TEXTILE INDUSTRY AT THE VIENNA EXHIBITION.—No. I.

By Dr. H. GROTHE.

Never at any previous Universal Exhibition was the vast importance of textile industry so well shown as it is at the great gathering from all nations now being held at Vienna. For if former exhibitions brought into general public notice inventions which have since exercised an important influence on this branch of industry, or new raw materials such as jute, China-grass, and esparto, never before was there brought together a series of exhibits so complete or so significant of the progress in all branches of this industry, as that now presented at Vienna.

We, in fact, find the textile industry so prominently represented at Vienna that we feel almost inclined to say that it surpasses in importance its industrial companions, coal and iron; while it is undoubtedly a fact that the state of its development, as compared with that of these other industries, affords an index to the degree of civilization and manufacturing progress of the various nations. This relation between the developments of the textile and other industries is expressed with unusual distinctness at the Vienna Exhibition.

Let us examine, for instance, the exhibits sent by the Eastern tribes—Persia, a state without any really perceptible progress, appears entirely enveloped in carpets and coverings; and no product, no manufacture, no industry of any kind whatever could justly be placed at the side of this branch of manufacture in the case of this primitive state. In the same manner appear Turkey, Tunis, Egypt, the colonies of England, Holland and France, and also Brazil, that wonderful treasurehouse of material wealth. From all these countries textile products are yet represented with special prominence, still a number of other manufactures form not unimportant rivals to this. The first industry of mankind. In our modern state of civilisation, coal, iron, and textile fibres may be said to range in importance in the order in which we have mentioned them; but even here the general importance of the latter products is striking, as the textile industry may be said to fight for each foot of space of which other branches of manufactures are trying to deprive it.

We have intended in the foregoing sentences not only to indicate the peculiar and always characteristic grouping of the chief branches of industry as created by the progress of civilization, but also to sketch out the features of the Exhibition as a whole. In order to make the picture clearer we will now proceed to consider details. As already mentioned, Persia, Tunis, Turkistan, Caucaasia, Turkey, and Egypt have brought together very rich collections of webs and tissues, the productions of manual labour according to old usages and inherited methods, and distinguished by native taste and hereditary colouring. In the case of the colonies of England, Turkey, Holland, textile manufacturers have, as we have explained, to compete with other industries which the interchange of ideas with Europe has developed and naturalised. Here we find cotton and jute have obtained a place and have received regular culture as agricultural products. In the case of China and Japan there is less indication of the predominance of textile industry, while that predominance becomes still less striking in the case of countries in a higher state of culture—such as Italy, Russia, Portugal, Holland, Sweden, and Denmark. In the case of these latter states we find art and science, metal work, and the industries required for the production of articles of luxury, more powerfully represented. States of the highest range of culture, again, such as England, Germany, Belgium, and France, show clearly enough the harmony existing between the various branches of their manufactures. In the exhibits of these countries textile products still hold an important position; but they cease to be ostensibly prominent, and they are equalled in their extent by the products of other branches of industry.

It would, however, be erroneous to suppose that those countries which are especially distinguished by the predominance of their textile exhibits have, more than others, contributed to the development of this branch of industry. Such a conclusion would, however, easily enter the mind on comparing the wonderful Persian webs and tissues with the English and German manufactures, for the latter countries have scarcely exhibited anything that equals for beauty and richness of design the products of their Eastern rival. The question is too-day no longer only whether a product is beautiful, but for the general interest it has to be considered whether the product is of any practical value, whilst the artistic value is left to be decided afterwards. The practical value, however, involves certain factors which are dependent upon the mode of manufacture, and which are, shortest time of production, cheapest mode of production, greatest durability, and use; factors which can be compared to Russian products in comparison with those of the Western countries.

It is a task to obtain in a short time a general view of the various exhibits at Vienna connected with textile industry, as these exhibits are too various to be found in a single place. The Agricultural Hall contains raw materials and machines for cultivating them, the contents of the Industry Palace include a confused collection of textile products, and finally the Machinery Hall shows in each department, except that of Russia, something belonging to textile industry. It should be remarked, however, that notwithstanding it exhibits no machinery of the class of which we are now speaking, Russia nevertheless possesses an extensive textile industry, which has been founded by the help of English and German machinery, and which occupies already a high position. The slow growth of mechanical engineering in Russia at first prevented, however, the full and timely development of the textile branch of this class of industry, as that branch required a higher degree of skill in the construction of machines than was, until lately, available in Russian engineering factories. But we may be sure that it will not be long before the rapidly increasing industrial enterprise of the Russian people will cultivate jealously this branch of mechanical engineering.

In our articles on textile industry, as represented at Vienna, we propose first to investigate the raw materials and examine the new channels they open for manufacturing operations; next to consider the various fabrics and to obtain from them evidence as to the actual commercial condition and the development of the chemical branch of this manufacture, and finally to deduce from the exhibits generally some data as to the artistic industrial position of the various countries. As closely connected with the fabrics, we have on the agricultural department in order to learn what materials are available, and how they have been cultivated, and the Machinery Hall, in order to see how and with what appliances these materials are being worked. The chief data for a judgment as to the state of textile industry lies thus always in the quality of the finished product.

Textile industry is divided into almost numberless branches—a fact distinctly shown at Vienna—and in proposing to give a report on the state of that industry, as represented at the Exhibition, we have before us a not very easy task. We have, in fact, to treat of the raw materials, the spinning and the weaving, and closely connected with it the dyeing, cloth printing, and finishing. The spinning department is divided, according to the raw materials, into a number of special branches, such, for instance, as the spinning of flax, of short and long wool, of cotton, and of silk. The latter is again subdivided into reeling, spinning, and the spinning of flax or wool.

The department of weaving is proportionately more uniform, but it includes the hand looms, the looms for fancy weaving and for ribbons, the mechanical looms, and also at the present time the knitting, lace, and bobbin-net making machines. As a special branch of weaving, or rather as an intermediate operation between weaving and spinning, we have to consider the manufacture of cords and of fringes, as the corresponding machines supply partly products which are absolutely webs, partly products which are scarcely anything else but complicated yarns, and finally products which are both webs and yarns. Considered from the starting point of view, these departments of weaving bear a long partly to the spinning and partly to the weaving department. As an important annex to the latter, there is the manufacture of weaving appliances to be considered. The department of dyeing is simple, whilst that of the finishing is more complicated, in so far as it has to be divided, firstly, according to the fibres used for the tissues, into five departments, and, secondly, according to the manipulations of the warp, the washing, the dyeing, the fulling, the singing, &c. The printing of cloth and cotton is related to the dyeing and finishing, to which latter, and to the crumbling of the tissues by figuring and stitching, time has added embroidery, whilst finally the invention of the sewing machine has facilitated, in a wonderful manner, the working up of the finished materials.

We have thus drawn the circle which limits our proposed review of the exhibition of textile products at Vienna, unless we also include the artistic industrial side of the subject. The number of exhibitors for textile industry is:

<table>
<thead>
<tr>
<th>Country</th>
<th>Exhibitors</th>
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<tbody>
<tr>
<td>Germany</td>
<td>1100</td>
</tr>
<tr>
<td>Hungary &amp; Austria</td>
<td>2000</td>
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<tr>
<td>France</td>
<td>750</td>
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<tr>
<td>England</td>
<td>300</td>
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<tr>
<td>Switzerland</td>
<td>90</td>
</tr>
<tr>
<td>Italy</td>
<td>500</td>
</tr>
<tr>
<td>Denmark</td>
<td>75</td>
</tr>
<tr>
<td>Netherlands</td>
<td>60</td>
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<tr>
<td>Russia</td>
<td>230</td>
</tr>
<tr>
<td>Greece</td>
<td>400</td>
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<tr>
<td>Turkey</td>
<td>210</td>
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<td>Total</td>
<td>4678</td>
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The wonderful official catalogue of the Exhibition does not give numbers for the other states, but we may say that the textile industry is represented by 10,000 exhibitors, as the numbers given above do...
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RAW MATERIALS.

It is not our intention to give here a detailed account of all the textile materials employed in the various departments of industry, and of the products which are made from them. This would be a task too large for the space which we have at our disposal, and it is not possible for us to do justice to the subject in a single article. We shall confine ourselves to a few of the most important raw materials, and of the products which are made from them.

Cotton.

Cotton is the most important of all the textile raw materials. It is grown in all parts of the world, and is used in the manufacture of a great variety of products, from clothing to carpets and upholstery. The cotton plant is a small shrub, native to the hot, dry regions of the southern United States. It is grown in a variety of soils, but does best in sandy loam. The seed, or cotton boll, contains a mass of tiny fibers, which are separated from the seeds and used for the manufacture of cotton goods.

The cultivation of cotton is an important industry in many countries, and the demand for cotton goods is constantly increasing. The cotton fiber is soft and absorbent, and gives a high degree of comfort when worn.

The cotton fiber is also used in the manufacture of a variety of other products, such as rope, cord, and thread. It is also used in the manufacture of cotton paper, cotton cloth, and cotton linens.

Silk.

Silk is another important textile raw material. It is produced by the silkworm, a small insect which feeds on leaves of the mulberry tree. The silk is obtained from the silkworm when it is in its cocoon. The silk is then woven into various fabrics, such as silk stockings, silk dresses, and silk scarves.

Silk is a soft and lustrous fabric, and is highly prized for its durability and its ability to hold its shape. It is also a very expensive material, and is used in the manufacture of only the finest of clothing.

Rice.

Rice is a staple food in many parts of the world. It is grown in a variety of climates, but does best in warm, humid regions. The rice plant is a small grass, native to the warm regions of Asia. The grain, or rice kernel, is obtained from the plant when it is ripe. The rice is then ground into flour, which is used for the preparation of a variety of dishes.

Rice is a very important food, and is used in the manufacture of a variety of products, such as rice flour, rice starch, and rice wine.

Wool.

Wool is another important textile raw material. It is produced by the sheep, a mammal which is found in a variety of climates. The wool is obtained from the sheep when it is sheared. The wool is then washed, carded, and spun into yarn, which is used for the manufacture of a variety of fabrics.

Wool is a soft and warm material, and is highly prized for its durability and its ability to hold its shape. It is also a very expensive material, and is used in the manufacture of only the finest of clothing.

Flax.

Flax is another important textile raw material. It is produced by the flax plant, a small plant which is grown in a variety of climates. The flax is obtained from the plant when it is ripe. The flax is then ground into flour, which is used for the preparation of a variety of dishes.

Flax is a very important food, and is used in the manufacture of a variety of products, such as flax flour, flax starch, and flax wine.

Jute.

Jute is a staple food in many parts of the world. It is grown in a variety of climates, but does best in warm, humid regions. The jute plant is a small grass, native to the warm regions of Asia. The grain, or jute kernel, is obtained from the plant when it is ripe. The jute is then ground into flour, which is used for the preparation of a variety of dishes.

Jute is a very important food, and is used in the manufacture of a variety of products, such as jute flour, jute starch, and jute wine.
Hungary gives us a good idea of how it maintains its flocks. Neither are there wanting the numerous varieties of goats' hair from Turkey, Armenia, Caucasus, Peru, Ecuador, &c., nor the colonial wool from Buenos Ayres, Cape of Good Hope, and Australia.

Silk is also well represented, and the Vienna Exhibition teaches us more about its quality and treatment than any book or treatise could do. But not only that, for all species of moths, the webs of which have been applied for the manufacture of silk, are represented at the Exhibition in long series. These varieties are to be recognised already in the cocoons themselves, which vary considerably in size and colour from the gigantic cocoons of Persia and Turkestan to the elegant cocoons from China. All the sizes between these two are shown by a fine collection of cocoons in the Italian department, where the same exhibitor shows a collection of all existing deformations of cocoons, caused by a spinning together by accident, and by diseases during the spinning time. The caterpillars and cocoons of the moths of Allanthus and Yasamai are to be found in this collection, as well as in others exhibited by America, Tunis, and Japan. The most interesting exhibits in this branch, however, are shown by Turkestan, Caucasus, China, and Japan, as they illustrate, besides the materials, the tools and apparatus for making silk. In the Japanese department we find a complete silk-spinning mill, which is highly interesting. Finally, we have to mention the fibres material obtained in fine and fair fibres from the beard of the Pseude solo, which is obtained in South Italy, especially in the bay of Tarent. It has the appearance of women's hair, and is used for imitating fur, &c., samples of which are to be found in the Italian department.