FI'BRE (Lat. *fibra*), a term of very common use as applied to objects of a stringy or thread-like character, whether of the animal, vegetable, or mineral kingdom. Minerals are often described as of a fibrous structure or appearance, in which there is, however, no possibility of detaching the apparent fibres from the general mass, or in which they are inflexible and brittle if detached: but a more perfect example of mineral fibre is found in *Amianthus*, a variety of ASBESTUS (q. v.). For the scientific use of fibre with regard to the animal kingdom, we refer to the article MUSCLE; for its scientific use with regard to the vegetable kingdom, to VEGETABLE TISSUE and to WOOD AND WOODY FIBRE. In its more popular, but perfectly accurate use, it includes the hair or wool of quadrupeds, the silken threads of the cocoons of silk-worms and other insects, the fibres of the leaves and of the inner bark of plants, and the elongated cells or hairs connected with the seeds of plants, the ordinary materials of cordage and of textile fabrics.

Of mineral substances, amianthus alone has been used for textile fabrics, and that only to a very limited extent. Animal and vegetable fibres have, from the earliest ages, supplied man with cordage and with cloth. How the invention took place, can only be matter of conjecture.

The animal fibres used for textile purposes are chiefly of the two classes already mentioned—(1) the wool or hair of quadrupeds, and (2) the silk of the cocoons of insects. To these may be added (3) the Byssus (q. v.) of molluscs, but this class contains only the Byssus of the PINNA (q. v.) of the Mediterranean, an article of ancient and high reputation, but more of curiosity than of use. The skins and intestines of animals, although sometimes twisted or plaited for various uses, can scarcely be reckoned among the fibrous materials afforded by the animal kingdom. For information regarding the fibres obtained from the cocoons of insects, see SILK and SILKWORM. It is to the first class that the greater number of different kinds of animal fibre used for textile purposes belong; and the wool of the sheep far exceeds all the rest in importance. See SHEEP and WOOL. But the wool or hair of other quadrupeds is also to some extent used, as of the Goat (see GOAT and ANGORA), the Alpaca (q. v.), the Camel (q. v.), the Bison (q. v.), the Musk Ox (q. v.), the Yak (q. v.), and the Chinchilla (q. v.); all of which, except the last—and it has but a doubtful claim to be mentioned—are, like the sheep, ruminants. The hair of comparatively few animals is sufficiently long for textile purposes, or can be procured in sufficient abundance to make it of economic importance. The warmth of clothing depends much on the fineness of the hair, and on other characters in which wool particularly excels.

The useful vegetable fibres are far more numerous and various than the animal. They are obtained from plants of natural orders very different from each other; none of them, however, belonging to the class of acrogenous or cryptogamous plants. They are obtained also from different parts of plants. Those which are derived from exogenous plants are either the fibres of the inner bark (or BAST, q. v.), as flax, hemp, &c., or hairs of the fruit, as cotton. The useful fibres of endogenous plants sometimes also belong to the fruit, as coir or cocoa-nut fibre, and the unimportant fibre of cotton-grass. The spathe of some of the palms is sometimes also sufficiently fibrous and strong to be used for bags, &c., without separation of its fibres; the fibres of the interior of the stem of old cocoa-nut palms are sometimes used for coarse purposes; the fibrous character of the stems of the slender palms called rattans, of bulrushes, &c., fits them for wicker-work, for plaiting into chair-bottoms, and the like; the roots of the *Agaves* (q. v.) yield fibres useful for various purposes; but generally, the more valuable fibres obtained from endogenous plants are those of their leaves, either of the leaf-stalks—as Piassaba fibre and Gomuto or Ejoo fibre, both produced by palms—or of the blade of the leaf, as Pine-apple fibre, Pita Flax, New Zealand Flax, Bowstring Hemp, &c. The fibres of the leaves of endogens being parallel to each other, are easily obtained of sufficient length for economical purposes; whilst the reticulated fibres of the leaves of exogens, even if long enough, which is comparatively seldom the case, cannot be separated for use. The *bast* fibres of exogens, however, are often of sufficient length, and easily separable. Their separation is generally accomplished by steeping in water, or by frequent bedewing with water, so as to cause a partial rotting of the other parts of the bast and of the bark which covers it. But the fibres of endogens being in

general discoloured and injured by this process to a much greater degree than those of exogens, mere mechanical means are usually preferred for their separation, such as beating, passing between rollers, and scraping. The fibres of many leaves are separated by scraping alone. The fibres of *fruits*, as cotton, exist in nature in a separate state, like the wool or hair of animals, and require merely to be collected and cleaned.

A complete enumeration of the kinds of vegetable fibre applied to economical purposes would not be easy. Flax, Hemp, and Cotton have long had the pre-eminence. To these have recently been added New Zealand Flax, Jute, Sunn or Sunn Hemp, Coir, Pita Flax, Abaca or Manilla Hemp, Bowstring Hemp, China Grass, Piassaba, and many others. New kinds are continually being brought under notice, and to this industrial exhibitions and industrial museums have most beneficially contributed. New kinds, however, do not immediately command the attention they deserve. 'If a new product is sent into the market,' says Dr Royle, 'few of the regular customers will buy it, as they want that to which their machinery and manufactures are suited.' But for the judgment and enterprise of Mr Salt, it might have been long ere alpaca wool had obtained its present place among the materials of our manufactures; and there is much reason to think that many vegetable fibres, now little regarded, may yet in like manner be exalted to importance.

For the use of vegetable fibres in the manufacture of paper, see PAPER.

FIBROUS PLANTS. Without attempting a complete enumeration of plants which yield fibres employed for economical purposes, we give the following as a list which may be useful. Many of the subjects will be found treated in separate articles, or more fully noticed under the natural orders. The most important are indicated by capitals.

I. EXOGENOUS PLANTS.

1. *Fibres of the Fruit.*

Nat. Ord. *Malvaceæ*. COTTON, produced by species of *Gossypium*.
——— *Sterculiaceæ*. Silk-cotton, or vegetable silk, the produce of *Bombax villosum*, &c.
——— *Asclepiadaceæ*. The silk-like down of the seeds of Virginian Silk (*Asclepias Syriaca*).

2. *Fibres of the Inner Bark or Bast.*

Nat. Ord. *Malvaceæ*. Deckanee Hemp (*Hibiscus cannabinus*).—Other species of *Hibiscus*, *Althæa cannabina*, *Sida abutilon*, &c.
——— *Sterculiaceæ*. A number of species of different genera; some of them cultivated to a small extent.
——— *Tiliaceæ*. JUTE (*Corchorus olitorius*, *C. capsularis*, &c.)—The bast of some trees of this family, as the Linden or Lime (*Tilia Europæa*, &c.) is used for mats, ropes, &c. See BAST.
——— *Linaceæ*. FLAX, the produce of *Linum usitatissimum*.
——— *Leguminosæ*.—SUNN, Jubbulpore Hemp, &c., the produce of species of *Crotalaria*.
Spanish Broom (*Spartium junceum*).
Bokhara Clover (*Melilotus arborea*).
Dhunchee (*Sesbania aculeata*).
Species of *Cytisus* (as Common Broom), Butea, *Parkinsonia*, *Bauhinia*, &c.
——— *Asclepiadaceæ*. Jetee (*Marsdenia tenacissima*).
Yercum or Mudar (species of *Calotropis*).
Virginian Silk (*Asclepias Syriaca*, *A. debilis*).
Other species of several genera.
——— *Apocynaceæ*. Canadian Hemp (*Apocynum cannabinum*).
Nat. Ord. *Urticeæ*. Common Nettle (*Urtica dioica*) and other species of *Urtica*.
Species of *Bœhmeria*, one of them yielding CHINA GRASS Fibre.
——— *Cannabinaceæ*. HEMP (*Cannabis sativa*).
Hop (*Humulus lupulus*).
——— *Moraceæ*. The bark of some species of Fig.
——— *Coniferæ*. Inner bark and roots of some species of Pine and Fir.
——— Unknown. Buaze.

II. ENDOGENOUS PLANTS.

Nat. Ord. *Liliaceæ*.
NEW ZEALAND FLAX, fibre of leaves of *Phormium tenax*.
Bowstring Hemp, fibre of leaves of species of *Sanseviera*.
Fibre of leaves of species of *Aloë* and of *Yucca*.
——— *Amaryllideæ*. Pita Flax, fibre of leaves of *Agave Americana*.
Fibre of leaves of species of Fourcroya.
——— *Musaceæ*. Abaca or Manilla Hemp, and Plantain Fibre, obtained from leaves of species of *Musa*.
——— *Bromeliaceæ*. Pine-apple Fibre, Curratow, &c., fibres of leaves of species of *Bromelia*, &c.
——— *Pandanaceæ*. Fibres of leaves of Screw-pines.
——— *Palmaceæ*. COIR or cocoa-nut fibre, from husk of cocoa-nut. Fibre of cocoa-nut stem. Gomuto or Ejoo fibre, from leaf-stalks of Gomuto Palm (*Arenga saccharifera*).
Piassaba, from *Attalea funifera* and *Leopoldinia Piassaba* (the Chiquichiqui Palm).
Other fibres from leaf-stalks, &c., of many palms.
——— *Cyperaceæ*. Fibre from leaves of *Eriophorum cannabinum* (see COTTON-GRASS). Mats, chair-bottoms, &c., made of different *Cyperaceæ*.
——— *Gramineæ* or Grasses. Esparto (*Stipa tenacissima*).
Moonja (*Saccharum munja*).