepper.—As a medicine, pepper was used in very ancient times.

How was pepper used in early times?

In the middle ages it was known as a spice, but was so costly that only very wealthy people could use it. A gift of a few pounds of pepper was considered a very generous offering.

When was it employed as a spice?

BLACKBOARD OUTLINE.

PEPPER.

1. THE PLANT.
2. PREPARATION.
3. USES.
4. EFFECTS ON THE SYSTEM.
5. VARIETIES OF PEPPER.
6. PEPPER IN THE MIDDLE AGES.

OBJECTS TO AID IN TEACHING PEPPER.

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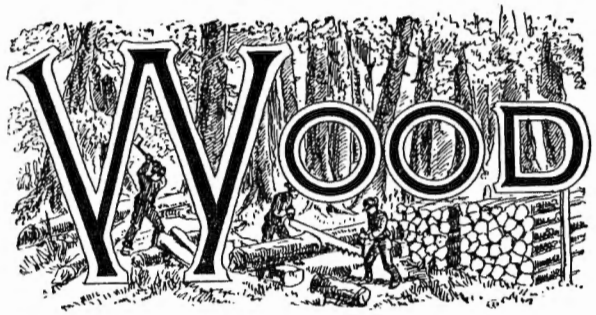
1. SPECIMENS OF PEPPER BERRY.
2. SAMPLES OF GROUND PEPPER.



Source.—It would be difficult to name a substance more necessary to the comfort of mankind than wood. For this material we are indebted to the forest trees which grow so plentifully in many parts of the world. The trunks of these wonderful products of nature represent beauty, strength and wealth. To name all the different species of trees which supply the great demand for wood, is impossible within the limits of this article, but we will consider a few of the most common ones.

From what is wood obtained?

What portions of the trees are used as lumber?

The Oak.—This tree takes precedence of all others for usefulness. The wood it furnishes is very tough and strong. It is used for making articles that will be subjected to great weight or rough usage. It is particularly adapted to ship-building and quantities are used for this purpose. The timber is a brownish color and is very ornamental. It is used for furniture and for the decoration of buildings. The oak grows in England and in the United States.

What is the most useful tree?

What is oak used for?

What color is it?

Where does the oak tree grow?

What color is walnut wood?

Walnut.—Much of the furniture in use at the present time is made of the timber of the black walnut tree. This tree is plentiful in most parts of the world. The wood is strong and handsome. A common species of the tree, known as white walnut or hickory, yields a very useful plain wood.

What is hickory?

Describe the mahogany tree.

Mahogany.—The mahogany tree grows to an immense size. Its trunk is from five to six feet in diameter, and the foliage is very thick. It is a native of the West Indies. The wood is very valuable, it is brown in color, shading from a yellowish hue to dark reddish-brown, and is beautifully veined. The trees are so large and the climate so hot, that it is a difficult task to procure the wood. The logs are drawn by oxen to the nearest stream and floated to the docks from which they are shipped to other countries. The wood is used for making furniture and articles made of it are highly polished and very handsome.

What color is this wood?

What wood is used for pianos?

Rose-wood.—Vast quantities of this wood are used for making pianos. The rose-wood tree grows in the tropics. The timber is very hard and has a dark rich color. It receives its name from the peculiar odor it possesses, somewhat like that of a rose.

Why is it so named?

Name a *very* useful wood.

Pine.—This wood is very plentiful and ranks next to the oak in usefulness. The trees grow in many parts of the world, those found in cold countries like Russia, Norway and Sweden, yielding the best timber. The white pine of our own country is a tall tree producing wood much in demand for house building and for the masts of vessels.

Where does it abound?

For what is it used?

What can you say of the maple tree?

Maple.—Very handsome articles are made of this wood. It is beautifully grained and marked. The tree is American in origin.

What can you say of the chestnut tree?

The Chestnut tree.—This tree grows abundantly in this country and is found also in the southern part of Europe. The wood is very durable and is much used for railings, posts and strong household furniture.

Describe ebony?

Ebony.—This wood is very dark in color, the most valuable being black. The ebony tree is found in Madagascar and Ceylon. The timber can be highly polished and is used for decorating articles made of other kinds of wood. Objects made entirely of ebony are very expensive.

Where does the tree grow?

What wood was used many centuries ago?

Cedar.—A species of the cedar tree called the "cedar of Lebanon," is mentioned in the Bible. The wood at that time was used for building religious temples. Varieties of this tree are found in many parts of the world. The cedar used in this country is from the West Indies and the Southern States. The color is reddish, and the wood although strong, is not heavy. It is used for making furniture, particularly chests and wardrobes in which clothes are packed away as moths cannot eat through it. Row-boats made of it are graceful and easy to manage. Lead-pencils are made of this wood.

Describe the wood.

For what is it used now?

What great want does wood supply?

Fuel.—Besides its importance in building and the manufacture of furniture, wood is necessary as fuel. In some regions, where coal is not easily obtained, it is the only fuel used.

BLACKBOARD OUTLINE.

WOOD.

1. SOURCE.
2. OAK.
3. WALNUT.
4. MAHOGANY.
5. ROSEWOOD.
6. PINE.
7. MAPLE.
8. CHESTNUT.
9. EBONY.
10. CEDAR.
11. WOOD AS FUEL.

OBJECTS TO AID IN TEACHING WOOD.

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1. PICTURES OF VARIOUS TREES.
2. SAMPLES OF DIFFERENT KINDS OF WOOD.
3. ARTICLES MADE OF WOOD.

The cork tree.—Cork is obtained from a tree which is very much like the oak in appearance. The trees are allowed to grow to be from ten to fifteen years old before any cork is collected. The cork is the outside surface of the trunks of the trees, that is, the bark. Cork trees sometimes live to be one hundred and fifty years old. They grow in Spain, Italy and Portugal.

From what is cork obtained?

Where does the tree grow?

What part of the tree is used?

How the cork is procured.—The bark is cut into in a lengthwise manner and stripped off in sheets. In a year the new bark forms and the trees appear as they did at first. The process of removing the bark is repeated every few years, the quality and quantity of cork being improved at each operation. The cork is collected in July and August.

How is the cork obtained?

How long do the trees live?

How the bark is treated.—The sheets of bark are soaked in water and heavy weights placed on them to prevent their rolling up. When they are dry they are ready for use.

What is done to the bark?

How are corks for bottles made?

At first these sheets of bark were cut into corks by hand, no instrument being used but a knife.

Now all the cutting is done by machinery. The sheets are divided into narrow strips, then these strips are cut into pieces the right length and rounded into corks such as are used for bottles.

What nation manufactures the best corks?

The French are more expert in the manufacture of corks than any other nation.

Uses of cork.—Most of the cork obtained is used for making stoppers for bottles. It is so elastic that after being pressed tightly into the neck of a bottle, it fills the space so that no air can pass in, nor can the contents of the bottle escape.

What is cork used for?

Cork is also used for the soles of slippers and shoes.

Why is it adapted to making life-preservers and life-boats?

It is so light that it floats easily on the surface of the water, and because it possesses this quality it is used for life-preservers and in the construction of life-boats.

BLACKBOARD OUTLINE.

CORK.

1. THE CORK-TREE.
2. HOW THE CORK IS PROCURED.
3. HOW TREATED.
4. USES.

OBJECTS TO AID IN TEACHING CORK.

1. PICTURE OF TREE.
2. PIECE OF BARK.
3. CORKS FOR BOTTLES.
4. LIFE-PRESERVER OR PICTURE OF ONE.
5. CORK SOLE.
6. PICTURE OF LIFE-BOAT.

What nation first manufactured glass?

History of glass.—The Egyptians manufactured glass thousands of years ago, and from it made beads and imitation gems, also curious urns and drinking vessels. Some of these can now be seen in museums.

The first country of Europe to engage in the manufacture of glass was Italy. From there it was introduced into England, and later by the English into the United States.

What country furnishes the best sand?

A very pure sand is needed and this is not plentiful. The finest is found in Massachusetts in the Green Mountains.

Importance of glass.—We have only to look around us to realize what a useful article glass is.

Name all the articles you can, that are made of glass?

Mirrors, window-panes, vases and articles for the table formed of this material constantly meet our view. For many centuries glass was very expensive and only royal families could afford articles made of it. It is now so plentiful and cheap that all may possess it in some form.

Is glass expensive?

Discovery of glass-making.—The following story has been handed down to us from former generations in relation to the art of making glass. Its truth cannot be vouched for, however.

Repeat the story told of the origin of glass?

A party of pirates landed on the shore, somewhere in the northern part of Africa. They built a large fire of sea-weed with which to cook their food. After the fire had burned out, they found pieces of glass in the ashes. The sandy ground upon which the fire had been built, and the alkali in the sea-weed had united and the heat of the fire had converted them into glass.

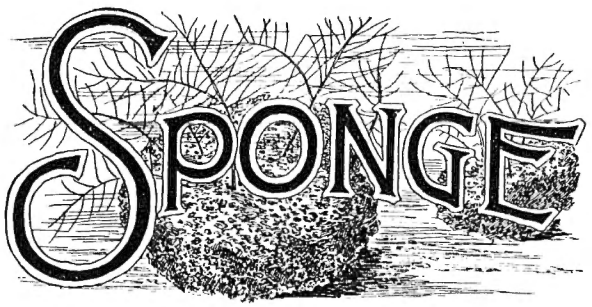
BLACKBOARD OUTLINE.

GLASS.

1. MANUFACTURE.
2. FLINT-GLASS.
3. PLATE-GLASS.
4. ANNEALING.
5. BOTTLE-GLASS.
6. ENAMEL.
7. HISTORY OF GLASS.
8. USES OF GLASS.
9. SUPPOSED ORIGIN OF GLASS-MAKING.

OBJECTS TO AID IN TEACHING GLASS.

1. SPECIMENS OF SAND, FLINT, POTASH, SODA, &c.
2. OBJECTS MADE OF GLASS, AS VASE, BOTTLE, BEADS, ETC.
3. PIECE OF LOOKING GLASS.
4. WATCH-DIAL. (ENAMEL.)



What is sponge?

Origin.—For a long time sponge was supposed to be of vegetable origin but it is now known to be an animal of the lowest order. The animals are attached to rocks, shells and other hard substances below the water.

Where is it found?

What are the qualities of sponge?

Appearance.—Sponge is a very soft, elastic substance, consisting of a horny framework, made up of innumerable small tubes, branching from larger ones which grow still larger near the center of the sponge. These tubes all have openings at the surface of the sponge and are filled throughout their length with a jelly-like, fleshy substance. Through the pores at the end of the small tubes the sponge takes in water, which passes through the tubes and finally out again through the openings of the large tubes. The nourishment for the sponge is thus supplied, the food necessary for the growth of the animal being left by the water. Sponges are of various shapes, some being almost spherical, others cone-shaped, cylindrical, cup-shaped or bottle-

Describe its appearance.

How is food supplied?

Name some of the forms sponge assumes?

shaped. Some have very coarse fibres, others are fine as thread.

From what country do the finest sponges come?

From what countries obtained.—The finest sponges are from the waters on the coast of Greece. In some of the islands of this country the people are trained when very young to dive for sponges. Fine sponges are found in the Mediterranean and Red Seas and on the coast of Florida and the West Indies.

What seas furnish sponge?

Where are these seas?

Where are the West Indies?

Preparation for use.—When first removed from the water, the sponges are slimy and sticky owing to the jelly-like matter in the tubes. There is also mineral matter in the sponges, such as small stones and shells. The sponges are buried in the sand for a few days, when the animal matter becomes putrid and can be easily washed out. The mineral substances are reduced to a powder by heating the sponges and can then be removed without trouble. After thorough washing and soaking, the sponges are dried and sent to other countries.

How do the sponges feel when first gathered?

How are they purified?

How are the sponges prepared for export?

Uses of sponge.—As an article for the bath, sponge is familiar to all. It is of great use to physicians and chemists.

How is sponge used?

The French have taken advantage of the felting properties of sponge and make it into a kind of cloth which they use for the foundation of carpets and rugs. Sponge is sometimes used to stuff cushions and furniture.

What use is made of sponge by the French?

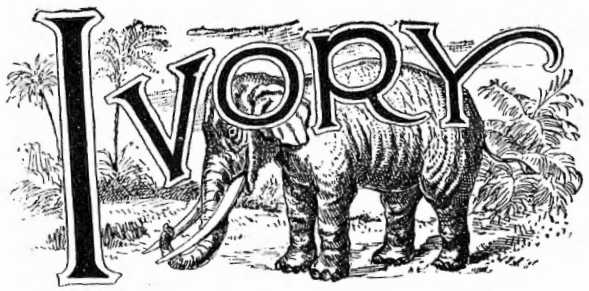
BLACKBOARD OUTLINE.

SPONGE.

1. NATURE OF SPONGE.
2. APPEARANCE.
3. HABITS OF NOURISHMENT.
4. COUNTRIES FURNISHING IT.
5. PREPARATION FOR USE.
6. USES.

OBJECTS TO AID IN TEACHING SPONGE.

1. SPONGES OF VARIOUS DEGREES OF FINENESS.
2. MAPS OF SEAS AND COUNTRIES NAMED.



What is ivory?

From what source.—The large teeth or tusks of the elephant, walrus and hippopotamus furnish a hard, bony material which is called ivory. The largest supply and finest quality of this article comes from Africa. Much of the ivory in use is obtained from collections of bones and tusks found in Asia, which are supposed to be the remains of a species of animals, immensely large, now no longer in existence. The bones and tusks so found are usually imbedded firmly in the soil and seem to be a part of it. Many valuable tusks are often found together, some weighing over one hundred-and-eighty pounds, and as much as ten feet in length. The tusks obtained by hunting the elephants of Africa and India are much smaller than those mentioned, the weight of a tusk sometimes being fifty or sixty pounds, but usually much less.

Where is the best ivory obtained?

Where do fossils furnish ivory?

Describe these tusks.

What is the usual weight of a tusk?

Appearance of Ivory.—The ivory procured from elephants is a hard, white substance, fine in texture and showing when examined a fine network

Describe the appearance of ivory.

What are its qualities?

composed of curved lines crossing and interlacing each other. Ivory is somewhat elastic and can be made still more flexible by placing it in a solution of phosphoric acid. It then becomes semi-transparent.

Name articles made of ivory.

Uses of ivory.—Large quantities of this substance are used for knife-handles, billiard balls, chessmen, portions of games and toys. The keys of pianos and parts of other musical instruments are made of ivory. France manufactures beautiful articles out of this material, but the Chinese are the leading workmen in this art. They carve it with the utmost delicacy, and make miniature chapels, gods, images, vases and ornaments of it, the ivory often presenting a lace like appearance. It is often used as a background for delicate paintings and portraits. Ivory obtained from the hippopotamus is very white and not grained like the elephant ivory. It is used by dentists for making artificial teeth. The various uses of ivory make it a substance of great importance and the demand for it is constantly increasing. Thousands of elephants are slaughtered every year to meet this demand.

What people are the finest workers in ivory?

How is ivory used by artists?

What kind of ivory do dentists use?

What about the demand for ivory?

Early history of ivory.—The value and beauty of ivory were appreciated in very early times. It is frequently spoken of in the Bible. The Greeks made statues of it, one in particular, representing the Olympian Jupiter, being of wondrous beauty, and showing the great skill of the sculptor Phidias. The Romans used ivory in quantities and by them it was introduced into other portions of Europe.

What book mentions ivory?

What nation made statues of this material?

What is vegetable ivory?

Vegetable ivory.—This substance which closely resembles animal ivory in appearance, is the fruit of a tree of the palm species, growing in Peru and other sections of South America. The tree is very beautiful, having light green, pointed leaves of great size. In general appearance they resemble tufts of immense ostrich feathers. The flowers grow in thick clusters. The fruit is as large as a man's head, and contains many nuts the size of a hen's egg. The kernels of these nuts furnish the hard, white substance known as vegetable ivory. It is used for making buttons, umbrella and cane handles and articles of jewelry.

Describe the tree furnishing it.

What part of the tree is used?

What is made of vegetable ivory?

BLACKBOARD OUTLINE.

IVORY.

1. SOURCE.
2. APPEARANCE.
3. USES.
4. CHINESE WORK IN IVORY.
5. EARLY USE OF IVORY.
6. VEGETABLE IVORY.
7. ITS USES.

OBJECTS TO AID IN TEACHING IVORY.

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1. ELEPHANT'S TUSK.
2. OBJECTS MADE OF IVORY.
3. PICTURE OF PALM, PRODUCING VEGETABLE IVORY.
4. BUTTONS &c. MADE OF IT.

Manufacture.—Bricks are made of clay, which is abundant in many localities. This clay contains iron, lime and potash. It is dug up and exposed to the air for quite a long time, and is then mixed with water until it makes a thick paste. Formerly this was done with a spade and the bricks were placed in little wooden molds by hand, but now the whole process of brick-making is generally performed by machinery. The machines are quite complicated and many skilled workmen are needed to attend to them. When the clay is finally removed from the machines, it is in the form of bricks which are moist and are called *green* bricks. A single brick-making machine, run by steam-power, turns out from twenty to thirty thousand bricks a day.

Of what are bricks made?

Of what is clay composed?

How are the bricks made?

What are *green* bricks?

The kilns.—The green bricks are dried by gentle heat, sometimes the heat of the sun being sufficient. The final process is the baking of the bricks in immense ovens, called *kilns*. It takes from two to seven days to bake or *fire* bricks.

How are the bricks dried?

What are kilns?

How long does it take to fire bricks?

What affects the color of bricks?

The color of bricks.—After the baking, the bricks assume various shades, due to the amount of iron contained in the clay. If there is much iron in the clay, the bricks will become *red* when fired; if only a small proportion of iron is present, the bricks are *cream* colored.

What is terra cotta?

Terra Cotta.—Very fine clay is sometimes made into ornamental bricks of various shapes, known by the general name of *terra cotta*. This material is of a delicate red color and adds greatly to the appearance of a building. Many architects use it in place of the stone and marble decorations formerly the fashion. Terra cotta is also used for urns and statues.

For what is it used?

What nations first engaged in brick manufacture?

Early history of bricks.—The inhabitants of Egypt, Babylon and Assyria were the first to manufacture bricks. Rough vessels and fragments of brick tombs have been found, fully three thousand years old. Bricks at that time were probably dried in the sun, as the building of kilns was introduced at a much later period. The bricks of ancient times were made of clay mixed with grass, or straw. In India, the walls of old towns are made of brick, and the ruins of great buildings in Rome are of the same material. The Romans introduced the art of brick-making into England. Various portions of the United States furnish clay, and the manufacture of bricks is an important industry.

Of what materials did they make the bricks?

What nation introduced this industry into England?

For what are bricks used?

Uses.—The bricks are used for building houses, churches, bridges, towers, pavements, walls, arches, cisterns, vats, etc. They are cemented together with mortar, which is made of sand and lime.

With what are bricks cemented together?

What articles are made of the clay mixture?

The mixture of which bricks are made is itself used for making coarse vessels, flower-pots and jars.

BLACKBOARD OUTLINE.

BRICKS.

1. MANUFACTURE.
2. THE KILNS.
3. APPEARANCE OF BRICKS.
4. TERRA COTTA.
5. USES OF TERRA COTTA.
6. HISTORY OF BRICKS.
7. USES OF BRICKS.

OBJECTS TO AID IN TEACHING BRICKS.

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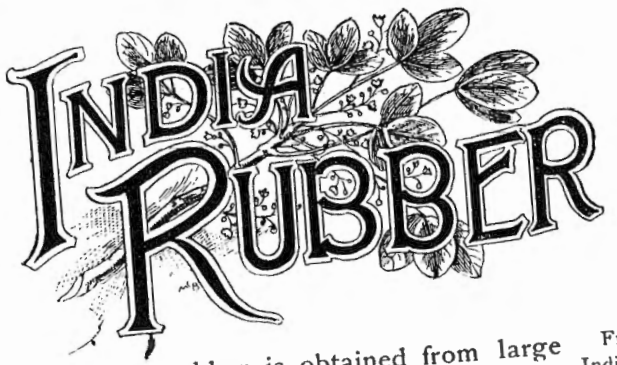
1. SAMPLES OF CLAY.
2. BRICKS.
3. SPECIMEN OF TERRA COTTA.
4. FLOWER-POT, JAR &c. MADE OF BRICK.



From what is India rubber procured?

Where does the rubber tree grow?

Source.—India rubber is obtained from large trees, which grow in India, Central America, Mexico, and Brazil. The largest quantity of rubber comes from the latter country in the region of the Amazon river.

How is the India rubber obtained?

What is its appearance?

How procured.—A hole is bored in the trunk of the tree, and a thick juice of a yellowish white color flows out. If kept in a bottle, closely corked, it retains its fluid state, but if exposed to the air soon hardens.

How is it prepared for export?

Preparation for the market.—The juice is placed in molds of clay and heated over a wood fire so as to hasten the hardening process. The molds are in various shapes and when heated sufficiently they are broken and the rubber removed. The latter is in the form of the molds and has assumed a dark color from the action of the smoke of the wood fire. India rubber in this form is exported to other countries.

What gives it a dark color?

What other names are applied to rubber?

Qualities of rubber.—This substance is also known by the names *caoutchouc* and *gum-elastic*. As

What are its properties?

the latter term implies, it is pliable, extremely elastic and soft. At the same time it is tough and not easily cut. It burns when lighted, with a white flame and thick smoke, and emits a strong, disagreeable odor.

What is the effect of burning it?

Uses of caoutchouc.—The extreme elasticity of this substance makes it available for many purposes. Air cushions, portions of surgical instruments and delicate machinery are made of this material. As it does not dissolve in water or allow liquids to pass through it, water-bags and liquor pouches are fashioned of it. It is employed in making elastic bandages, garters, suspenders etc. It is woven for this purpose into an elastic ribbon, the rubber in fine threads running the length of the ribbon, the cross threads being of silk or cotton. Cut into small pieces rubber is used to erase pencil marks. The property it has of removing lead pencil marks caused it to be called *rubber*.

Name articles made of India rubber.

How is ribbon elastic made?

How is it used?

Why is this substance called rubber?

Waterproof clothing.—When India rubber is mixed with naphtha, turpentine or ether it forms a liquid which makes any substance to which it is applied thoroughly water-proof. When cloth is covered with a layer of this liquid it is used for making ladies' rain-cloaks, gentlemen's coats, over-shoes, boots, and blankets for carriages.

What important liquid is made of rubber?

How is it used?

Mackintoshes.—This name is applied to rain-cloaks made of a strong material which is composed of two layers of cotton or linen with a layer of rubber paste between them. The cloth so prepared receives its name Mackintosh from the inventor of the fabric. The cloth is often striped or checked and garments made of it are pretty as well as serviceable.

What is Mackintosh cloth?

For what is it used?

What is its appearance?

What is vulcanized rubber?

Vulcanized rubber.—When the caoutchouc is mixed with sulphur and subjected to intense heat it undergoes a complete change. It becomes more elastic than ever, but loses its adhesive qualities and is not affected by heat or cold. It is used for springs, belting, gas tubes, and hose-pipes. When a pitchy substance is added it becomes hard and black, and when highly polished is a very handsome material. It is used for making combs, boxes, ornaments, knife-handles, buttons, chains, jewelry, etc.

Name articles made of it.

How is it made still more ornamental?

For what is it used?

The art of vulcanizing rubber was discovered by a man named Goodyear in New York City.

By whom was the art of vulcanizing discovered?

The rubber tree.—The tree from which this gum is obtained grows to a great height before the branches spread out. The species from India is so beautiful that it is cultivated as an ornamental plant in some conservatories in this country.

How is the rubber tree valued in this country?

BLACKBOARD OUTLINE.

INDIA RUBBER.

1. SOURCE.
2. COLLECTING IT.
3. PREPARATION FOR EXPORT.
4. PROPERTIES.
5. OTHER NAMES APPLIED TO IT.
6. USES.
7. RIBBON ELASTIC.
8. WATERPROOF CLOTHING.
9. MACKINTOSHES.
10. VULCANIZED RUBBER.
11. ITS USES.
12. THE RUBBER TREE.

OBJECTS TO AID IN TEACHING INDIA RUBBER.

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1. PICTURE OF RUBBER TREE.
2. PIECE OF RUBBER.
3. RIBBON ELASTIC.
4. RUBBER BAND OR BALL.
5. SAMPLE OF VULCANIZED RUBBER.
6. BUTTONS, CHAINS, &c. MADE OF IT.
7. WATERPROOF CLOAK, OVER-SHOES, &c.

Description of plant.—Tobacco is a plant five or six feet in height, which grows extensively in North America, and is cultivated in other countries. It has a moist, hairy stem, and very large leaves, these latter being sometimes two feet long. The leaves are arranged round a single stalk, and the flowers, which are white and shaped like a funnel, grow at the top of the plant.

Describe the tobacco-plant.

How are the leaves arranged?

Where do the flowers grow?

Cultivation.—The tobacco plant requires a rich soil. It is raised from seed, which is usually sown in January, in little seed-beds. The seed-beds are protected from frost by spreading small branches of trees over them. By June, the plants have made a fine start and are then transplanted to another field. The transplanting must take place in rainy weather or the shoots will not grow.

How is tobacco cultivated?

When does the trans-planting occur?

Where raised.—Tobacco is cultivated in the West Indies, in the southern portions of the United States and in Connecticut. Virginia is considered the best tobacco-growing state. The plant is also raised in some parts of Europe.

Where is the plant raised?

Where is Virginia?

Preparation for the market.—The plants are cut down, usually at noon-time, when the sun is hottest and spread out to dry. In some regions, regular drying-barns are built, and the tobacco stalks are hung up in them until the leaves are dry. When first cut, the leaves have very little taste or smell, but when dry, the taste is extremely bitter, and the odor is strong and disagreeable. When perfectly dry, the leaves are a greenish-yellow color. They are stripped from the stems, sorted and packed for exportation. The leaves growing lowest on the plants are the least valuable.

How are the leaves dried?

How do the dry leaves taste and smell?

Which are the poorest leaves?

Methods of using.—Tobacco leaves are prepared for use in several ways. Rolled up tightly, they form cigars. When used with a pipe, they are cut into small pieces, and when ground very fine, snuff is the result. For chewing, the leaves are pressed into small cakes and enveloped in tin foil.

How is tobacco used?

What is snuff?

Wide-spread use of tobacco.—There is no climate in which tobacco is not consumed in some form. Both civilized and savage nations make use of it. It is thought that the habit of smoking was prevalent among the Indians of America, long before the first white settlement was made. For Indians of different tribes to smoke together is a sign of good feeling, and the Calumet or "pipe of peace" is always smoked after a bargain or treaty has been completed. The Turks and Persians are the greatest smokers in the world. In India also, nearly every one smokes, and in China the habit is universal, even little girls using pipes.

How did the American Indians show friendship?

What is a Calumet?

Which people are the greatest smokers?

Where do these people live?

Discovery by Spaniards.—Tobacco was discovered by the Spaniards in the latter part of the fifteenth century in St. Domingo. One of the Spaniards carried some of the tobacco to England, where it was raised at first merely as an ornamental and curious addition to the garden. It was soon considered a luxury to smoke, and the use of tobacco was adopted by the wealthy.

Who introduced tobacco into England?

How was it used at first?

Effects of using tobacco.—The effects of tobacco upon the human system are universally acknowledged to be injurious. When chewed, it discolors the teeth, and impairs the digestive organs. No one who is naturally orderly and neat, would indulge in this disgusting habit. When smoked moderately, its action on the system is at first pleasant, but habitual use of tobacco in this form causes many diseases. One of the most dangerous results of a constant use of tobacco is paralysis, or loss of the power of moving any part of the body. The oil which is found in the leaves is a deadly poison. It is said that the Hottentots kill snakes by dropping some of this oil on their tongues.

How does chewing affect people?

Is it a clean habit?

What are the dangers of constant smoking?

Where do the Hottentots live?

Cigarettes.—The most harmful way in which tobacco is used, is in the form of cigarettes. These are seldom made of pure tobacco, but are formed from the stumps of old cigars and refuse matter. Many young boys injure their health by smoking cigarettes.

Of what are cigarettes made?

No decrease in use.—In spite of the suffering caused by tobacco, and the many learned writers who have expressed their disapproval of it in strong language, the habit of using the weed is in no way diminished.

Has suffering lessened the tobacco habit?

BLACKBOARD OUTLINE.

TOBACCO.

1. SOURCE.
2. CULTIVATION.
3. GEOGRAPHICAL LOCATION.
4. PREPARATION OF LEAVES.
5. HOW USED.
6. EARLY USE OF TOBACCO.
7. DISCOVERY OF TOBACCO.
8. EFFECTS OF ITS USE.
9. CIGARETTES.

OBJECTS TO AID IN TEACHING TOBACCO.

1. TOBACCO LEAF.
2. CIGAR.
3. CIGARETTE.
4. SNUFF.
5. CAKE OF TOBACCO FOR CHEWING.

How made.—Paper, at the present time, is made of old rags. These are collected by peddlers, who sell them to the paper-manufacturers. The rags are sorted, so that those of the same color and quality will be together. They are cleaned and bleached until white. Chlorine is used for the bleaching. Then a machine with sharp knives cuts and tears the rags into tiny pieces. These pieces are mixed with water and form a pulpy substance. The water is drained away and the solid matter is subjected to great pressure until it is flattened into a thin sheet. When it dries, it is the material we call *paper*. The beauty and strength of paper depend upon the kind of rags used.

Of what is paper made?

How are the rags prepared for the machinery?

What is done to the pulp?

Varieties of paper.—*Writing-paper* receives its fine surface from being dipped in a mixture of alum and hot glue. The paper is cut into sheets of various sizes such as are used for *note-paper*, *legal-cap*, *foolscap*, &c. Twenty-four of these sheets form a quire, and a quire with envelopes to match is often put up in boxes for sale. The large sheets

How is writing paper prepared?

How is it arranged to sell?

are usually sold by the ream. Twenty quires or four-hundred and eighty sheets make a ream. Some note paper is very fancy in finish and handsomely decorated. Coarser paper, such as is used for drawing, blotting-pads, newspapers, &c., is made of the commonest rags.

For what are common rags used?

Wall-paper is often made of old, worn-out pieces of paper, reduced to a pulp, and pressed over again. It is colored and printed with fancy colors.

Of what is wall-paper made?

Pasteboard.—This material is made of several sheets of paper, pasted one above the other. It is thick and strong and vast quantities of it are used for making boxes.

What is pasteboard?

For what used?

Papier-mache.—Many articles, such as plates, pails, vases, &c., are made of a strong paper substance, called *papier-mache*. The rag pulp is mixed with glue or sizing and moulded into the desired shape. The articles are sometimes varnished and are then durable and water-tight.

Describe papier-mache.

Of what use is it?

Ancient methods of paper-making.—The Egyptians made paper out of a reed-like plant which grew on the banks of the Nile river. The plant was called *papyrus*, and the name *paper* is derived from that word. The bark of this plant was stripped off and flat layers made of it. One layer was pasted on top of another and a strong material was made upon which the Egyptians wrote.

What is papyrus?

For what used?

By whom?

Where is Egypt?

Chinese-paper.—The Chinese manufacture various kinds of paper, using many different substances. They make it of the bark of plants, of cotton, and of silk. They make a fine paper called

Where do the Chinese live?

Of what do they make paper?

rice-paper which is used for wrapping up delicate articles, for table-napkins, and for printing upon.

The Japanese manufacture strong paper from the bark of the mulberry tree. It is used for umbrellas, tents and articles of clothing. It looks much like silk and is varnished, so that it will be water-proof.

What do the Japanese use?

Where is Japan?

Uses of paper.—Many of the ways in which paper is used have been already mentioned. *Printing* was invented after paper had been manufactured for many years. It would be of little use, were there not such a cheap material plentifully supplied. Newspapers and books require quantities of this material, and there is hardly a small town even, where some work of this kind is not done. All large cities have one or more printing establishments and it would be difficult to estimate the amount of paper used daily.

What art depends greatly upon the manufacture of paper?

Is much paper used?

The first paper-makers.—The nests of *wasps* are made of a substance resembling paper. These little insects make this material by mixing the fibres of trees and plants with their saliva so as to form a pulp. They spread this pulp out and build nests of it, either in a hole in the ground, or hanging from walls or the branches of trees.

What insects make paper?

Of what do they make it?

The nests are divided into cells, the walls being constructed of thick paper.

Frequent additions are made to the nests, new paper being made by the little manufacturers for this purpose.

Describe a wasp's nest.

BLACKBOARD OUTLINE.

PAPER.

1. MANUFACTURE.
2. KINDS OF PAPER.
3. PAPIER-MACHE.
4. PAPER MAKING IN EGYPT.
5. CHINESE-PAPER.
6. USES OF PAPER.
7. PAPER MADE BY WASPS.

OBJECTS TO AID IN TEACHING PAPER.

1. OLD RAGS.
2. PAPER PULP.
3. DIFFERENT STYLES OF WRITING-PAPER.
4. NEWS-PAPER.
5. WALL-PAPER.
6. PASTE-BOARD.
7. ARTICLE MADE OF PAPIER-MACHE.
8. SAMPLE OF RICE-PAPER.