

Musk: It's Origin and Export*

Annual Slaughter of a Hundred Thousand Deer to furnish the World with Perfume

By Austin J. Clements

Musk is the chief and most valuable export of Tachienlu, Szechuan. Some thirty thousand ounces are disposed of annually, involving a turnover of Tls. 300,000. The trade is mainly in the hands of four large firms, but there are at least four score others of lesser degree engaged in it. The larger firms export to Chengtu, Chungking and Shanghai; the smaller ones confine their business to the local market. The trade is well established, and yields large profits. It has been adversely affected by the European War, and the disordered state of China, but should easily recover under normal conditions.

Musk is exported from other towns on the Chino-Tibetan border, such as Sungpan, Kuanhsien, Batang and Aduntze, but the largest quantity finds its way out through Tachienlu, which is the chief emporium for trade on the Eastern frontier. Musk is brought down to Tachienlu by Tibetan traders, by Chinese merchants or their agents in the interior, and by the hunters themselves. It comes in single pods or by the score; or again according to the firm which handles it, by the hundred and even the thousand pods. Supplies are drawn from a wide area. Even as far west as Jyekendo, musk is collected and sent down to Tachienlu; while Chamdo, Tengko, Shaeshu, Derge, Chantui, Kantze, Dawo, Litang, Hsiangcheng, Muli, Minyia, Yutong and Romedrange, all regard Tachienlu as their natural outlet. China is said to be the chief exporter of musk to the world's market, and that being so, it is safe to say that the largest proportion comes out by way of Tachienlu.

The bulk of information which follows, has been gleaned from persons engaged in, or connected with, the musk trade in Tachienlu. Many of those with whom I spoke have never seen a musk deer dead or alive, but musk pods they have seen and handled in plenty. I must confess to the same disability, if such it is, but perhaps the deficiency may be condoned when it is recalled that the musk deer is a solitary and retiring animal, which naturally avoids the haunts of men, hence, to be seen and studied, it must be sought after in the distant mountain forests. At present I am chiefly concerned in writing about the musk trade as it is carried on in Tachienlu, or a study of the animal itself may be left for another occasion; but since the deer provides the musk of commerce, a brief reference to it may fittingly lead on to an account of the trade.

Wilson, "a Naturalist in Western China," describes the musk deer as a small animal, of stout and rather heavy build. Its hind legs are longer than the front ones, raising the rump above the level of the fore-quarters, giving the animal a hunched-up appearance. Neither sex has horns, and the long tusks and musk gland distinguish the male from the female.

The musk is secreted during the rutting season, by a skin gland situated on the genital organ of the male. The deer frequents the upper wooded country between 8,000 feet altitude and the tree limit 11,500-14,000 feet, according to the climate, where forests composed of spruce, silver fir and larch, with thin undergrowth and plenty of rocks obtain. It occurs solitary or in pairs, though in a small area, several may be found. It is very active and surefooted, traversing rocks and precipitous ground with great agility.

HUNTING.

The musk deer is hunted both by Tibetans and Chinese, by means of traps and snares; in some cases dogs and guns are used. The deer are tracked by their feeding and drinking places. They feed upon grass, moss and lichen. "Faier Scarf," a parasite which flourishes in the forests and festoons the trees, is a favorite food; also the leaves and acorns of the prickly oak, which may be found in the form of stunted bushes and fairly large-sized trees throughout Eastern Tibet. To the practiced eye of the hunter, marks of feeding by the deer on the bushes are easily detected, and where such signs are found, traps are set. It is thought by some, that the deer which feed largely on the scrub oak, produce better musk, hence they are much sought after in the places where the oak freely grows.

The deer is hunted at all seasons of the year, but the period when the musk is at its best is considered to be during the autumn and winter. There is no

closed season, and the chase is carried on in spring and summer as well, but at this time the musk is thought to be slightly inferior in quality; however, in selling no distinction is made.

Marco Polo has a curious reference to the time of hunting the musk deer. He says: "The musk is obtained in the following manner: At the time when the moon is at the full, a bag or imposthume of coagulated blood forms itself about the umbilical region, and those whose occupation it is to take the animal, avail themselves of the moonlight for that purpose, when they cut off the membrane, and afterwards dry it with its contents in the sun. It proves the finest musk that is known." He adds: "Great numbers are caught, and the flesh is esteemed good to eat." Apparently methods have changed considerably since his day.

The traps which are set are designed to spear the deer and kill them. The snares take them alive by the feet. The latter method has more to commend it, because if the hunter gives close attention to his work, better results are obtained. As the male alone produces musk, it is the male that is most sought after. Both male and female are taken in the snares. In the case of the latter, the hunter can use his discretion and let them go for further breeding, or retain them for their venison.

The same applies to young, immature deer, under three years old, which are not sufficiently developed to warrant killing. Not all hunters, however, are considerate and it follows almost as a matter of course that there is a great deal of indiscriminate slaughter.

From three years upwards the male deer produces well, and the quantity of musk found in the pod, increases each year of its life. Deer between the age of three and seven, are the hunter's objective. These bear small and medium-sized pods. Deer above the age of seven are scarce, the conditions of forest life not being conducive to such longevity! Occasionally older deer are caught, and yield pods of musk from one to two ounces in weight.

On rare occasions hunters secure what is known among the Chinese as *shoe teo hsiang*, i. e., snake's head musk, which is highly esteemed by the merchants, being considered of greater value than the ordinary musk. The name arises from the form which the musk takes on in the pod, as to some it resembles a snake's head in appearance. There are different theories as to the origin of this rarity, the more plausible being that the secretion in the preputial sac of the older deer dries up and hardens, assuming in the process a similarity to the head of a snake. This musk, having attained greater maturity and become highly concentrated, increases in value accordingly.

Other distinct forms are known and classified as *Chuyiuhsiang*, which is of the consistency of lard; and *chingyiuhsiang*, corresponding to vegetable oil in consistency. Both kinds are rare, and fetch a higher price than the ordinary.

A Yutong hunter told me that he recently caught a deer which produced a pod of the *chuyiuhsiang*, which weighed one ounce and a tenth (Chinese), and sold in Tachienlu for Tls. 28.

The number of deer killed every year to supply the musk market is enormous. A computation based on the quantity of musk exported annually, should give a fairly correct idea. The total export of musk from Tachienlu averages about two thousand catties a year. In the ordinary way, twenty-two pods of musk are required to make a catty. The pods vary in size and weight, but when large and small are mixed together, the average works out at twenty-two to the catty. On this basis the death of at least twenty-two male musk deer must be encompassed, to place one catty of musk on the market.

But for a comprehensive calculation this ratio is too low. If it were reckoned that thirty musk deer are killed to produce one catty of musk, we should be nearer the mark, for due regard must be paid to the fact that in snaring and hunting, both male and female, young and old, are taken indiscriminately, hence it is reasonable to conclude that for every catty (gross) supplied, at least thirty deer are killed.

And since the annual export from Tachienlu is in the region of two thousand catties, it follows that to supply the Tachienlu trade alone, there is a yearly slaughter of sixty thousand. And when the exports

from Sungpan, Kuanhsien, Batang and Aduntze are added, the figures for the Szechuan-Tibetan border pass beyond one hundred thousand head. Yet in spite of this heavy exaction, the musk deer survives, and the quantity of musk brought down yearly to Tachienlu shows no sign of diminution.

This wholesale slaughter is nevertheless regrettable. If the demand increases, reproduction may not keep pace with destruction, and there will be danger of extermination. By the methods now employed, the life of the musk deer is sacrificed to obtain the musk. Could not some method be found to extract the musk without destroying the life of the deer? It seems to me quite feasible. The preputial sac containing the musk is accessible, and has a natural opening on the outside, through which the musk might be drawn without injury to the animal. Those who are familiar with the ways of the musk deer say that it is the habit of the males to lie down in places exposed to strong sunshine and relax themselves, in which condition the musk sac opens by itself and the musk is exposed. If the musk deer were reared in semi-captivity, and suitable means employed to extract a small quantity of musk annually, some interesting developments might take place.

BUYING AND SELLING.

The purchase of musk in Tachienlu is a very difficult and onerous undertaking, calling for knowledge and experience beyond the ordinary. Adulteration is practiced extensively, and the powers of the buyer are taxed to their utmost to detect imposition. Even the most experienced buyers are subject to deception, and in a whole year's dealings it is considered a good average if eighty per cent of the musk bought can be classed as pure. The loss of twenty per cent is practically taken for granted.

In buying a consignment of musk amounting to several catties in weight, and made up of say over a hundred pods, it is customary for the buyer to spread the pods of musk on a table, or on the floor, and group them according to their size and weight. The pods are in their rough and dry condition, with an outer covering of hide and hair. Embedded in the hide is the musk pod, which in its dried state is seldom larger than a walnut. The practiced eye of the buyer runs over the musk spread out before him, and he divides the various pods from each other, placing those of approximately half-an-ounce in one group, those of three quarters in another, and so on, until the whole has been graded. Then with the aid of an abacus he calculates the total weight, and according to the current price per ounce, he bases an average per pod.

The use of scales to test the weight is not customary, although they may be resorted to by agreement. In the case of buying a score of pods that have been previously trimmed and dressed, testing by scales would be a better method; but in buying large quantities in their rough, dried condition, the amount of extraneous matter, such as hide, skin and hair, would preclude the certainty of close reckoning, and thus defeat the object. So ordinarily the buyer has to rely on his own judgment.

As an alternative the musk pods might be opened, and the musk bought and sold by net weight. It might be remarked in favor of this method, that adulterated musk could more easily be detected. Against this, however, it may be argued that musk in bulk, might more easily be adulterated. Be that as it may, the present custom of buying musk in the rough pod has been long established in Tachienlu, and is not likely to be changed, even though different methods prevail in other places. Nor might a change to the open method be profitable in the end, since after being removed from its natural covering, and frequently submitted for sale to one and another, the musk would be in danger of losing much of its strength through exposure.

When passing through Aduntze several years ago, I observed that M. Perrone, a French musk merchant residing there, followed the practice of turning out the musk from the pod after purchase, and storing it in special tin canisters for export.

In the hands of a foreigner this method is no doubt safe and effective, but I doubt the wisdom of entrusting it to natives.

*From North China Daily News.

In disposing of small quantities, the seller has the advantage. It is the custom of some persons to prepare the pods for the outside market, and then sell them locally. By this method the pods can be weighed with a good prospect of accurately gaging their weight and value. The method followed is to cut away a fair amount of the hide and hair, then soak the pod in water to bring it to its natural soft condition. In this moist state the pod is weighed, and the actual market value of the musk ascertained. The pod is then allowed to dry again, and in its dried, contracted state, offered for sale. Obviously the one who sells, by his previous testing of the weight, has a correct idea of the real value of the pod, and since his object is to get as high a price as he can, if the buyer in his mental calculation commits the error of rating the value of the pods too high, his offer is likely to be snapped up, and his mistake discovered when too late to remedy it.

Business dealings in Tachienlu are more or less open, consequently a knowledge of other people's affairs is quite common. Most of the merchants have a fairly good idea of the extent of the trade of their fellow business men; hence certain transactions such as the purchase of musk are generally known and freely discussed in business circles, even to the quantity bought and the price paid.

It was not unusual, therefore, in making inquiries about musk, to hear of a Tibetan trader from Rom-batsa who had one thousand eight hundred pods for sale, and that the chief Chinese musk firm in the town had entered into negotiations for the purchase of the whole consignment. The price offered was said to be Rupees 27½ per pod. The pods averaged three-quarters of an ounce in weight. One thousand seven hundred of them were up to standard, but one hundred were below par, and the offer of Rupees 27½ was made on condition that the hundred poor pods were to be thrown in to boot. According to report the deal was not concluded, as the Tibetan trader stood out for a higher price.

When musk is sold in a Tibetan caravansery, the custom prevails of paying a percentage on the transaction to the landlord or landlady. Much of the business is done through their hands, it being understood that they assist in finding suitable buyers for the goods of their Tibetan guests, act as interpreters where necessary, and when their guests buy goods from Chinese firms on credit, the landlord of the caravansery nominally stands as surety. In consideration of these services as middleman, a regular commission is paid. Certain goods sold by the Tibetans are classed under the descriptive head of *mao-ho*, or hairy goods, comprised of wool, furs, deerhorns in velvet, hides and musk, the latter being included because of the tuft of hair attached to the pod.

The landlord's commission on musk sales is four per cent, and is charged to the buyer. Musk being a valuable commodity, the commission on a year's sales is considerable.

In so costly an article as musk, even the least adulteration successfully carried out is a lucrative undertaking, for musk is worth more than ten times its weight in silver; so the buyer has to be on his guard against all kinds of devices, and where his suspicions are aroused, he makes a thorough examination of the goods offered for sale, before he concludes a deal.

For the purpose of testing the quality of musk, the Chinese merchants use certain instruments specially designed for the work. The set consists of three articles usually made of iron, but occasionally of silver, according to the fancy and means of the person who uses them. The first is a thick and rather blunt needle, about four inches long, which is used to enlarge the natural opening in the pod, to allow of a sample being removed without injuring the pod. The second is a hooked needle resembling a button hook, which is inserted into the pod, and pushed over to the extreme edges, to probe these places, and detect any hard substance such as grain, which may have been secreted there. By means of the hook, the musk around the sides can be brought over to the middle for closer inspection. The third is a curved, grooved needle, used to extract a small quantity of musk from the pod, to be examined and tested.

Inquiries of musk merchants regarding the testing of adulteration, elicited the reply that there is no infallible test known to them. The consensus of opinion is that efficient testing turns on experience, and even the most experienced buyers are subject to deception.

In general there are half a dozen tests, and each merchant uses those which appeal to him most. Nearly all of the human senses are brought into play when full testing takes place; sight, smell, touch and taste each bear their part. In the sight test, general

appearance and color are of importance. When a fresh sample is withdrawn from the pod and exposed to the air, if the musk is of good quality, it will expand and almost effervesce. Color indicates quality. According to local authorities, musk may be found in three colors, namely, yellow, yellowish red and black. Chinese consider yellow musk the best. Yellowish red comes next, black or dark musk is placed third. In the immature pods of a yearling, the undeveloped musk is said to be whitish and practically valueless.

The sense of smell is naturally exercised in testing an article whose chief value is in its fragrance. If the scent is rich and full, it passes as pure; but if some additional smell is combined with it, the presence of adulterated matter is indicated. In this connexion, fire readily exposes adulteration, for when burned, some of the things used to adulterate musk, throw off a strange odor, which, by those experienced in testing, can be distinguished from the smell of burnt musk.

The touch is also a fair test. Musk pods when trimmed and dressed, are sensitive to the touch. Foreign matter inserted in the pods has a tendency to harden, and will not easily yield to the pressure of the fingers, whereas pure musk is soft and impressible. A further test may be employed by placing a little saliva on the finger and thumb, together with a small quantity of musk. By this means adulterated musk can be worked into a paste between the finger and thumb, but pure musk will not mingle with saliva. It resists the action of water, and remains in its natural condition.

The sense of taste may also be employed, by placing a little musk on the tongue. Musk has its own peculiar flavor, which, though strong, does not wholly prevent the detection of any foreign matter that may have been mixed with it.

ADULTERATION.

The adulteration of musk is carried on both within and without Tachienlu, before and after arrival. Soon after the musk deer is taken and killed, a good opportunity is afforded for adulteration, for then the pod is soft, and the natural opening easily stretched. But these fraudulent operations are not confined to that time alone. Those fully initiated into the mysteries of the art, choose their own time and place, with, it is to be feared, only too much success.

Adulteration takes various forms, and numerous expedients are adopted to introduce an adulterant, and thereby increase the weight of the pod. By some, peas are used, also barley and grains of wheat. Comparatively speaking, these are among the simpler and better forms of adulteration, for they can be fairly easily detected, and when found, removed entirely without much difficulty or damage to the musk. Other more elaborate and deleterious adulterants employed are tsamba, mashed acorns, fried liver, pulverized beef, etc. These latter substances are more effective from the adulterator's point of view, because they can be mixed with the musk, and are more difficult to detect. Their effect upon the musk is of course injurious, and reduces it to an inferior grade, but does not spoil it altogether.

It is said that here in Tachienlu, there is a firm which is wholly devoted to the manufacture of false musk, and so successful is their work, that the production resembles real musk in every respect except smell! This absent quality is added by mixing a small proportion of real musk with the spurious article. The adulterant is sold surreptitiously in any quantity required, and is bought by unscrupulous musk dealers to increase the weight of small pods. Indeed some persons allege that no really pure musk is exported from Tachienlu, all being more or less adulterated.

THE BUSINESS OF EXPORTING.

The condition of the musk pod when it leaves Tachienlu, is decidedly different from its appearance on entering.

The pods are generally brought down in a rough dried condition, with an outer covering of hide and hair. To prepare the pod for the Shanghai market, it is first soaked in water until soft and plump, after which the redundant hair and hide are trimmed and reduced to more convenient proportions. The pods are then carefully packed in layers in small wooden boxes containing about ten cattles, and despatched to the coast. When in their dried, contracted condition, the musk pods emit very little musk smell, the prevailing odor being of uncured hide, which surrounds the pod. After treatment by soaking, they give off a pleasant musk perfume.

Owing to the fact that pods are packed and transported in a damp condition, the export of musk is restricted to the cooler months of the year. From

the first to the third moon the weather is suitable, because the temperature is low; but during the fourth, fifth, sixth and seventh moons the heat of the Yangtze route is too great to allow of safe shipment, so export is discontinued for that period. If musk is sent to the coast in damp pods, irrespective of weather conditions, the probability is that it will spoil in transit. The action of the great heat on the damp pods causes mould, and makes the musk useless. From the eighth to the twelfth moon export can be safely resumed.

IMPORT AND EXPORT DUES.

The musk trade is subject to taxation in the interior, at Tachienlu and along the route to Shanghai. The local impositions are fairly light, but taken in the aggregate, the numerous charges are considerable. . . .

THE USE OF MUSK.

Although it does not come directly within the scope of this article, a brief reference to the use of musk, may not be out of place. It is used by Chinese apothecaries in compounding medicine, especially for children. It is also much in favor among Chinese as a perfume. When supplied to the foreign market it is chiefly used for perfumes, either as musk alone, or in combination with other scents. As a base for general perfume it has the effect of making them more lasting.

OTHER USES OF THE MUSK DEER.

Whilst the musk pod is by far the most valuable part of the musk deer, yet its worth and utility does not end there. The venison is esteemed a great delicacy. Among other kinds of flesh, the Chinese place venison from the musk deer first. . . .

The hide also is of commercial value, being remarkable for its softness. It is in considerable demand in Tachienlu by furriers, who tan it, and use it freely in the composition of fox-skin gowns. Those who have paid any attention to the reverse side of a fox skin gown made by a Chinese tailor, will have noticed that the garment is largely composed of narrow strips sewn together. In making a garment of fox skins, the furriers contend that the fur is too thick to allow of its being used in large pieces, so the skin is cut up into strips barely half an inch in width, and narrow slats of bare deer skin inserted between. When the gown hangs down or lies flat, the abundant fur overlaps these bare spaces, and presents a normal appearance. The hide is also used by Tibetans to make small bags in which to carry their tsamba. Again, they cut it up into very thin strips for thread to stitch their leather work.

In the process of tanning the hide, the hair of the musk deer, which is coarse, brittle and hollow, is reserved for stuffing mattresses. In this department, the Tibetans have excelled themselves, and are able to produce small, folding mattresses, suitable for use on journeys, or for regular use at home, which, for neatness and resilience, would do credit to a firm of modern upholsterers.

One specimen which I saw was about five feet long by two and a half broad, and folded neatly into four sections.

Electric Resistivity of Hardened Steels

Quantitative data and the rate at which the electric resistivity of hardened steel changes when the steel is reheated to a temperature as low as 100° C., and even when standing at ordinary temperatures, are given in a paper by E. D. Campbell presented before the Iron and Steel Institute in London. A brief summary of this paper follows:

The steels experimented with contained 0.57, 0.76, 0.945 and 1.05 per cent of carbon respectively. Bars were heated in a nelectrical furnace without oxidation to the desired temperature, and quenched in a large volume of water kept below 10° C. by means of crushed ice. After the specific resistance had been measured, one set of bars was placed in an electrically heated drying oven maintained at a temperature between 100° and 108°, and usually between 105° and 108°. They were kept in the oven for three periods of one hour, one period of three hours and one of six hours, their resistance being determined after each period of heating. The total drop in resistance after the 12 hr. tempering was 2.01, 6.50, 9.01 and 10.54 for the four steels. The other set of bars was placed in a cylinder at room temperature, and covered with oil to prevent rusting. Resistance measurements were made at various intervals; and after two years the total drop was found to be 0.47, 2.31, 3.32 and 3.53.—*Iron Age*.