after depositing their eggs the next generation would certainly live well through the larval stage. For special treatment towards the regeneration of an infected race, the most robust worms were to be selected, and the moths issuing from the cocoons were to be coupled in numbered cells, where the female was to be confined till she deposited her eggs. The bodies of both male and female were to be examined for corpuscles, and the eggs of those found absolutely free from taint were preserved for similar “cellular” treatment in the following year. By this laborious and painstaking method it has been found possible to re-establish a healthy stock of valuable races from previously highly-infected breeds. The rearing of worms in small educations under special supervision has been found to be a most effective means of combating pebrine. In the same way the rearing of worms for graine in the open air, and under as far as possible natural conditions, has proved equally valuable towards the development of a hardy, vigorous, and untainted stock. The open-air education was originally proposed by Dr Chavannes of Lausanne, and largely carried out in the canton of Vaud by M. Roland, who reared his worms on mulberry trees enclosed within “manchons” or cages of wire gauze and canvas. The insects appeared quickly to revert to natural conditions ; the moths brought out in open air were strongly marked, lively, and active, and eggs left on the trees stood the severity of the winter well, and hatched out successfully in the following season. M. Roland’s experience demonstrated that not cold but heat is the agent which saps the constitution of the silkworm and makes it a ready prey to disease.

*Wild Silks.—*The ravages of pebrine and other diseases had the effect of attracting prominent attention to the numerous other insects, allies of the mulberry silkworm, which spin serviceable cocoons. It had been previously pointed out by Captain Hutton, who devoted great attention to the silk question as it affects the East Indies, that at least six species of *Bombyx,* differing from *B. mori,* but also mulberry-feeding, are more or less domesticated in India. These

include *B. tex­*

*tor,* the boro-

pooloo of Ben­

gal, a large

species having

one generation

yearly and pro­

ducing a soft

flossy cocoon ;

the Chinese

monthly worm, *B. sinensis,* having

several generations, and making

a small cocoon ; and the Madrasi

worm of Bengal (*B crœsi)*, the

Dassee or Desi worm of Bengal (*B*.

*fortunatus),* and *B. arracanensis,*

the Burmese worm,—all of which

yield several generations in the

year and form reelable cocoons.

Besides these there are many other

mulberry-feeding *Bombycidæ* in the East, principally belonging to the genera *Theophila* and *Ocinara,* the cocoons of which have not attracted cultivators. The moths yielding wild silks which have obtained most attention belong to the extensive and handsome family *Saturnidæ.* The

most important of the

species at the present

time is the Chinese tussur

or tasar worm, *Antheræa*

*pernyi* (figs. 7, 8), an oak-feeding species, native of

Mongolia, from which is

derived the greater part

of the so-called tussur

silk now imported into

Europe. Closely allied

to this is the Indian

tussur moth (fig. 9) *An­*

*theræa mylitta,* found

throughout the whole of India feeding on the bher tree, *Zizyphus jujuba,* and on many other plants. It yields a large compact cocoon (fig. 10) of a silvery grey colour, which Mr Thomas Wardle of Leek, who has devoted a great amount of attention to the wild-silk ques­tion, has succeeded in reeling. Next in promising qualities is the muga or moonga worm of Assam, *Antheræa assama,* a species to some extent domesticated in its native country. The yama-mai worm of Japan, *Antheræa (Samia) yama-mai,* an oak-feeder, is a race of considerable importance in Japan, where it was said to be jealously guarded against foreigners. Its eggs were first sent to Europe by M. Duchêne du Bellecourt, French consul-general in Japan in 1861 ; but early in March following they hatched out, when no leaves on which the larvæ would feed were to be found. In April a single worm got oak-buds, on which it throve, and ulti­

mately spun a cocoon whence a female moth issued, from which M. Guérin Méneville named and described the species. A further supply of eggs was secretly obtained by a Dutch physician M. Pompe van Meedervoort in 1863, and, as it was now known that the worm was an oak-feeder, and

would thrive on the

leaves of European

oaks, great results

were anticipated from

the cultivation of the

yama-mai. These ex­

pectations, however, for various reasons, have been disap­pointed. The moths hatch out at a period when oak leaves are not ready for their feeding, and the silk is by no means of a quality to compare with that of the common mulberry worm. The mezan- koorie moth of the Assamese, *Antheræa mezankooria,* yields a valuable cocoon, as does also the Atlas moth, *Attacus atlas,* which has an omnivorous larva found throughout India, Ceylon, Burmah, China, and Java. The Cynthia moth,

*Attacus cynthia,* is domesticated as a source

of silk in certain provinces of China, where

it feeds on the *Ailanthus glandulosa.* The

eria or arrindi moth of Bengal and Assam, *At­*

*tacus ricini,* which feeds on the castor-oil plant,

yields seven generations yearly, forming loose

flossy orange-red and sometimes white cocoons.

The ailanthus silkworm of Europe is a hybrid

between *A. cynthia* and *A. ricini,* first obtained

by Guérin Méneville, and now spread through

many silk-growing regions. These are only a few

of the moths from which silks of various useful­

ness can be produced ; but none of these presents

qualities, saving perhaps cheapness alone, which

can put them in competition with common silk.

*Physical and Chemical Relations of Silk.*

Common cocoons enclosing chrysalides weigh each from 16 to 50 grains, or say from 300 to 600 of small breeds and from 270 to 300 of large breeds to the lb. One- seventh of this weight is pure cocoon, and of that not more than one-half is obtainable as reeled silk, the remainder consisting of surface floss and of hard gummy husk or "knub." The total length of double thread or “bave’’ which the silk-worm winds into its cocoon may amount to 4000 yards ; the quantity reelable therefrom rarely exceeds 900 yards, and may range from 330 to 650 yards. It is found that the reelable fibre is as a rule thickest and strongest at the middle portion, tapering down very notably towards each extremity. In 1885 Mr T. Wardle of Leek showed by an elaborate series of measure­ments that the transverse section of common silk double thread or bave measures on the average 1/900 to 1/1000 in. at the thinnest and from 1/700 to 1/800 in. at the thickest part, and in some instances the middle was one-third thicker, stronger, and more elastic than the ends. As a great deal of silk remains on the husk after reeling, it is obvious that the thread last emitted by the silkworms on the inner wall of the cocoons must be of extreme tenuity. The silk of the various species of *Antheræa* and *Attacus* is also thicker and stronger at the centre of the reeled portion than towards its extremities; but the diameter is much greater