THE ANGORA GOAT.

JOHN L. HAYES.
THE ANGORA GOAT:

ITS

ORIGIN, CULTURE AND PRODUCTS.

By JOHN L. HAYES,

SECRETARY OF THE NATIONAL ASSOCIATION OF WOOL MANUFACTURERS.

From the Proceedings of the Boston Society of Natural History,
Vol. XI, March 18, 1868.

BOSTON:
PRESS OF A. A. KINGMAN,
MUSEUM OF THE BOSTON SOCIETY OF NATURAL HISTORY,
BERKELEY STREET.
1868.
THE ANGORA GOAT.

The Jardin des Plantes, the source and model of our Societies of Natural History, gave to the world not only Buffon and Cuvier, who, by their brilliant labors, won for the researches of the naturalist a place in the domain of science, before accorded only to studies of the imponderable elements, but two other scarcely less illustrious naturalists, whose labors were inspired by the purpose of applying their favorite science to increase the material resources of man. To this idea France owes the Merino sheep with which Daubenton endowed her, and the Imperial Society of Acclimatation, the creation of Geoffroy St. Hilaire, which aims to submit to practical study all the animals by whose acquisition the geographical zone of France can be advantageously augmented. Trusting that this Society may regard with favor the discussion of a subject akin to those which have received the attention of the great practical naturalists of France, I propose to submit a memoir upon the Angora Goat, the last acquisition which our agriculture and manufactures have received from the animal kingdom.

When we reflect that of the numerous species which compose the animal kingdom, forty-three only are at the command of man, and that the only lanigerous animal extensively appropriated in this country, besides its product of food, has furnished in a single year, from
domestic sources, seventy per cent. of the raw material for a manufacture valued at over one hundred and twenty millions of dollars, we must regard the acquisition of a new animal producing food and material for clothing, as an epoch in the industrial history of the country. It is the peculiar province of a Society like this to aid the development of this new national resource by shedding the fullest light upon the specific and geographical source of this animal, upon its habits, food and diseases, the uses of its products, and, above all, upon the laws which govern its reproduction; in a word, to make upon this subject natural history applied. As my object is less to present original matter than to diffuse the best authenticated information, corrected by your criticism, or sanctioned by your approval, a work rendered necessary by the errors abounding in agricultural reports and publications, I shall avail myself of the memoirs of M. Brandt, M. Tchihatcheff, M. Saece, and M. Boulier, naturalists of high repute, and the very numerous notices scattered through the proceedings of the Imperial Society of Acclimatation.

The description of this animal, given in 1855, by M. Brandt, director of the Museum at St. Petersburg, and distinguished among the zoologists of Europe, for his conscientious work and profound knowledge, is as follows:

"The magnificent example of the Angora goat, which the Museum of the Imperial Academy owes to M. Tchihatcheff, produces at first sight the general impression of a domestic goat, when attention is not directed to its thick and silky fleece, to its flat cars turned downwards, and its inconsiderable size. But it is precisely these traits which impress upon this animal a distinct seal, which give it the character of a peculiar race, whose origin is perhaps not the same as that of the domestic goat. The extremity of the snout, the cheeks, the nasal and frontal bone, as well as the ears, and lower part of the legs below the tarsal articulation, are covered with external hairs, which are shorter and thicker than those which cover the above mentioned parts in other species of goats. The forehead has soft hairs of less length, less applied to the skin, and, in part, curled. The hair of the beard, which is pointed and of moderate dimensions, being
six inches in length,\(^1\) is stiffer than the hair of the rest of the body but less so than that of the beard of the ordinary goat. The horns, of a greyish white tint, are longer than the head; at their lower part the interior marginal border turns inwards in such a manner that in this part they appear broad viewed in front, and narrow when seen exteriorly; at half their extension they direct themselves moderately backwards, and turn spirally outwards, so that their extremities, directed slightly upwards, are very much separated one from the other, and circumscribe a space gradually contracting itself. The whole of the neck, as well as the trunk, is covered with long hairs, which, particularly upon the neck and lateral parts of the body, are twisted in spirals having the appearance of loosened ringlets, it being observed at the same time that they reunite themselves into rolled tufts, a disposition which is less marked in the anterior part of the neck. The hairs which exhibit the greatest length are situated above the forelegs, and are almost nine and one-half inches long. Those of the neck are a little shorter and are nine inches long, and those of the belly eight inches three lines. The length of the hair with which the lateral parts of the body, as well as the back, are covered, is only seven inches six lines, and that of the hair of the hind legs six inches to seven inches. Finally the slightly stiff hair of the tail is about four inches in length. The color of the robe of the animal is a pure white, here and there slightly inclining to yellow. The hoofs, somewhat small in proportion, are, like the horns, of a greyish white tint. The hair is without exception long, soft and fine; it is at once silky and greasy to the touch, and shows distinctly the brilliancy of silk.\(^2\)

M. Brandt observes that the hairs corresponding most to external hair have only a third, or at most, do not attain half the thickness of the external hair of the common goat; and that the external hair of the wild and domestic goats is not only closer, stiffer, and more massive, but has a more considerable torsion and a less even

---

\(^1\) All the dimensions given by M. Brandt are in German measurement. One German foot is equal to 1.0299 English feet.
surface, that is to say, it is rougher and more scaly. He also remarks that "the walls of the hair of the Angora goat being thinner than those of the hair of the common goat, the substance contained in the fatty cellules oozes out more readily, which renders the hair of the Angora goat softer and more flexible, and gives it the lustre of silk."

M. Brandt omits to mention that the long ringlets cover the hair, properly called, which is rough and short and lies sparingly upon the skin.

The dimensions of the specimen examined by M. Brandt are given by him as follows:¹

<table>
<thead>
<tr>
<th>Description</th>
<th>ft.</th>
<th>in.</th>
<th>l.</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the point of the snout to the root of the tail</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Length of head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the point of the snout to the eye</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From the eye to the ear</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>From the eye to the horns</td>
<td>1</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Length of ear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of horns in direct diameter</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Length of horns following the curvature</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Distance between horns taken at their roots</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distances between their terminal points</td>
<td>1</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Width of horns at their roots</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of tail, including the hair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height of anterior part of the body</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Height of posterior part of the body</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

The point of inquiry most strictly pertinent to the objects of this Society and one at the same time eminently practical, as indicating the laws which govern the reproduction of this animal, thus illustrating the relations of pure science with utilitarian ends, is the determination of the specific source of the Angora goat.

The popular opinion as to the origin of this species is founded upon the authority of Cuvier, who mentions but three species of the genus *Capra*—*Capra aegragus, Capra ibex, Capra caucasica*. He says,

---

"Capra aegragus appears to be the stock of all the varieties of domestic goat;" adding that they vary infinitely in size and color, in the length and fineness of the hair, in the size of the horns, and even in the number; the Angora goats of Cappadocia having the largest and most silky hair. 1

The more recent researches of zoologists have greatly developed the knowledge of this genus. Instead of three only there are now recognized nine species of wild goats, which are divided into two groups based upon the form of the horns:

1. Group with horns flat in front, having a horizontal triangular section, and furnished with large transversal knots.

2. Group with horns compressed and carinated in front.

\[
\begin{array}{l}
\text{Capra ibex.} \\
\text{Capra hispanica.} \\
\text{Capra pyrenaica.} \\
\text{Capra caucasica.} \\
\text{Capra sibirica.} \\
\text{Capra Walei.} \\
\text{Capra Beden.} \\
\text{Capra Falconeri.} \\
\text{Capra aegragus.} \\
\end{array}
\]

1 Animal Kingdom, McMurtrie’s Translation. Vol. I., p. 198.

**Note. — The Cashmere Goat.** The only goat beside the Angora which is strictly dangerous is the Cashmere or Thibetian goat, which abounds in Central Asia, but whose origin is still obscure; although it has, according to Brandt, affinities with the Angora race. The size of the Cashmere goat is quite large; the horns are flattened, straight and black, and slightly divergent at the extremities. The ears are large, flat, and pendant. The primary hair, which is long, silky and lustrous, is divided upon the back, and falls down upon the flanks in wavy masses. Beneath this hair there is developed in the autumn a short and exceedingly fine wool, from which the famous Cashmere shawls are fabricated. The enormous prices of these shawls when extensively introduced into France at the commencement of the present century, as high as ten or twelve thousand francs, stimulated the French fabricants to emulate the Indian tissues. The first yarns from Cashmere wool were spun in 1815, and the high numbers were worth eight dollars per pound. The peculiar Indian texture called “Espouline” was perfectly achieved; and the success in this manufacture was hailed as the most brilliant triumph of the textile industry of France. Under the patronage of Monsieur, afterwards Charles X., in 1819 a great number of these goats were imported from Thibet, as many as four hundred being introduced by one manufacturer, Baron Ternaux, and much enthusiasm was excited in their culture. Experience, however, proved that these goats yielded but very little milk, and
The so-called goat of the Rocky Mountains is removed by Professor Baird from the genus *Capra*, where it was formerly placed by him under the designation of *Capra Americana*, Mountain goat. He says in the description of *Aplocerus montanus*, contained in his Report of the Zoology of the Pacific Railroad routes, "The figures and description of the skull and other bones of this species by Dr. Richard_ son, show very clearly that the affinities are much more with the antelopes than with the goats or sheep. In fact, none of the more modern systematic writers place it in the genus *Capra*, or, indeed, in the ovine group. The mere general resemblance, externally, to a goat is a matter of little consequence; indeed, its body is much more like that of a merino sheep. The soft, silvery, under hairs are very different from those of a goat, as well as the jet black horns, which are without any ridges, and smooth and highly polished at the extremities."³

The more recent investigations have shown that the animals re-

---
³ Vol. vii., p. 672.
ferred to, and figured by G. Cuvier and F. Cuvier as types of the *Capra aegragus* or Paseng, and said to occur both in Persia and on the Alps, were domestic goats which had become wild. Later researches have determined the true characteristics of *C. aegragus*, a species formed by Pallas from a cranium only, received by Gmelin from the mountains of the north of Persia, and have shown that naturalists had adopted this species as the source of the domestic goat without resting the assertion upon any proof. The comparison by M. Brandt in 1848 of a collection of skulls and horns obtained by M. Tchihatchef in the Cappadocian Taurus, with the original cranium which served Pallas for the type of his species, has enabled that naturalist, for the first time, to demonstrate positively the derivation of our domestic goat from *Capra aegragus*. M. Brandt asserts that it results from his labors that this species “is incontestably and exclusively the source of the domestic goat of Europe,” and gives the following arguments in support of this assertion:

1. “The *Capra aegragus* has all the exterior forms and all the proportions of the domestic goat.”

2. “It resembles it very much in the general as well as local distribution of its colors.”

3. “It approaches the domestic goat more than any other species in the configuration of its horns, a configuration which plays so important a part in the characteristics of the wild species.”

4. “It presents the same agreement with the domestic goat in respect to the cranium. Finally, it is found in the mountains of the countries, especially Mesopotamia, inhabited by the people of antiquity; (the Israelites, Assyrians, etc.,) which have furnished the most ancient information respecting the raising of the goat.”

The establishment of the perfect identity of the domestic goat with a wild species is a negative argument of much force for the exclusion from the same source of an animal so widely differing as the Angora goat. A positive argument of equal weight is the recent observation

---

that the Angora goat more nearly resembles another wild species lately discovered. This species, the *Capra Falconeri*, is found upon all the mountains of Little Thibet, and upon the high mountains situated between the Indus, the Badukshan and the Indo Kusch. It resembles greatly the domestic goat, from which it differs principally in its magnificent horns, which, near together at the base, are at first arched backwards, and then turn in a spiral inwards, and then over again outwards. They are strongly compressed, triangular and free from knots; their internal face, at first plane, is rounded higher up, whilst their external face is everywhere convex. Although there does not appear to be a development of fleece in this wild species corresponding to that of the Angora goat, M. Sace, professor in the faculty of sciences at Neuchatel, who has made a special study of the goats, does not hesitate to declare, that "all the characters of this species seem to indicate that it is the source of the beautiful and precious Angora goat whose horns are spirally turned like those of Falconer's goat." M. Brandt intimates that the domestication of other wild species than *C. aegagrus* and perhaps the *C. Falconeri* had produced the Angora goat. Geoffroy St. Hilaire, the highest authority upon the origin of domestic animals, refers to the opinions of M. Sace and M. Brandt without dissent, thus: "he (M. Brandt) is led especially to see in the Angora goat, produced, according to Pallas, by the cross of the sheep with the goat, an issue of the *Capra Falconeri*; this opinion is also admitted by our learned confrere, M. Sace."¹

The hypothesis that the Angora goat is descended from Falconer's goat is rendered probable by the diffusion of the former around the mountains of Thibet, where Falconer's goat abounds, and even beyond the central plains of Asia from Armenia to Chinese Tartary, where its wool is manufactured, or exported in a natural state by the port of Shanghae. Angora wool, or mohair, was exhibited at the London Exhibition of 1862 among the Russian products, as proceeding from the country of the Kalmucks of the Don, situated between the

Black and Caspian Seas. This species is thus seen to be diffused, although it may be sparingly, over the whole surface of Asia.

That this goat is at present more abundant in the country about Angora in Asia Minor, near the habitat of the *Capra aegragus* and distant many thousand miles from Thibet, may seem opposed to its derivation from the Thibetian species. The learned memoir of the Russian traveller, M. Tchihatcheff,\(^1\) establishes beyond question the comparatively recent introduction of the Angora goat into Asia Minor. He has shown that among the countries of classic antiquity there is no one which the ancient writers have mentioned more frequently and under more varied aspects than Asia Minor, because this country was not only one of the foci of the Greek civilization, but also the native country of a great number of the most celebrated writers of antiquity, such as Herodotus, Homer, Strabo, Dion of Halicarnassus, Galen, etc. Hence in all that concerns the natural history of Asia Minor, the writings of these authors have an especial interest, while their silence has the value of a negative argument. Referring to the writings anterior to the classic period, we find in the most ancient and venerable of historic monuments, the Bible, that the goat is frequently mentioned among the domestic animals which constituted the riches of the first patriarchs. Yet there is nothing in these notices which leads us to suppose that they were possessed of a race with fine and white wool. The beautiful comparison in the Song of Solomon which might seem to suggest the existence of a choice race of these animals, "Thy hair is as a flock of goats that appear from Mount Gilead" taken in connection with the verse following, "Thy teeth are like a flock of sheep that are shorn, which come up from the washing," would seem to intimate that the color was referred to by the poet as the point of resemblance; while the first comparison, to be flattering to youthful beauty, must imply that the color was black and not white.

---

Coming down to the Greek authors,—Homer and Hesiod, though frequently mentioning the goat as a domestic animal, make no allusion to any particular race. Ælian, referring to the goats of Lycia and the practice of shearing them like sheep, says that the wool is used for cords and cables. Appian mentions the stuffs known under the name of K:λίξια from Cilicia, the ancient name of the country in which Angora is situated, as a means of protection against projectiles; implying that the tissues of the goats of Cilicia were not distinguished for their fineness. Virgil gives the wool of the goat no other destination than to serve for the necessities of the camp and for the use of poor sailors:

"Usum in castrorum et miseris velamina nautis."

Columella, the great writer on Roman agriculture, quotes this line of Virgil as applicable to the covering of goats, and while tracing the qualities which a perfect animal should possess, excludes all resemblance to the Angora goat by demanding that the hair should be black. Strabo, born in the town of Amasia, very near the present domain of the Angora goat, makes no mention of goats of that country distinguished for their fleeces, although he remarks upon the different races of fine wooled sheep found in many places in Asia Minor. The author whom I am following observes that the most careful research among the Byzantine writers, after the Roman possessions became the patrimony of a barbarous people, has not afforded the least indication of a fine and white wooled goat. It was not until the year 1555, that the Angora goat was distinctly made known through the Father Belon, who had travelled in Asia Minor, by a brief but sufficiently characteristic description. The silence of the classic authors in respect to any goat with fine and white fleece would seem to place it beyond doubt that the progenitors of this animal were introduced into Asia Minor at a comparatively recent period, when the country was invaded by barbarous and pastoral races, either Turks or Arabs. M. Tchitchatcheff observes that the Arabs have never formed stable establishments in Asia Minor, while the Turkish race is the only one among the modern invaders of that country which came in search of a per-
manent home and has preferred it unto this day. He shows that two branches of the Turkish race, the Sülükjets and the Oghus, successively installed themselves in Asia Minor in the eleventh and thirteenth centuries, taking possession of the precise region in which Angora is included, and which their descendants still occupy. Immediately previous to their immigration they had occupied the vast plains of Khorassan and Bokara, and still more anciently, according to the most celebrated orientalists and geographers, the country on the southern borders of Siberia and the mountains of the Altai chain. It appears thus to be not improbable that a race of animals, originating in Central Asia, whose representative still exists in the *Capra Falconeri*, should have been carried by the migration of pastoral tribes to the region in which they are now found in the modified form of the Angora goat. This hypothesis is supported by the statement of the President de la Tour d'Aigues, probably derived from the Turkish shepherds who accompanied the flock introduced by him into Europe in 1787, that "there is a constant tradition that the goats of Angora did not originate in that country, but were derived from Central Asia."¹

Although the origin of the Angora goat from Falconer's goat is not demonstrated by proofs as positive as those which support the derivation of the common goat from *Capra aegragus*, they are not less positive than those which formerly led all naturalists to attribute the paternity of the common goat to that species. The absolute knowledge of the progenitor of the Angora goat is of less practical importance than the demonstration of a specific difference between the two races. That the Angora goat constitutes a particular race, and is not due to the same origin as the common goat, seems established by the following considerations:—

1. There is an essential difference in the horns of the two races, those of the Angora race being twisted spirally, a configuration wholly wanting in the common race, the form of the horns being recognized by modern systematic writers as the basis of the classification of the

family Capricornia, or ruminants with horns permanent, hollow and enclosing a piece of the frontal bone.

2. The mammillary organs are hemispherical, while they are elongated in the common species.

3. The very long wooly hair hanging in corkscrew ringlets, fine, white and lustrous as silk, covering the short and harsh hair properly so called, which lies upon the skin, is in striking contrast with the short and coarser external hair of the common goat with its finer interior hair or down.

4. The cry, wholly different from that of the common goat, resembles that of sheep.

5. The milk is more fatty; the odor of the male less strong and disagreeable.

6. The Angora, unlike the common goat, is fattened as readily as the sheep, and the flesh is exceedingly palatable.

7. The specific difference is finally established by the character of the crosses, a point to be referred to hereafter with more detail.

The theory of the difference of species in these two races is not invalidated by the fertility of the products of their crosses; such fertility having been observed in the mixed offspring of the more widely separated species, the horse and the ass. In this case it is well established that the he mule can generate and the she mule produce, such cases occurring in Spain and Italy, and more frequently in the West Indies and New Holland.¹

The practical deduction to be drawn from the separation of the two species is thus clearly stated by M. Sacc. "There is then no utility in creating flocks of the Angora for crossing with the ordinary goat. We must limit ourselves to preserving the species in entire purity and devote ourselves to improving the race by itself as has been done with the justly celebrated merinos of Rambouillet."² A leading object of this paper is to enforce the opinion of this sagacious and practical naturalist.

Upon the introduction of the Angora goat into France in 1787, and more recently in 1855, the opinion was generally entertained that the principal benefit to be derived from the new race would result from the amelioration of the products of the common species. This opinion unfortunately prevails in this country. It is sanctioned by all the agricultural notices or essays which have been published respecting the new race, and is naturally fostered by importers and breeders to enhance the selling price of bucks.

One of the earliest papers descriptive of this species which appeared in this country was published in the Patent Office Agricultural Report for 1857, it being the abstract of a report upon the Cashmere goats, as they were called, in the possession of Mr. Richard Peters, of Atlanta, Georgia, written by the well-known naturalist, Dr. John Bachman, of Charleston, S. C. This excellent naturalist, repeating the views at that time generally entertained, says: “The varieties of goats are equally numerous and equally varied in different countries. They are all of one species, the varieties mixing and multiplying into each other ad infinitum. They all claim as their origin the common goat, Capra hircus, which it is admitted by nearly all reliable naturalists derives its parentage from the wild goat, Capra aegagrus, that still exists on the European Alps.” After referring to the diversity of color, aspect and form, seen in the goats of Hindostan, Chinese Tartary and Thibet, he says, “in a word, they are all of one species, but under many varieties; breeds have become permanent, and some are infinitely more valuable than others.” He gives the results of breeding the Angora with the common goat as shown in the flocks of Mr. Peters in the following language:—“Familiar as we have been through a long life, with the changes produced by crosses among varieties of domestic animals and poultry, there is one trait in these goats which is more strongly developed than in any other variety that we have ever known. We allude to the facility with which the young, of the cross between the male of the Asiatic goat and the female of the common goat assume all the characteristics of the former. It is exceedingly

---

1 p. 56.
difficult to change a breed that has become permanent, in any of our domestic varieties, whether it be that of horses, cattle, sheep or hogs, into another variety by aid of the male of the latter. There is a tendency to run back into their original varieties. Hence the objection to mixed breeds. But in the progeny of these Asiatic and common goats, nine-tenths of them exhibit the strongest tendency to adopt the characteristics of the male, and to elevate themselves into the higher and nobler grade, as if ashamed of their coarse, dingy hair, and musky aromatics, and desirous of washing out the odorous perfume and putting on the white livery of the more respectable race."

Speaking of the Angora goat, Mr. Israel S. Diehl, who has contributed a paper upon it of much research, and valuable for many original observations, says:1 "This goat, though described as the Capra Angorensis, is only an improved variety of the Capra hircus or common domestic goat." He refers to numerous State agricultural societies and scientific and practical men to show the value of the Angora goat and its fleece, "and the facility with which it can be crossed and bred with the common goat, by which a flock can be readily raised and increased," adding, "almost all the progeny exhibit the strongest tendencies to the higher and nobler grades by assimilating themselves to the male and putting on the white livery of the more respectable, honored, and valued race." These views, widely circulated through the Government agricultural reports, have been accepted without question, and the efforts of breeders in this country have been largely wasted in vain efforts to produce crosses which would have all the value of the pure race.

To judge of the value and feasibility of such attempts we must bear distinctly in view the precise economical result to be sought for. It is obviously, not primarily to obtain a breed of goats which shall be fit for the butcher. Neither is it to secure a breed which will furnish a merely tolerable fleece which would be simply a substitute for the wool of the sheep. The object is to appropriate a race of animals which

shall produce a textile material adapted for certain defined purposes in the arts as distinct as silk, noble Saxony wool, or sea island cotton; a material which is a substitute for nothing else known, and has originated its own fabrics. The introduction of a race which fails to give this peculiar fibre, would be no real acquisition, however amusing to the breeder, and interesting to the physiologist the experiments in crossing might be.¹

Laying aside the statements given in the agricultural reports, as of little value as testimony, because there is no matter in which even skillful flock breeders are so liable to be deceived, as in the character and adaptation of their fleeces, and because there is no evidence that the products of the crosses referred to have ever been subjected to the only conclusive test, that of spinning, let us consider the feasibility of producing the typical fleece of the Angora goat, by means of crosses, by reference to admitted physiological principles, and the results in analogous cases. The illustrious naturalist, M. de Quatrefages, who has recently discussed, in his lectures at the Muséum d’Histoire naturelle, and in the Revue des Deux Mondes,² the principles which govern the formation of races, remarks that “there is one law in crossing which is constantly verified; each of the two authors tends to transmit to the product at the same time all its qualities good or bad.” This tendency he admits is modified by the predominance in one or the other, of the power of transmissibility. “When this power is equal in the two parents the product will have an equal mixture of the qualities of the parents; there will be a predominance of the qualities of one where this power of transmissibility is unequal. The inequality of the power of transmissibility appears to

¹ The conviction is extending among intelligent wool growers in this country of the importance of preserving the varieties of woolly fibre, each in its own character, purity and excellence, and free from that “mongrel type which will do for everything but is not desirable for anything.” At a meeting of the Ohio Wool Growers Convention, January 7, 1867, “Mr. R. M. Montgomery moved that the true course in breeding sheep is to keep breeds entirely distinct and to endeavor to produce the best clothing of the best combing wools, which proposition was unanimously agreed to.” U. S. Economist, January 25, 1868.

² Vide Revue des Deux Mondes, Decembre 15, 1850 to April 14, 1861.
be much greater when the races are nearest each other, for sometimes
the crossing between such races gives a product which seems to be-
long entirely to one of the two."¹ He observes that it follows from
these principles that nothing could be more irrational than to take
animals of the half blood as regenerators to ameliorate a race; for not
possessing completely the qualities which we seek, and having pre-
served a part of the bad which we wish to shun, they transmit a
mixture of one, and besides, as they are necessarily of a formation
more recent than the race to be regenerated, it will be the last one
which will impress itself, if not upon the first, at least upon successive
generations. These views are confirmed by the recent observations of
Professor Agassiz, in Brazil, on the effects of crosses of races of men.
He observes that the principal result at which he has arrived from
the study of the mixture of human races in the region of Brazil is
that "races bear themselves towards each other as all distinct species;
that is to say, that the hybrids which spring from the crossing of men
different races are always a mixture of the two primitive types
and never the simple reproduction of the characters of one or the
other progenitor. It is also remarked by the same high authority, that,
"however naturalists may differ respecting the origin of species, there
is at least one point in which they agree, namely, that the offspring
from two so-called different species is a being intermediate between
them, showing the peculiar features of both parents, but resembling
neither so closely as to be mistaken for a pure representative of the
one or other.²

The views of the eminent physiologists above quoted give no sup-
port to the popular fallacy into which Dr. Bachman and Mr. Diehl
seem to have fallen, that the male animal possesses the greater power
of transmitting blood to his progeny. Dr. Randall in the chapter
upon the principles of breeding in his "Practical Shepherd," while
admitting that the ram much oftenest gives the leading characteristics

² A Journey in Brazil, by Professor and Mrs. L. Agassiz. pp. 236 and 338.
of form, attributes the greater power of the ram to the superiority of blood and superiority of individual vigor, as the ram is generally "higher bred" than the ewes, even in full blood flocks. If it be true as a physiological principle that the parents in widely separated races tend equally to transmit all their qualities, what hope is there of obtaining a valuable lanigerous animal from the crosses of goats so widely separated as to belong to different species; especially when the heavy coating of one is absolutely worthless, and nothing short of the peculiar qualities found in the other is worth seeking for? All analogy teaches that it is vain to expect to form a permanent race of any value from the crosses of such widely separated races. Dr. Randall declares that "all attempts to form permanent intermediate varieties of value by crosses between the merino and any family of the mutton sheep with the view of combining the special excellencies of each have ended in utter failure." The German breeders say that it is impossible to transform, by crossing, the common sheep into merinos. Even after nine generations the common type reappears as soon as the use of merino rams of the pure blood has ceased. It is for this reason that the Germans refuse to the highest bred grade any other designation than improved half breeds.

The constant use of regenerators of pure blooded Angoras, if they could be procured, which would soon be impossible, from domestic sources, if the system of crossing should be persisted in, would be of little avail. In the Asiatic goat we have a perfect standard, as in the Arabian horse. Mr. Youatt says of the English races of the horse descended from the Godolphin Arabian, or the Darley Arabian and the blood mares of Charles I., "where one drop of common blood has mingled with the pure stream, it has been immediately detected in the inferiority of form and deficiency of bottom." So, we may infer,

1 pp. 110, 111.  
2 The Practical Shepherd. p. 125.  
4 Practical Shepherd. p. 127.  
5 Youatt on the Horse.
will a drop of blood of the common goat detract from the lustre and fineness of fibre found in the pure Asiatic race.

The elaborate article of Mr. Fleischman on German fine wool husbandry\(^1\) gives the results of constantly regenerating by the pure merino ram, the cross from the pure merino and common country sheep. At the fourth generation the fleece consists of 25 per cent. *prima*, 50 per cent. *secunda*, and 25 per cent. *tertia* wool. The nature of the wool is still coarse. There are about eighteen thousand wool hairs in a square inch. In the tenth generation the fine wool predominates. A fleece yields from 60 to 70 per cent. *prima*, 20 to 25 per cent. *secunda*, and 10 to 15 per cent. *tertia* wool. In the twentieth generation the fine wool is still coarse. There will yet be sometimes found *stickel* or coarse hair. At this period twenty-seven thousand wool hairs grow upon a square inch. Thus even at the twentieth generation, with the constant use of regenerators of the pure blood, the wool falls short of the fineness of the original or perfectly pure blooded animal, which has from forty thousand to forty-eight thousand wool hairs on a square inch. These facts show how slow is the approach to fineness of fibre even in crosses of animals descended from a remote though common ancestor.

Proceeding from analogy to direct evidence as to the results of breeding the race under consideration by means of crossing with the common species, no person in Europe has examined the Angora goat so thoroughly and for so long a period as M. de la Tour d'Aigues, President of the Royal Society of Agriculture of France, who in 1787 introduced some hundreds of these goats into Europe under the care of Turkish shepherds, and established them upon the low Alps where they greatly prospered. He affirms that even after the sixteenth generation the hair of the crosses obtained by crossing the Angora buck with females of the common goat remained hair and although it was elongated it could not be spun.\(^2\) "This species is," he says, "constant;

---

and although they procreate with our goats we can never hope to multiply them by crossing the races, because the vice of the mother is never effaced. If some individuals approach, more or less, the race of the sire, the hair will always be shorter and too coarse to be worked."

The testimony of this official head of the agriculture of France is of the highest value, not only because his position led him to seek the utmost advantage from the introduction of a new race, but because an elaborate memoir published by him shows that he had made thorough experiments in spinning and manufacturing the products of his fleeces, for which he gives minute directions.

The observations of M. Brandt show that the thickness of the hair of the pure Angora goat is from a third to a half that of the common goat. This fineness of fibre is an essential spinning quality. The fibre of this species is always prepared and spun in the form of worsted of long wool, that is, the fibre is not carded or subjected to a process by which the fibres are placed in every possible direction in relation to each other, adhering by their serratures, but are drawn out by combing so that they may be straight and parallel, the ends of the fibre being covered in the process of spinning, so that the yarns are smooth and lustrous. The fibres being extremely slippery they will not adhere in spinning unless they have the requisite fineness to permit many parallel fibres to be united in a yarn of a given number. When the fibres are too large they require to be mixed with combing wool to "carry" the fibre, as it is technically called, which diminishes the lustre of the fabric. Manufacturers of worsted, who have had large experience in spinning the mohair of Asia and this country, inform me that the best mohair can be spun into yarns of the number forty-two, while others are with difficulty spun into yarns numbered from ten to sixteen. Fibre of the latter quality is of no more value than the most ordinary combing wool, except for a few exceptional purposes to be hereafter referred to. Lots of so-called Angora wool, doubtless the products of recent crosses, offered in the market the pres-

---

ent season, could be used only for carpet filling, the lowest use of woolly fibre.

Although the facts and reasoning given above leave no doubt upon my own mind that the breeding from crossings of the common goat of this country should be abandoned, it is proper that I should state that hopes are still entertained in France of good results from breeding with the domestic goats of that country. M. Richard, of Cantal, in a report made in 1862 upon the animals deposited by the Society of Acclimatisation at the farm of the Souliard in the Cantal, says: "Crosses produced from the Angora and the ordinary goats of Auvergne have given products, which at the second generation much resemble those of pure blood; and if the Society should continue its experiments upon this subject, I think it will obtain some happy results. Nevertheless, to settle the opinion upon this point, it would be useful to study this practical question wherever the Angora goats have been deposited." The most that can be made of the opinion so cautiously expressed is that the system of crossing is still regarded in France as a proper subject of experiment.

CULTURE IN THE REGION OF ANGORA.

The culture of this species in the country of its greatest development next demands attention. Ample information upon this point is furnished by scientific travellers. The celebrated academician Tournefort, the master in botany of the illustrious Linnaeus, was the first to shed full light upon the ancient magnificence of Ancyra, the site of the present Angora, mentioned by Livy among the illustrious cities of the East. He refers to its most ancient people as having made even the Kings of Syria their tributaries, while its later inhabitants were the principal Galatians, whom the Apostle Paul honored with an epistle. He describes its monument to Augustus, the most splendid in all Asia, upon which was inscribed in pure Latin the life of the Emperor, its streets abounding with pillars and old marbles

---

mingled with porphyries and jaspers, its walls built up of ruins of architraves, bases and capitals, and its tombs covered with Greek and Latin inscriptions, all attesting that this was one of the centres of the Roman civilization, and making more significant the silence of contemporary authors before alluded to. But more interesting than the monuments of past splendors, is the mention first given with any detail by this traveller, of the contribution to modern civilization made by the barbarians from Central Asia. I transcribe his language:—

"They breed the finest goats in the world in the champaign of Angora. They are of a dazzling white, and their hair, which is fine as silk, naturally curled in locks of eight or nine inches long, is worked up into the finest stuffs, especially camlet. But they do not suffer these fleeces to be exported from this place because the people of the country gain their livelihood thereby. . . . . However it be these fine goats are to be seen only within four or five days' journey of Angora and Beibazar. Their young degenerate if they are carried further. The thread made of this goat's hair is sold for from four livres to twelve or fifteen livres the oque. Some is sold for twenty and five and twenty crowns the oque, but that is only made up into camlet for the use of the Sultan's seraglio. The workmen of Angora use this thread of goats' hair without any mixture, whereas at Brussels they are obliged to mix thread made of wool, for what reason I know not. In England they use up this hair in their peri-wigs, but it cannot be spun. . . . . All this country is dry and bare, except the orchards. The goats eat nothing except the young shoots of herbs, and perhaps it is this which, as Brusbequis observes, contributes to the consummation of the beauty of their fleece, which is lost when they change their climate and pasture."1

Interesting statements in relation to the culture of this species at Angora are given by Capt. Conelly, an English traveller, in a paper read before the Asiatic Society, which I deem it unnecessary to repeat,

---

1 A Voyage into the Levant. By M. Tournefort, Chief Botanist to the French King.
as they are generally accessible in Mr. Southey's work on wool.\footnote{Southey on Colonial Wools, p. 322, et seq.}

The most recent information is that given by the Russian traveller before quoted, who devoted five years to the study of natural history in Asia Minor, and M. Boulier (Pharmacien Aide Major) in a report of a mission to Asia Minor presented to the French Minister of War.\footnote{Vide Considerations sur la chèvre d'Angora par M. P. de Tchihatcheff, Bull. supr. cit., T. xi., p. 346. Sur la chèvre d'Angora. Par M. Boulier, Pharmacien Aide Major. Bull. supr. cit., T. iv., p. 557.}

The region marked out by the former of these scientific travellers, as the peculiar domain of the Angora goat, is situated between $39^\circ 20'$ and $41^\circ 30'$ north latitude, and between $33^\circ 20'$ and $35^\circ$ longitude east of Paris, a surface of about 2350 metric leagues square, equivalent to about a forty-fourth part of the surface of the peninsula of Asia Minor, and about the same fraction of the area of France. This country is more or less mountainous and furrowed by deep valleys, its mean altitude being estimated at 1200 metres; while the more elevated masses are generally shaded with fine forests, the plateaus which form a large part of the country, are very little wooded. The absence of trees, bushes and arborescent plants gives the country the aspect of immense steppes. This nudity permits the first heats of the spring to dry up the little humidity which the earth has acquired in winter. The climate is excessive, the winters being very cold, and the summers exceedingly hot. The country is covered with snow in winter, the rain and snow being very frequent, the thermometer in the neighborhood of Angora frequently descending to $-12^\circ -15^\circ -18^\circ$ of the centigrade thermometer, corresponding to $10.6^\circ, 5^\circ$ and zero Fahrenheit.

The cold season continues, however, only three or four months. During the rest of the year the temperature is very hot, particularly in the valleys, while the fine days continue almost without interruption; abundant pasturage is found for the white goats only after the frosts and snows, when the first warm rains revive the vegetation. This time is of short duration, and the stimulus given by a copious
and succulent nourishment is exerted wholly in developing the fleeces in length. The shearing, which takes place in April, is hardly concluded when the vegetation called forth by the warm spring is arrested, and receives no moisture from the dews, persons lying at night in the open air finding in the morning no humidity upon their garments. This dryness, however, gives to the vegetation which flourishes, the only aliment to flocks during summer, an aromatic character which makes it peculiarly digestible and stimulating.

The mineralogical character of the rocks which underlie the country is generally feldspathic, the trachytic and serpentine rocks abounding. No peculiar mineralogical elements appear to be essential to the successful culture of this species, as M. Boulier observes that there is not the least sign of degeneracy in the fleeces of flocks grown upon calcareous or gypseous soils. The localization of this species in certain districts within the general domain assigned to it, is quite remarkable, and appears to be mainly determined by the altitude of the country, the flocks of the pure race being rarely distributed upon the most elevated districts, in the deep valleys or the neighborhood of the forests. This localization is doubtless encouraged by the native proprietors, who unanimously assert that this goat cannot be transported from the place where it is born to a neighboring village without suffering a deterioration of fleece. Even the intelligent travellers above referred to seem to partake of this opinion. Direct observations, however, in Europe and elsewhere, have shown that this apparent deterioration is only the effect of age, and not due to a change of place and climate or food. The finest fleece is found upon animals a year old, which is worth eleven francs the kilogrammes; although somewhat less fine in the second year, it is quite good at the end of the fourth year, when it is worth six francs the kilogramme. At the end of the sixth year the fleece is positively bad, and at this period the animals are usually killed, their natural life being only nine or ten years.

All authors agree that these animals, although able to resist both heat and cold except immediately after shearing, when they are liable to
be destroyed by moderate depression of temperature, cannot with-
stand much humidity, either in their pastures or folds. In a moist
atmosphere they are especially subject to maladies of the respira-
try organs, or a kind of pleuro-pneumonia. In severe winters, while the
common goat of the country is unaffected, the mortality among the
goats of the pure race is frightful. This is due largely to their con-
finement, when the temperature is 15° centigrade, in very bad stables
completely closed and unvented, and to their nourishment upon
fodder imperfectly dried, a very little barley only being given when
the snow falls. The delicacy and lymphatic temperament of the
white Angoras, which seem to be inherent to this race, appear to be
closely related to their color. Some physiologists see in the color and
delicacy of this animal the evidence of an imperfect albinism. In
the very interesting discussions of the Board of Agriculture of Massa-
chusetts in 1867, many curious facts were stated, illustrating the re-
lation of a white color in animals with certain diseases and defici-
cences; for instance, that white horses are subject to diseased to which
black or red horses are not. Prof. Agassiz expressed the opinion
that change of color in animals must be the result of some general
change in the system, and if it is not shown in the eyes it will be
shown in something else, the light color being a kind of bleaching of
those darker tints which are connected with the qualities of the blood,
indicating a certain feebleness of the system." These views are
peculiarly interesting when taken in connection with the facts stated
by M. Boulier as to the manner in which the losses above referred to
are repaired. The fact had already been stated by M. Tchihatcheoff,
that when the losses are very considerable, the people of the country
repair them by crossing the Angora with the common goats, and that
the purity of the race is regained in the third generation. This state-
ment was regarded in France as conclusive as to the expediency
of crossing with the common goats of France, until the statements
which follow were published. M. Boulier shows that the goats
referred to as common in Asia, are of the same species as those of
the pure Angora race, from which they differ only in their color and
size. The variety which is spread everywhere in Asia Minor upon
all soils and at all altitudes, is the black or Kurdl race. The variety confined to the narrow limit is the white race. "The one and the other," he says, "have long fleeces. Their general forms resemble each other. The black goat is only of a size about a fifth larger than the white goat. The weight of the fleeces of the black race varies between three and four oeques (3 kil. 750 to 5 kil.). The hair, black, straight and without undulation, reaches a length of 0.27 m. ... The length of the locks of the white race reach 0.25 m. The length of the locks of the white race reach 0.25 m. The weight of the best fleeces two oeques (2 kil. 500)." M. Boulier cites two examples to show that the introduction of the white female goats into the country where they have not previously existed is not regarded by the natives as the most simple and rapid means of acquiring the more precious race. "Seventy years ago, at Zchiitela Gentchibe Yallaci, the natives possessed no white goats. Since that period they have crossed the black female goats of the village with the buck of the white race, and at present there are not less than eight thousand goats of the latter race upon the territory of that district. We have examined the flocks, and the fleeces are in no respect inferior to any of those which we have seen elsewhere. It is now established in respect to these new generations that after three years of experience the newly crossed race has not degenerated; it is distinctly established, since for a long time the regenerators are taken from the flocks themselves. At Sidi Ghazi the crossing by the same procedure has been commenced within only six years. The flocks are magnificent." The effects of the crossing in the successive generations are thus detailed:

"1. The cross of a black female goat with a white buck will present a fleece marbled with a yellow color upon an impure white foundation. The flanks, the shoulders and the head will preserve more particularly the marks of the color of the mother; the fineness of the fleece will be sensibly ameliorated.

"2. The cross of this first product with a white buck will cause all the dark tints to disappear. The fleece will become white. The shoulders and the flanks will be covered with wavy ringlets; but the
whole line of the back, and the forehead will remain furnished with coarse, straight hairs.

3. On coupling this new cross always with a buck of the pure race we shall obtain a greater fineness in the long ringlets of the flanks and shoulders; the dorso-lumbar portion of the vertebral column will no longer retain coarse hairs which will remain still on the upper part of the neck and forehead.

4. A fourth cross, carried on with the same precautions as before, will fix a stamp of purity to the product, the coarse hairs will have disappeared on the forehead and neck.

5. The consecutive crossings will render more stable the modifications already formed, and already after the fifth generation the individuals will be able to reproduce as if they were of the pure blood."

An infallible proof of fineness not mentioned by M. Boulier is insisted upon by other writers, viz., the curling of the wool, which is observed upon the young individuals only when they are of the pure blood, so that all the young bucks are rejected from the flocks with the utmost care as not being of the pure race, whose wool is not curled.

It is not to be denied that further observations are greatly to be desired in confirmation of the observations of M. Boulier. They are, however, referred to by M. Sacc as both "skillful and conscientious," and are relied upon by the latter naturalist as establishing the identity of the species of the black Kurd and white Angora race, and they are quoted with approbation by M. Bemis, principal veterinary surgeon of the army of Africa. This identity seems confirmed by the observations of M. Diehl, who has personally visited Angora. "There

---

1 Bull. supr. cit., T. v., p. 168. The facts stated by M. Boulier may seem inconsistent with the views elsewhere presented in this article as to the slowness of improvement by crossing. The identity of species in the black and white race is not settled by this naturalist. The power of deviation within wide limits may be a characteristic of this species in domestication; and these facts, to use the language of Prof. Agassiz in relation to deviations of species, may "only point out the range of flexibility in types which in their essence are invariable." A Journey in Brazil. p. 42.
is also a second, or other variety of Angora or shawl wool goat, besides those generally described. This goat has an unchanging outer cover of long coarse hair, between the roots of which comes in winter an undercoat of downy wool that is naturally thrown off in spring or is carefully combed out for use. A remarkably fine species of this breed exists throughout the area to which the white-haired goat is limited."

The number of goats of the white race grown in the district of Angora is estimated by M. Sace and others at three hundred thousand, and the product in wool, called tiftik by the natives and mohair in England, at two million pounds. The English tables of Turkish exports make the product in 1867 a little over four million pounds. Formerly the wools of Angora were wholly spun or woven in place, and were exported in the form of yarns or camlets, of which the city of Angora sold in 1844, thirty-five thousand pieces to Europe. The exportation of the wool was prohibited through the same wise policy which enabled England by its monopoly of the combing wools to build up its stupendous worsted manufacture. Some twelve hundred looms were employed. The natives displayed great skill in making gloves, hosiery and camlets for exportation, and summer robes of great beauty for the Turkish grandees.¹ The town flourished and the whole population was busy and happy in the pursuit of their beautiful industry. After the Greek revolution the Turkish Government was tempted by British influence to admit, free of duty, the products of European machinery and to permit the export of the raw tiftik. This fatal step was the death blow of the town of Angora. The whole product, with the exception of twenty thousand pounds only, still worked up at home, was exported to England. The looms employed were reduced from one thousand two hundred to not more than fifty; and the town, although having at its command the raw material for a most important and characteristic manufacture, offers in its sad decline another monument of the desolating influence of

¹ Southey on Colonial Wools.
that system which would make the raw material of every country tributary to the one great workshop of the world.

RESULTS OF EXPERIMENTS IN ACCLIMATION IN EUROPE AND THE UNITED STATES.

The attention of philanthropic agriculturists in Europe was drawn to this race in the last century. The first attempt to appropriate the race in Europe was made by the Spanish Government, which imported a flock in 1765, which has disappeared. Next followed the importation of the President Tour d'Aigues, who introduced some hundred upon the Low Alps in 1787. This experiment of acclimation appears to have been wholly successful, as this eminent agriculturist declares that although his flocks received no special care, they were constantly preserved in good health and accommodated themselves as well to the climate as the pasturage. "I can attest," he says, "that nothing is easier than to raise and nourish the species; they are led to the pastures with the sheep and are fed like them in winter." Towards the end of the last century Louis XVI. imported a flock of Angoras to Rambouillet, but this, as well as the flocks of Tour d'Aigues, disappeared in consequence of the revolution. The best results were obtained in Spain from the importation of a flock of a hundred in 1830 by the King of Spain. M. Graells reports that this flock was transported to the mountains of the Escurial where he says: "I had occasion to see them for the first time in 1818, that is to say, eighteen years after their entry into Castile. At this time the flock was composed of two hundred individuals, almost all white. The males had a magnificent fleece. The shepherds told me that all the primitive individuals had disappeared, and that those which lived were born in the country, and that they could be regarded as naturalized to the climate, the food and other inherent conditions of the central region of Spain. At Huelva there is another flock of Angora goats, composed of a hundred head, and from the information I have obtained it prospers very well in the mountainous region of
that province." The above extract is instructive as showing the slowness with which this race is multiplied, the primitive flock having tripled only in eighteen years.

In 1854, the Imperial Society of Acclimatation of France resolved upon vigorous efforts to appropriate this race. In 1855, it was in possession of a flock of ninety-two head. This flock was subdivided and placed in different districts in France. But the success was far from encouraging. Many died, and those which survived gave fleeces which were far from satisfactory. In 1858, all the separate flocks were reunited and placed at Souliard in the mountainous and trachytic district of the Cantal. The animals rapidly recovered their health, and were increased without suffering any malady. The fleeces were in an admirable condition, and were fabricated into velvets of such fineness and lustre that it was pronounced that "the wool of the Angora goat has been ameliorated in France." The increase of this flock was disastrously checked by the rigorous winter of 1859, and the rainy and damp summer which succeeded. "The abundant snows of the winter," says M. Richard, "prevented on the one hand the goats from issuing from their stable; the stabulation favored in them a predominance of the lymphatic system. On the other hand the showers and the incessant rains of the spring continued during the whole summer. The goats, always in a damp atmosphere, eating wet grass, contracted as well as the sheep an aqueous cachexy; a third of the animals succumbed from this malady. If energetic means had not been employed upon the first symptom of the invasion of the affection which was decimating the flock, it is very probable that few would have survived. The malady was arrested by a tonic and fortifying medication." The flock, reduced from ninety-two head in 1855 to seventy in 1862, was at the latter period in good health.

The experience in France, although by no means encouraging in all respects, is instructive as indicating the principal cause of the destruc-

---

tion of the flocks, exposure to a damp climate. The excessive climate of the middle and northern districts of this country, the cold winters and warm dry summers would seem to indicate these districts as most favorable to the acclimation of this species. Experience has fully confirmed what might have been assumed a priori. The first importation was made in 1849, by Dr. J. B. Davis, of eight Angora goats, two bucks and six females. The facts relative to subsequent importations and their results are given in the elaborate article of Mr. Diehl, which, being readily accessible in the widely circulated Agricultural Report of 1863, I need only briefly refer to. Mr. Diehl gives the results of his observations of most of the flocks, proceeding from some three hundred head imported from Angora, numbering, according to him, several thousand, and scattered mainly through the southwestern States, as follows:

"We have either personally visited and examined most of the localities and flocks (mentioned by him), seen or obtained animals or specimens of the wool, comparing them with what we saw abroad and the best specimens of wool to be obtained from abroad, or the best imported ones, and are well satisfied and thoroughly convinced that we have succeeded, and can continue to succeed, in raising this valuable wool-bearing animal, with its precious fleece, almost anywhere throughout our country where sheep will prosper, especially in the higher and colder localities,—producing an animal more hardy, with a heavy and more valuable fleece than the Angora or Cashmere itself in its own country. The specimens of wool in our possession are more silky and fleecy than the imported or original ones." M. Diehl gives extracts from original communications of practical stock raisers confirmatory of his statements. It is to be regretted that the value of these observations is diminished by the want of accurate discrimination between the products of the crosses and animals of pure blood.
APPLICATION OF PRODUCTS.

It has been already stated that mohair is not a substitute for wool but that it occupies its own place in the textile fabrics. It has the aspect, feel and lustre of silk without its suppleness. It differs materially from wool in the want of the felting quality, so that the stuffs made of it have the fibres distinctly separated and are always brilliant. They do not retain the dust or spots, and are thus particularly valuable for furniture goods. The fibre is dyed with great facility and is the only textile fibre which takes equally the dyes destined for all tissues. On account of the stiffness of the fibre it is rarely woven alone, that is, when used for the filling, the warp is usually of cotton, silk or wool, and the reverse. It is not desired for its softness in addition to silkiness, such qualities as are found in cashmere and Mauchamp wool, but for the elasticity, lustre, and durability of the fibre with sufficient fineness to enable it to be spun. Those who remember the fashions of thirty or forty years ago may call to mind the camlets so extensively used for cloaks and other outer garments, and will doubtless remember that some were distinguished for their peculiar lustre and durability, which was generally attributed to the presence of silk in the tissue. These camlets were woven from mohair. Its lustre and durability peculiarly fit this material for the manufacture of braids, buttons and bindings, which greatly outwear those of silk and wool. The qualities of lustre and elasticity particularly fit this material for its chief use, the manufacture of Utrecht velvets, commonly called furniture plush, the finest qualities of which are composed principally of mohair, the pile being formed of mohair warps which are cut in the same manner as silk warps in velvets. Upon passing the finger lightly over the surface of the best mohair plushes the rigidity and elasticity of the fibre will be distinctly perceived. The fibre springs back to its original uprightness when any pressure is removed. The best mohair plushes are almost indestructible. They have been in constant use on certain railroad cars in the country for over twenty years without wearing out. They are now sought by all the best railroads in the country.
as the most enduring of all coverings, an unconscious tribute to the remarkable qualities of this fibre. The manufacture of Utrecht velvets at Amiens in France consumes five hundred thousand pounds of mohair, which is spun in England. Ten thousand workmen were employed in weaving these goods at Amiens in 1855, the product being principally sent to the United States. The mohair plushes are made of yarns from No. 26 to No. 70, the tissues made of the former number are worth four francs per metre and of the latter ten francs per metre, showing the importance of preserving the fineness of the fleece. A medium article is made extensively in Prussia, of yarns spun from an admixture of mohair with combing wool, but it is wanting in the evenness of surface and brilliant reflections or bloom of the French goods. Mohair yarn is employed largely in Paris, Nismes, Lyons and Germany for the manufacture of laces, which are substituted for the silk lace fabrics of Valenciennes and Chantilly. The shawls frequently spoken of as made of Angora wool, are of a lace texture and do not correspond to the cashmere or Indian shawls. The shawls known as llama shawls are made of mohair. I have seen one at Stewart’s wholesale establishment valued at eighty dollars, weighing only two and one third ounces. Mohair is also largely consumed at Bradford in England in the fabrication of light summer dress goods. They are woven with warps of silk and cotton, principally the latter, and the development of this manufacture is due principally to the improvements in making fine cotton warps, the combination of wool with mohair not being found advantageous. These goods are distinguished by their lustre and by the rigidity of the fabric. All the mohair yarns used in Europe are spun in England, the English having broken down by temporary reduction of prices all attempts at spinning in France. Successful experiments in spinning and weaving Angora fabrics have been made in this country, as shown by the samples of yarns spun by Mr. Cameron and the dress goods spun and woven by Mr. Fay of the Lowell Manufacturing Company from Angora wool grown by Mr. Chenery at Belmont.

Before the demand of this material for dress goods and plushes,
Mohair was largely used in Europe and this country for lastings for fine broadcloths, the lustrous surface acting as a frame in a picture to set off the goods. This use is now abandoned. Mohair is now extensively used to form the pile of certain styles of plushes used for ladies’ cloakings, also for the pile of the best fabrics styled Astrakans. Narrow strips of the skin of the Angora with the fleece attached have been recently in fashion for trimmings, and great prices were obtained for a limited number of the pelts for this purpose. The skins with the flesces attached will always bring high prices for foot rugs, on account of their peculiar lustre and the advantages they possess over those made of wool, in not being liable to felt.

Nearly all the raw mohair of commerce is at present consumed by a very few manufacturers in England, who first commenced spinning in 1835, at the suggestion of Mr. Southey, and soon excluded the Turkish yarns by the superiority and evenness of their yarns. The enormous works of Mr. Salt in England were erected in 1853, mainly for the manufacture of mohair and alpaca fabrics. The annual exports of mohair from Turkey as well as other instructive facts are given in the following letter from a leading wool and commercial house in New York, obtained at my request.

**New York, December 7, 1867.**

**Messrs. G. W. Bond & Co., Boston,—**

**Dear Sirs:**—Agreeably with the request of your Mr. G. W. Bond, we beg herewith to hand you all the information we have regarding mohair or goats’ wool.

Good mohair (Angora goat) is not known as an article of commerce anywhere but in Asia Minor. It is received from Asia Minor in bales varying from one hundred and fifty to two hundred pounds in weight, as most convenient, each fleece carefully rolled up and tightly packed. The exports from Turkey are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Bales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>12,884</td>
</tr>
<tr>
<td>1860</td>
<td>11,902</td>
</tr>
<tr>
<td>1861</td>
<td>16,592</td>
</tr>
<tr>
<td>1862</td>
<td>17,706</td>
</tr>
<tr>
<td>1863</td>
<td>14,812</td>
</tr>
<tr>
<td>1864</td>
<td>19,761</td>
</tr>
<tr>
<td>1865</td>
<td>27,641</td>
</tr>
<tr>
<td>1866</td>
<td>22,068</td>
</tr>
</tbody>
</table>

1 Vide James’s History of the Worsted Manufactures.
We have seen samples of goats’ wool grown in South Africa and this country, but they had degenerated, becoming coarser, and losing the lustre and silky appearance which gives the staple most of its value. It is consumed by less than a dozen houses in Europe; in fact, one firm consumes about one-third of the whole supply, and has agents in Turkey choosing the same. It is a very peculiar article; either everybody wants it, or no one will touch it. There seems to be no steadiness in the trade; but the demand is seldom in abeyance for more than four months at a time. Large buyers have avoided it for some time, therefore stocks have accumulated to a considerable but not excessive extent.

About two years ago the price was up to nearly ninety-six cents gold, and fell, after long inaction, to about fifty to fifty-four cents gold per pound for super, white Constantinople: but even at this price there is very little demand. The value for second-class locky lots is always very uncertain. It forms, however only a trifling portion of the exports, and will fetch about twenty to thirty cents gold, per pound.

Fawn, a dark gray mohair, with long staple, is usually salable at twenty-four cents gold to thirty cents currency. There is also a fair kind of brown mohair, but shorter and more cotted, that we think sells best in France at prices between twenty to thirty cents gold. The terms on which this article is sold in the market are cash in one month less five per cent. discount; England, tares actual and one pound draft per cwt.

Yours faithfully,

Bauendahl & Co.

I have ascertained from other sources that the price of mohair in England of late years has been about double that of the best English combing wools.

RECAPITULATION AND CONCLUSION.

Experience in Europe, confirmed by observations in this country, has demonstrated the practicability of the acclimation of this race under favorable conditions of climate, without degeneracy of the fleeces. There are districts in this country possessing climate, temperature and hygrometric conditions, corresponding to those observed in Asia Minor and Europe as favorable to the culture of this race. The Angora goat and the domestic goat of Europe and this country having descended from separate sources, the obtaining of good results from the crosses of these two races is theoretically improbable, and is demonstrated to be so by the best experience in Europe. The normal fibre desired for the textile arts is only to be found in flocks of the perfectly pure race, and perhaps in flocks bred back to the stand-
ard of the pure race by crosses of a perfectly pure buck with the black Asiatic goats of the same race. It is desirable that importations should be made of the black female Kurd goat of Asia Minor, for crossing with the pure white bucks. There is evidence of great weight in favor of good results from such cases.

Systematic measures of acclimation must always be impeded by the eagerness of breeders for sale to obtain merchantable results. The appropriation of this race is of sufficient importance to deserve the earnest attention of the Government, as the best races of the merino sheep have been only secured through the persevering and disinterested efforts of governments in Europe. In the absence of any national society for acclimation in this country, a deficiency which ought not long to exist, the department of agriculture, under its present vigorous and intelligent head, offers the best means of securing the desired results. The cost of a single Rodman gun would secure a magnificent flock to serve for prolonged experiment and as a model to our agriculturists. Producers cannot expect to obtain remunerating prices for their fleeces until the manufacture of mohair fabrics is established in this country. It must be years before a sufficient supply is grown here to occupy a single mill. The fleeces of over ten thousand sheep are consumed every week in the single establishment of the Pacific Mills. It is probable that there will be a demand for all that can be grown for some time, for yarns for braids, and for Astrakhan cloakings which are being made in Rhode Island. The demand for animals of the pure race will increase without reference to the value of the fleeces. There are enough agriculturists of taste and wealth in this country who will readily pay large prices for these docile and beautiful animals simply as ornaments for their farms.

I am convinced that the greatest obstacle to the permanent acquisition of new resources from any department of nature is exaggerated expectations as to their value and facility of acquirement. Our impatient countrymen need to be reminded that real progress is the offspring not only of human effort but of time, and that of acclimation especially it may be said: Non solum humani ingenii sed temporis quoque filia est. There is encouragement however in the fact
that the fruits of decades or centuries in older countries are matured here in years. In how brief a time has this vast country been stocked with all the animal wealth which Europe had to bestow! How rapidly have we appropriated all the best ovine and bovine races of the old world! Within half a century we have spread the merino sheep over all the prairies of the West, and within a less period have acquired and perfected the cattle of the Durham short horn breed and even sent them back to ameliorate the parent stock in England. The hope then is not vain that the precious race, whose slow march westward we have traced from the remote East, may at no distant time be fully secured for the western world.