WOOL is a variety of Hair (q.v.). The term hair is applied, in ordinary language, to a smooth, straight-surfaced filament like human or horse hair, without serrations of any kind on its surface. Wool, on the other hand, is always more or less waved, as in fig. 1; besides which, externally each woolly filament is seen under the microscope to be covered with scales overlying each other, and projecting wherever a bend occurs in the fibre; fig. 2, in which one of the leading varieties of wool is shewn both in its

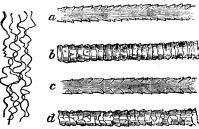


Fig. 1.

Fig. 2.

natural state (a in outline, and b complete) and after it has undergone the process of carding (c in outline, and d complete), in each condition both as a transparent and as an opaque object. Upon the minute points of difference here shewn, the value of wool chiefly depends, especially with regard to the great variety of its applications. If each fibre were straight and smooth, as in the case of hair, it would not retain the twisted state given to it by spinning, but would rapidly untwist when relieved from the force used in spinning; but the wavy condition causes the fibres to become entangled with each other, and the little projecting points of the scales hook into each other, and hold the fibres in close contact. Moreover, the deeper these scales fit into one another, the closer becomes the structure of the thread, and consequently of the cloth made of it. This gives to wool the quality of Felting (q. v.). By combing, or drawing the wool through combs with angular metal teeth, some of the scales are removed, and the points of many more are broken off, so that wool which has been combed has less of the felting property, and is consequently better adapted for light fabrics; and yarn made of such wool is called worsted, and the cloths made of it worsted goods. But such is the variety of wools obtained by careful breeding and selection, that these differences can be

got without combing, some wools being found to have naturally fewer serratures, and a less wavy structure, than others. These are consequently kept separate, and are called *combing-wools*; whilst those which are much waved, and have many serratures, are called carding-wools, from their being simply prepared for spinning by carding-machines. The serratures or points of the scales are exceedingly small, and require the aid of a good microscope to see them. They vary from 1200 up to 3000 to an inch.

Wool is the most important of all animal substances used in manufactures, and ranks next to cotton as a raw material for textile fabrics. Its use as a substance for clothing is almost universal in the

temperate regions of the globe.
Previous to 1791, British woollen cloths were made almost wholly of native-grown wools. At that time, the whole supply of the country could not have much exceeded 100,000,000 lbs. The merino wool of Spain then began to displace them in the best kind of goods, and the imports from that country reached their maximum in 1805, being in that year 7,000,000 lbs. Before 1820, the German wool had begun to supersede the Spanish, and was imported largely till 1841. After that, the cheaper wool of the British colonies to a great extent took the place of the German, and the latter is now chiefly used for only the finest cloths.

Wool varies in character according to the peculiar breed of sheep which yields it, and also with the nature of the soil, food, shelter, and climate. In a wool of first-rate quality, the fibres are fine, soft, elastic, sound, of good colour, and free from deleterious or troublesome impurities: the commercial value of any sample depends, therefore, upon the extent to which it possesses these properties. If it be a combing wool, it will also depend upon its

length of staple.

For technical purposes, shorn fleeces are divided into two classes, one called hogs or tegs, the other The former are the first fleeces wethers or ewes. shorn from the sheep, the latter are those of the second and succeeding years; but the meaning of these terms varies a little in different districts. The fleeces of yearlings are, as a rule, longer in the staple, and otherwise of superior quality to the wool of older animals. In the south of England, it is customary to clip lambs, and the wool so obtained is called shorn lamb's wool. Wool taken from the skins of slaughtered sheep is called skin-wool or pelt-wool, and is of a more variable quality than fleece-wool, on account of its being obtained in all

As long-stapled wools are used for worsted goods, and short-stapled for woollen goods, the various breeds which yield these two leading kinds are naturally divided into the long-woolled and short-woolled classes of sheep. The Lincoln, the Leices-ter, and the Cotswold breeds are considered good types of the former; and the Down, the Welsh, and the Shetland breeds, of the latter.

The following brief notice of the characteristic properties of the various native wools, is founded upon the description given of them in the Jury Report of the International Exhibition of 1862

Of the 'long wools,' the Lincoln has greatly risen in value of late years. It is coarse, of great length, and silky in appearance, so that it is well adapted for 'lustre' goods, in imitation of alpaca fabrics. Leicester wool is highly esteemed for combing. It is rather finer in the hair, but not usually so soft and silky in the staple as the last. Cotswold wool is similar to the Leicester, but somewhat harsher. It is not suited for lustre goods. Highland wool is the merine, which not so long ago sent all the wool

long stapled, and of coarse quality, but known to be susceptible of great improvements. The practice of 'smearing' greatly depreciates its value. It is chiefly used for the coarsest kinds of woollen fabrics, as carpets, rugs, and similar articles. It is also used for Scotch blankets.

Of the 'short wools,' the different breeds of

Downs partake very much of the same characters, but soil and climate so far affect them. The South Down is a short-stapled, small-haired wool, the longer qualities of which are put aside for combing purposes, and the shorter for the manufacture of light woollen goods, such as flannel. The Hampshire Down differs from it in being coarser, and in having the staple usually longer. The Oxford Down, again, exceeds the last in length and coarseness of staple. The *Norfolk Down*, on the other hand, when clean, is of a very fine and valuable character. The Shropshire Down is a breed increasing in importance, and is longer in the staple, and has more lustre than any of the other Down breeds. Ryelands wool is fine and short, but the breed is nearly extinct. The Welsh and Shetland wools have a hair-like texture, deficient in the spiral form, upon which depends the relative value of high-class wools. They are only suited for goods where the properties of shrinking and felting are not required. Shetland wool is obtained of various natural tints, which enables it to be used for producing different pat-

of the intermediate wools, *Dorset* is clean, soft, and rather longer, and not quite so fine in the staple as the Down breeds. The *Cheviot* has increased very much of late years in public estimation. It is a small, fine-haired wool, of medium length, and is suitable for woollen and worsted purposes, for which

it is largely used.

Some of the British colonies are very important wool-producing countries, Australia in this respect standing far in advance of all other countries what-ever. The Australian wool has in general a beautiful, short, silky staple, well adapted for the manufacture of soft, pliable, and elastic fabrics. All the settled districts of this continent have been found well adapted to the growth of fine-woolled sheep, and the extraordinary increase in the flocks forms one of the most remarkable features of the colony. The breed has sprung from three merino rams and five ewes taken out by Captain M'Arthur in 1797. The alpaca wool grown in Australia since the creature was introduced some years ago is of inferior quality; but this is supposed to have arisen from rearing the animals too near the coast, and hopes are now entertained of succeeding better with it inland.

The wool of Cape Colony has of late years been greatly improved by the introduction of merinos, and, as will be seen from the table below, the exports from it are increasing very rapidly.

Among the imports from India, wool has of late

become an important article, the quantity having risen from about 2,500,000 lbs. in 1840, to 21,500,000 risen from about 2,500,000 lbs. in 1840, to 21,500,000 lbs. in 1877; but the supply is rather fluctuating. A great deal of the Indian wool is coarse and hairy, and can only be used for low-class goods. We may state here that the most costly of all wools is obtained from the Tibetan goat, and is found next the skin, under the thick hair of the animal. From it the far-famed Cashmore shawls are mode. From it, the far-famed Cashmere shawls are made. The highest price of any quality which is sold is from 6s. to 7s. per lb. in the native markets, but the Maharajah of Cashmere keeps a strict monopoly over the best kind.

Turning now to European countries, it is somewhat sad to think that Spain, the native country of

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for the best English cloths, has allowed its quality to degenerate, and its once large supply to dwindle The wool of Saxony, Silesia, and some parts of Austria, which is obtained from sheep of the merino breed, is the finest produced in any country; and notwithstanding the lower price and nearly equal quality of the Australian, German wool is still employed for the finest broadcloths, some kinds of ladies' shawls, and a few other purposes. attention is paid to the breeding and rearing of sheep in Germany, and large flocks are reared for their wool alone. In Austria, the number of sheep is estimated at 45,000,000, and the annual yield of wool at 100,000,000 lbs., most of it being of fine quality, and all of which is consumed in Austrian manufactures. France produces a large quantity both of fine and coarse wool. In Italy, the production of wool from mixed merino breeds has become a source of great wealth. Russia, as might be expected from its great extent, rears many qualities, from the finest merino to a very coarse kind. The wools of the remaining countries of Europe are of minor importance.

We must not omit to mention that the wools of South America are now attaining great importance, as will be seen by the table below, but it is necessary to state that besides the 10,710,246 lbs. imported in 1877, there were 3,579,245 lbs. of alpaca (including llama and vicuna) wool. See Alpaca. The wool llama and vicuna) wool. See ALPACA. of the alpaca is very fine, from 6 to 12 inches long, of various colours, and well suited for certain kinds of goods, which are noticed under Woollen and WORSTED MANUFACTURES. South American sheep's wool is of an inferior quality.

Much finer wool would be produced in Britain than is at present, if it were not that the demand for mutton, and the unfitness of the merino sheep for supplying that article of good quality, lead our farmers to choose breeds which are primarily mutton-producing.

The following table will shew at a glance the remarkable changes which have taken place in the sources from which Great Britain has derived its supplies of wool, and also the steady increase in the aggregate quantity imported:

IMPORTS OF WOOL FROM THE PRINCIPAL COUNTRIES.

Year.	Spain.	Germany.	Australia.	South Africa.	East Indies.	South America.	
	lbs.		lbs.	lbs.	lbs.	lbs.	
1810	5,952,407	778,835	167) Insignifican	
1816	2,958,607	2,816,655	13,611	9,623		> previous to	
1820	3,536,229	5,113,442	99,415	29,717		1833.	
1830	1,643,515	26,073,882	1,967,279	33,407) 1000.	
1834	2,343,915	22,634,615	3,558,091	141,707	67,763	1	
1840	1,266,905	21.812.099	9,721,243	751,741	2,441,370	4,378,274	
1850	440,751	9,166,731	39,018,221	5,709,529	3,473,252	5,296,648	
1860	1,000,000	9,292,000	59,166,000	16,574,000	20,214,000	8,950,000	
1870	25,262	4,912,600	175,081,427	32,785,271	11,143,148	12,457,631	
1874	100,178	7,158,319	225,383,631	42,232,672	19,116,772	10,562,874	

To get the total imports for each year, we would require to add the amounts from countries of lesser importance, which are not given; but in the annexed statement we give the total annual imports for the three years 1872, 1874, 1877: (1872) 302,500,925; (1874) 340,288,032; (1877) 406,369,953. For several years past, about one-third of the imported wool has been re-exported. The estimated produce of home-grown wool in 1871 and the three preceding years was as follows:

1871	Total of A	nimal	a el	anchta	for	19	270	056	lbs.
1011.	estimat				i cu,		,010	,000,	34,017,654
	Net Clip o	of Woo	ıl,					-	144,985,712
1870.	17	11	٠	•					149,516,679
1869.	17	11		•	•		•		155,591,096
1868.	11	17							165,549,735

Independently of the vast amount of home and foreign grown wool which finds its way into our markets as wool that is in the condition fit for spinning and weaving, considerable quantities are retained on the skins, and made into rugs or mats for house and carriage use. For this purpose, skins of the very best quality are chosen, and it is necessary that the wool should be very long in the staple. After being carefully curried, the long silky locks of wool are dyed usually some bright colour, and combed. The which are not only in great favour in Britain, but are extensively imported. The chief seat of this trade is at Bermondsey, in London, but it is also carried on to a considerable extent in other parts of the kingdom. Large numbers of Astracan sheep and lamb skins, usually black, are also imported in the wool, and are dressed and used as furs, that is, for personal wear; and some of the Slink lambs skins for this purpose fetch high prices.

With respect to the wool, or woolly hair, of animals other than the sheep, which we have not already mentioned, the only one of much importance of this material, there were about 7,000,000 lbs. imported in 1877. It is a white silky wool, with an average length of staple of from 5 to 6 inches. The demand for it is only of recent origin, and, as will be noticed in our next article, it is chiefly used for certain kinds of ladies' dresses. The hair of camels, bullocks, common goats, and several furs are also used to some extent for manufacturing purposes.

The grand total of wool, shoddy, and goats' hair employed in the woollen industries of Great Britain in 1878, cannot have been far short of 500,000,000 lbs. The total import of raw cotton in 1877 was over 1,335,000,000 lbs.; but of this, nearly 1,512,500

lbs. were re-exported.