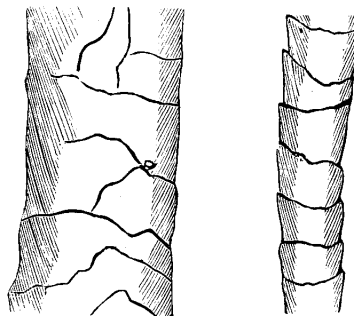


giving the surface a scaly appearance, as will be seen in the figures, which represent magnified sections of fibres of Southdown and of Saxon wool. The scaly grooves give to wool its



Sections of Southdown and Saxon Wool, magnified.

peculiar feeling of rawness and its property of felting. (See FELT.) In all the early races of sheep the distinction between wool and hair is very marked. The hair is coarse and hollow or pithy, and its appearance is much the same, whether on the sheep of the tropics or of cold regions; but in the tropics it is almost free from the under coating of true wool. The structure of wool fits it as perfectly for twisting into a yarn which will not unwind as for felting. The transverse grooves or serrations are exceedingly minute, measuring from each other only $\frac{1}{30000}$ to $\frac{1}{120000}$ of an inch. Wool varies in character according to the particular breed of sheep upon which it grows, and also in some degree to the nature of the soil, food, shelter, and climate. In fine Saxon wool there are about 2,720 imbrications to the inch; in ordinary merino, about 2,400; in the Australian merino, 2,000 to 2,400; in Southdown, about 2,000; and in Leicester, about 1,800. The fibres vary in diameter from $\frac{1}{7000}$ to $\frac{1}{10000}$ of an inch. In felting properties Saxon wool is superior to all others, the Leicester and Southdown being inferior, and making only coarse hairy cloth. The finest wool grows on the shoulders and along the back; the next finest on the neck, under the shoulders, and along the ribs. (For the manner of development and growth of wool, see HAIR.) A fatty secretion called the "yolk" accompanies the growth of wool, consisting of a soapy matter with a potash base, a small quantity of carbonate of potash, traces of acetate of potash, chloride of potassium, lime, and animal oil, the last imparting a peculiar odor. The yolk may therefore be regarded as a soap with oil in excess. As a rule, the finer woolled sheep have the greatest percentage of yolk, the Saxon often containing from 60 to 75 per cent., while coarse wools contain only from 20 to 50 per cent. The yolk obviously imparts flexibility to the fibres, and as a rule the fineness of fibre corresponds to the fineness of texture of the skin

WOOL, a covering similar to hair, growing from the skins of several kinds of animals, but principally of the sheep, the alpaca, and the Cashmere and Rocky mountain goat. In all but the sheep the wool is found only on certain parts of the body; and some parts of the sheep, as the nose and legs, are covered with hair. Other animals, as the beaver and wild cat, have more or less wool concealed beneath the longer growth of hair. Wool is in its structure a modification of hair, and like it is composed of an epithelium and a rind, but is without a marrow. The epithelium consists of small thin plates which overlap each other,

it grows on; gross feeding will increase the size of the fibre. Evenness and length of "staple" are desirable, and also "freeness," or that condition in which the fibres are not entangled with each other. Color is important, and for the reception of a brilliant dye it should be quite white. The length of wool ranges usually from 6 to 12 in.; but if the animal is allowed to go long unshorn, the fibres become coarser and may attain a length of 40 in. or more. The usual weight of an alpaca fleece is from 10 to 12 lbs. The whitest wool known in commerce is that of the Angora goat, termed mohair. The fleece, weighing from 2 to 4 lbs. and free from under down, is very silky, hanging in curls of an average length of 5 in. The wool of the Cashmere goat, which is the under coat, is short, but peculiarly soft, rich, and lustrous. The task of separating it, fibre by fibre, from the hair or "hemp" of the outer coat, is very tedious, and, despite the cheapness of Indian labor, is one cause of the great cost of Cashmere shawls.—The rearing of sheep dates from the earliest times; numerous passages in the Bible allude to sheep, wool, and woollen garments. Attic wool was celebrated from a very early period down to the first century B. C. The woollen fabrics of both Greece and Italy were excellent, although Strabo, living at the beginning of our era, says that the fine cloths worn by the Romans in his time were made of wool brought from Spain. Pliny describes several fine-wooled varieties of Spanish sheep. Livingston, classifying the merinoes of Spain at the beginning of the present century, declares those of Castile and Leon to be the longest and to have the finest fleece; those of Soria small, with very fine wool; those of Valencia of fine wool, but with a very short staple. He gives as the average weight of the Spanish fleece 8½ lbs. for the ram and 5 lbs. for the ewe, the loss of weight in washing being one half. The acclimation of the Spanish merino anywhere out of its native country appears to have been first attempted in France by Colbert about 1670; but the first successful importation into France was in 1786, of about 300 sheep, selected by order of the king of Spain in response to the application of Louis XVI. These sheep, from the finest flocks in Spain, were placed on lands at Rambouillet, about 30 m. from Paris. Taken from many different flocks, they gradually blended into one variety, yielding a fleece no finer than the Spanish, but of greater weight, increasing from 6 lbs. 9 oz. in 1796 to 9 lbs. 1 oz. in 1801. The successful introduction of merino sheep into Saxony was somewhat earlier than into France; the stock, in consequence of a different mode of rearing, became physically deteriorated, but improved in fineness of fleece. (For a further account of the qualities of wool produced by different breeds, see SHEEP.)—The English government records show repeated acts or edicts ostensibly forbidding the exportation of wool from the kingdom, but which for

some time really prepared the way for profitable licenses of such trade, or for special grants to individuals. In the 13th century a considerable wool traffic with Italy and the Low Countries had grown up. The first act intended to prohibit the exportation of British wool was that of Edward III. in 1337. The purpose of restrictive measures appears to have been to secure control of the trade, with revenue in some instances to the crown, and to encourage woollen manufactures in England. Still in 1354 the export of wool amounted to 31,651 sacks at £6 a sack. Until 1802 the importation of foreign wool into England was free, and the quantity was increasing, the total from 1791 to 1799 being 34,011,369 lbs., of which 33,190,595 was Spanish. At the demand of the wool growers a duty of 5s. 3d. the cwt. was laid on imported wool in 1802; this was increased until in 1819 it had risen to 56s., nearly 50 per cent. on the average price. Great Britain is the great wool market of the world. The total trade in foreign and colonial wool since 1870 has been as follows:

YEARS.	TOTAL IMPORTS.		Reexports, lbs.	Retained for consumption, lbs.
	Lbs.	Value.		
1870...	263,250,499	£15,812,598	92,542,384	170,708,115
1871...	323,036,299	17,926,639	125,089,794	187,946,505
1872...	306,379,664	18,523,350	137,511,247	168,868,417
1873...	318,036,779	19,541,678	123,246,172	194,790,607
1874...	344,470,897	21,116,184	144,294,663	200,176,234

The imports in 1875 reached nearly 360,000,000 lbs. More than one half of the entire quantity imported is from Australia; the other most important sources of supply are South Africa, South America, and the East Indies. There is also a considerable export of domestic wool, amounting to 10,077,619 lbs. in 1874, and to 10,649,100 lbs. in 1875. The reexports of foreign wool are chiefly to the United States, Germany, Belgium, and France. The production of domestic wool has been estimated (clipped) at 164,000,000 lbs. in 1874 and 162,000,000 in 1875. In 1875 there were about 30,000,000 sheep in Great Britain, and about 5,000,000 in Ireland. The production of wool is extensive in Russia, Germany, France, and Spain; it is largely consumed on the continent. Besides those countries in which the production of wool is largely retained for home consumption, the three great sources of supply are Australia, South Africa, and the river Plate in South America. Accurate statistics of the production in these countries are not attainable. The following statement of the production of clothing wool, compiled from the receipts into Europe and the United States by John L. Bowes and brother of Liverpool, will indicate the relative producing capacity of each country and the approximate yield for each year preceding those given in the table. The results are for the amount clipped and the amount of pure wool, after making allowance for shrinkage:

YEARS.	AUSTRALIA.		CAPE OF GOOD HOPE.		RIVER PLATE.		TOTAL.	
	Clipped.	Pure.	Clipped.	Pure.	Clipped.	Pure.	Clipped.	Pure.
1860.....	60,225,000	85,000,000	26,225,000	14,750,000	40,500,000	15,500,000	127,000,000	65,225,000
1868.....	155,750,000	90,225,000	39,000,000	25,000,000	199,225,000	75,750,000	394,000,000	191,000,000
1869.....	160,000,000	92,750,000	41,500,000	26,225,000	206,225,000	78,500,000	407,750,000	197,500,000
1870.....	180,000,000	104,225,000	43,225,000	29,000,000	181,750,000	69,000,000	405,000,000	202,225,000
1871.....	185,750,000	107,750,000	48,000,000	30,500,000	195,225,000	74,225,000	429,000,000	212,500,000
1872.....	181,750,000	105,500,000	55,750,000	34,000,000	210,500,000	78,000,000	448,000,000	217,500,000
1873.....	190,225,000	109,500,000	47,500,000	32,500,000	232,500,000	88,500,000	470,225,000	225,500,000
1874.....	222,500,000	124,500,000	49,000,000	34,225,000	207,000,000	72,500,000	478,500,000	231,225,000
1875.....	244,225,000	136,750,000	49,000,000	35,000,000	201,500,000	70,500,000	494,750,000	242,225,000

—The number of sheep and the production of wool in the United States have been reported by the federal census as follows :

YEARS.	Number of sheep.	Pounds of wool.
1850.....	21,723,220	52,516,959
1860.....	22,471,275	60,264,913
1870.....	28,477,951	100,102,387

The states producing the most in 1870 were: Ohio, 20,539,643 lbs.; California, 11,391,743; New York, 10,599,225; Michigan, 8,726,145; Pennsylvania, 6,561,722; Illinois, 5,739,249; Indiana, 5,029,023; Wisconsin, 4,090,670; Mis-

souri, 3,649,390; Vermont, 3,102,137. The wool clip of Ohio in 1875 was 16,684,276 lbs.; number of sheep, 4,100,288. The total number of sheep in the United States in 1875 was about 34,000,000. The growth of this industry in recent years has been far greater west than east of the Mississippi river. For several years California has produced far more than any other state in the Union, the yield of 1875 exceeding 43,500,000 lbs. The following statement, prepared by James Lynch of New York, a recognized authority, shows the estimated annual production of wool in the United States, in pounds, during the last decade :

YEARS.	Washed— on sheep, tub washed, and pulled.	Unwashed.			Total.	
		California, Oregon, and Nevada.	Texas.	New Mexico, Colorado, Utah, &c.		Sundry southern states.
1866.....	120,000,000	9,000,000	6,000,000	.....	2,000,000	137,000,000
1867.....	140,000,000	11,000,000	7,000,000	.....	2,000,000	160,000,000
1868.....	150,000,000	16,000,000	8,000,000	.....	3,000,000	177,000,000
1869.....	135,000,000	17,250,000	7,000,000	.....	3,000,000	162,250,000
1870.....	130,000,000	23,000,000	7,000,000	.....	3,000,000	163,000,000
1871.....	110,000,000	25,000,000	8,000,000	.....	3,000,000	146,000,000
1872.....	120,000,000	24,000,000	9,000,000	3,000,000	4,000,000	160,000,000
1873.....	125,000,000	32,700,000	9,000,000	4,500,000	3,500,000	174,700,000
1874.....	120,000,000	38,500,000	10,000,000	6,000,000	3,500,000	178,000,000
1875.....	125,000,000	45,000,000	12,000,000	7,000,000	4,000,000	193,000,000

The quantity and value of wool imported into the United States, for a series of years ending June 30, have been as follows:

YEARS.	Pounds.	Value.
1869.....	.....	\$5,600,953
1870.....	.....	6,743,350
1871.....	68,058,028	9,780,448
1872.....	122,256,499	27,438,284
1873.....	85,496,049	20,433,988
1874.....	42,939,541	8,250,806
1875.....	54,901,760	11,071,259

The chief countries from which the imports were received in 1875 were: South Africa, 6,286,849 lbs.; Argentine Republic, 8,999,693; Australia, 9,461,644; Brazil, 1,142,750; British possessions in North America, 3,018,547; Chili, 3,616,299; England, 11,882,207; France, 2,515,236; Mexico, 1,095,282; Russia, 3,814,950; Uruguay, 865,440. The quantity from Uruguay was 7,110,911 lbs. in 1872, 6,110,871 lbs. in 1873, and 4,094,275 lbs. in 1874. The imports from Turkey were also much greater in the years prior to 1875, amounting in 1873 to 2,812,840 lbs.