

DRESSING AND DYEING OF AQUATIC FURS.*

By CHARLES H. STEVENSON.

THE appearance of aquatic furs as they come from the hunters and trappers is quite different from that which they present when ready to be cut into garments. They are more or less greasy and dirty, and require thorough cleansing. The pelt or membrane

breaking, a workman rubs or works most of the overhairs out of the membrane. Those not removed in this manner are subsequently plucked out with a dull knife of soft metal. With this knife in his right hand and his thumb protected with a rubber cot about 4 inches in length, the picker grasps the hairs between the edge of the knife and his protected thumb, and with a quick, jerking motion pulls them out, going

Tubbing is gradually giving way in a greater or less extent to the "tramping machine," whenever anything less than the very best work will suffice. This machine is adapted from the French apparatus for fulling wool stock. It consists of two wooden hammers, which are moved alternately back and forth or up and down in a suitable receptacle, agitating the skins slowly and constantly, turning them over and over each other, and developing by friction the necessary heat, thus rendering the pelts soft and pliable. This process is far more economical than tubbing, costing only 10 or 20 per cent as much. The result, however, is not always so satisfactory, and for the choicest skins tubbing is yet generally used.

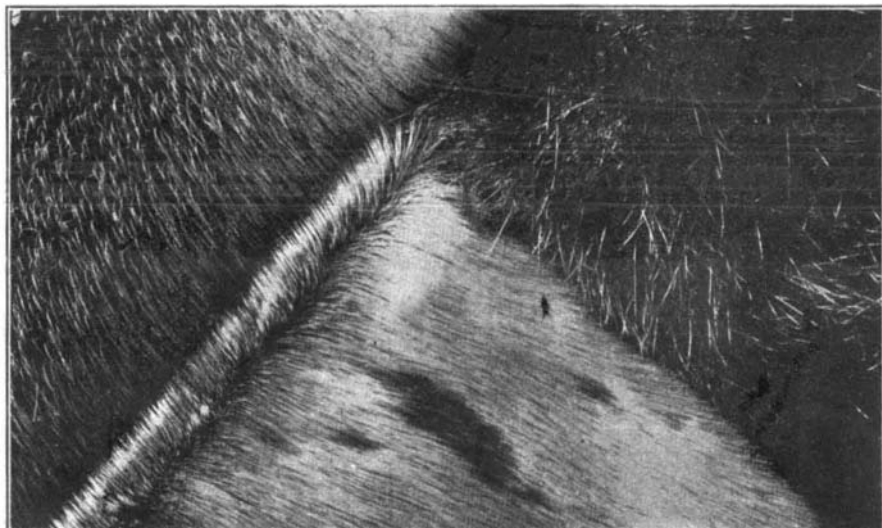
At this stage of the dressing process comes the fleshing or skiving, the former being applied to small skins and the latter to large ones. Fleshing consists in removing all particles of flesh and fat by means of a fleshing knife, formed with a broad blade having a sharp edge, fastened in an upright position on a bench. The workman sits astraddle the bench immediately behind the knife, with the edge turned from him, and proceeds to flesh each pelt by grasping it with both hands and drawing it repeatedly across the sharp edge of the knife, cutting off the superfluous flesh. Only small skins, such as mink and muskrat, are fleshed in this manner. Large skins, as those of beaver, otter, etc., are shaved on a beam with a skiving knife, in much the same manner as before the leathering process, except that the operation is performed much more carefully.

After fleshing or skiving, the skins are usually put through the tubs or tramping machines a second time, and on removal therefrom are cleaned of grease. In this operation two forms of revolving drums are used, one known as the cleaning drum and the other as the beating drum. The purpose of the former is to extract the grease by means of dry sawdust, and of the latter to remove the sawdust. The drums are usually about 4 feet wide and 6 or 8 feet in diameter, but the size is entirely a matter of convenience and desired capacity.

The cleaning drum is made of wood, and upon its interior circumference are four or five wooden shelves about 6 inches wide and at suitable distances apart. Instead of these shelves, some drums are provided with rows of wooden pins or pegs 6 or 8 inches in length and similarly situated. Sometimes each cleaning drum is inclosed in a wooden closet, which is heated by steam pipes or a charcoal fire. A number of skins, with a quantity of fine, dry, hard-wood sawdust, are placed in each drum. The latter is revolved steadily, making about 20 revolutions per minute, and within three or four hours the dry sawdust absorbs the grease, leaving the fur clean and soft but filled with sawdust.

The beating drum, also sometimes inclosed in a closet, has wooden ends, and its side or circumference is of wire gauze, with meshes about one-fourth inch square. Along the interior circumference are wire-gauze shelves about 10 inches wide, which catch the pelts at the bottom of the revolving drum and carry them nearly to the top, when they slide off and fall against the wire gauze covering the circumference of the drum. In this manner the pelts are cleaned of every particle of sawdust. Many of the larger pelts are beaten with rattans for the same purpose.

After removing the sawdust and straightening the fur with a steel comb, the dressing process is at an



Blueback seal.

Harp seal.

Wool seal.

SEAL SKINS TANNED WITHOUT REMOVING THE HAIR.

must be converted into a form of leather and made soft and pliable, while in some varieties it must be reduced in thickness. The overhair of many skins is quite undesirable and must be removed, this being the case with the fur-seal, beaver, nutria, and cheap grades of otter. The overhair is not removed from all varieties, however, for in some it constitutes the principal attraction, as in the sea-otter, mink, muskrat, and choice grades of otter. The fur-seal alone among the aquatics is usually dyed, but many cheap grades of other varieties are also dyed for the purpose of imitating more valuable ones.

In the dressing of aquatic furs there are no especially valuable trade secrets; but, as in nearly every other industry, some establishments have methods of treatment which they consider superior to those used by others and which they desire to keep from general use. As a rule, however, these secret processes are for the purpose of substitution or imitation, and have little standing among the most successful fur-dressers. In the best establishments the excellent results are due to conscientious application of well-known methods, without stint either in amount of labor or quality of material.

The fur-dressers of the United States are pre-eminent in the preparation of otter, mink, and beaver, while those of Germany rank well in dressing beaver and muskrat furs. The English have excelled for forty years in the dressing and dyeing of fur-seal skins and have prepared the great bulk of those on the market, but the Americans and French now prepare them equally well. The Chinese fur-dressers are the most ancient and among the best in the world. They dress sea-otter skins remarkably well and secure wonderful effects in matching furs of all kinds.

The principal fur-dressing establishments in this country are located in New York city, where the great bulk of the skins are prepared. Smaller establishments exist in Chicago, St. Paul, Newark, and Philadelphia. In Europe the fur-dressing is centered at Leipsic, Weissenfels, and Lindenau, Germany; London, England; Paris and Lyons, France; and Moscow and St. Petersburg, Russia.

When received at the fur-dresser's, peltries are usually hard, greasy, and dirty. If very greasy, as is the case with mink skins, the surplus grease is scraped or beamed off. The skins are soaked in water over night for softening and opening the texture preparatory to the unhairing and leathering processes. Salt water is generally used for soaking, especially during warm weather, as its tendency to loosen the hair is less than that of fresh water. Heavy pelts, as of beaver, otter, etc., are beamed the following day for the purpose of breaking up the texture of the membrane and softening it. The beam on which the skins are successively placed for this purpose is made of some hard wood, as locust, boxwood, etc. It is about 40 inches long and 8 or 10 inches wide, and is placed at an incline of about 45 degrees. The breaker is a dull scraping knife, with a handle at each end like a carpenter's draw knife, and is always operated in a downward direction. After beaming, the pelts are washed in warm soap water until perfectly clean and then they are freed of moisture.

If the overhairs are to be removed, that process is next in order, except in the dressing of muskrat skins, when it is usually postponed until after the dressing. In preparing for plucking, the hair side is dried and warmed by artificial heat, the membrane being kept moist in the meantime. Each skin is placed flesh side down on a flat, hardwood beam, similar to that used in breaking except that it is covered with thick, elastic leather. Chalk is first sprinkled over the hair, and then, using a knife similar to that employed in

over the entire pelt in this manner. The fur-seal is quite difficult to unhair, and the process is more complicated.

After plucking, the heavy pelted skins—as beaver and otter—are placed successively on a beam and shaved to a thin, even surface with a skiving knife. The blade of this knife is a straight piece of steel sharpened to a keen edge, which is then turned at right angles to the plane of the knife by means of a peculiar flat steel. This blade is fastened in a tool having two wooden handles differently attached, one running parallel to or in direct continuation of the blade, and the other placed at right angles thereto. Each skin is placed, fur down, on the beam, and by pushing the skiving knife downward and forward from his body, the workman scrapes the pelt perfectly clean and shaves off some of the membrane for the purpose of rendering it less bulky and more pliable.

The skins are now ready for leathering. The pelt side is dampened over night with cold salt water, and the following day butter or other animal fat is rubbed on the membrane. In dressing very fat or oily pelts, as those of mink, the greasing is omitted.

The pelts are then tubbed. This is probably the most noticeable operation in the fur-dressing establishment. Tubs or half hogsheads, slightly inclined backward from the floor, are located in a row along one side of the room. A number of skins are placed in each one, usually with a small quantity of sawdust. A workman with bared feet enters the tub, with a heavy cloth or piece of bagging tied about his waist and to the chime of the tub to prevent the sawdust



SHAVING MINK SKINS.

THE DRESSING AND DYEING OF AQUATIC FURS.

from flying out and to retain the heat. By treading and twisting movements he works the skin over and over for two or three hours or more until the pelt is thoroughly softened or leathered. It is a strange and interesting sight to see ten or twelve men working in an equal number of tubs placed in a row, each person monotonously treading and swaying from side to side in solemn manner.

This general process would suffice fairly well for all varieties of aquatic furs, but it is modified to suit the characteristics of the different sorts.

Except in case of very cheap skins the expense of dressing furs represents only a small percentage of their value. The following tabular statement shows the average charges that prevail in New York city for dressing skins in quantities for the trade:

* Extracted from the United States Fish Commission Report for 1902.

STATEMENT OF AVERAGE CHARGES PREVAILING IN NEW YORK CITY FOR DRESSING AQUATIC FURS.

Species.	Dressing.	Dressing and plucking.
Beaver	\$0.50	\$0.60
Fur-seal* .....	.....	3.00
Mink: Cased .....	.15	.....
Open .....	.14	.....
Mink tails .....	.03	.....
Muskkrat .....	.06	.08
Nutria .....	.....	.25
Otter .....	.50	.65
Sea-otter	2.00	.....

* Dressing, plucking, and dyeing, \$5.

With the exception of the fur-seal, the choicest furs of any particular species are rarely dyed. Indeed, their degree of excellence is determined by the nearness of their approach in the natural color to the most desirable shade for that species. So important is this that a skin of proper tint may be worth three or four times as much as one whose texture is equally fine but lacking just the right shade. For instance, the present average value of prime dark sea-otter skins is about \$600 each, whereas the average price of prime brown skins is only \$200. In case of mink, otter, and other choice species, the difference is as great in proportion.

In order to obtain those shades which taste and fashion have determined to be the most desirable, much of the aquatic fur is dyed. Either the ends of the fur and hair are merely tinted, or the color of the entire skin may be changed. The object of tinting or blending is to make all parts of the fur used in a garment of the same color, to make an inferior grade of fur like that of a superior, or to cause the fur of one animal to resemble that of another. Certain furs so closely resemble choicer ones in every particular except color, that when dyed to a similar hue they are almost indistinguishable to the casual observer.

While dyeing may be a cheap and ready process in the treatment of low-priced furs, it is an art when applied to choice skins. Its perfection consists in the exact imitation of the proper color and tint, with the preservation of the glossiness of the fur and its natural firmness and pliability, and, finally, in the durability of the dye. In case of the fur-seal, fashion has decided that the color shall be changed to a lustrous, blackish brown, an original color resembling nothing whatever in the animal kingdom.

Some skins of beaver, otter, etc., are "silvered" by passing lightly over them a solution of sulphuric acid, and also some are made a golden yellow by means of peroxide of hydrogen. Dyed furs are generally not so durable as those left in the natural state, the artificial color fading and the garment sooner presenting an old and worn appearance.

The dyeing of furs is of great antiquity, but its principal development, in America and Europe at least, has been within the last forty years. Experiments on the part of conscientious and able chemists have resulted in greatly improving the permanency of the dyes and lessening their injurious effects. The methods are constantly undergoing changes and many improvements are introduced from time to time. The composition of the new dyes and the methods of applying them are carefully guarded from general knowledge. One frequently runs across published directions for compounding the dyes and methods of applying them, but usually these descriptions are totally valueless, the methods described being either superseded by better ones or being lacking in essential ingredients.

The number of successful dyers in the world is very small. Their prosperity is dependent as much upon the elimination of competition as on the excellence of their work, and consequently they are not proclaiming from the housetops the composition of their dyes, frequently the results of long and costly experiments.

NATURAL PRODUCTS AND SCIENTIFIC INDUSTRY.

Of all the scientific problems of the present day, none possesses greater fascination than that of the imitation of the more precious natural substances. These substances, whatever be their nature, are only produced in limited quantities; and if they are highly valued on account of their possessing certain special qualities, the inevitable result is that the demand soon exceeds the supply, and the price of these materials rises till finally their employment for purposes which would lead to an excessive consumption, if the price were low, is dispensed with.

Consider, for instance, the multitude of articles that would be made of ivory if it were not so expensive! Only male elephants, however, have tusks, and the latter are not fully developed till in the later years of the animal's life. In spite of the reckless manner in which elephant hunting is carried on, in spite of the enormous price now paid for good ivory, the demand for this precious material is always in excess of the supply. The same is the case with tortoise-shell. The beautiful properties of this material have made it so popular, that fishing for turtles is carried on with the utmost recklessness, and to such an enormous extent that sooner or later there will be no more tortoise-shell in existence. The same thing is happening in the vegetable kingdom, and here, too, the most valuable substances are used up more quickly than they can be produced. Good India-rubber is becoming scarcer every day; the number of old oak trees, yielding well-seasoned wood, is diminishing everywhere; the manu-

facture of gun-stocks is making serious inroads on the supply of walnut trees in south Germany and Switzerland, while the beautiful old mahogany, of which our grandfathers made their best furniture, is simply not to be had any longer, and light mahogany, stained red, has to take its place.

These conditions—and instances might be multiplied indefinitely—have given a strong impulse to the desire, by artificial means and by making skillful use of the properties of easily accessible substances, to produce materials which may replace these rapidly diminishing natural products, at any rate for many purposes. The results already achieved in this direction are astounding, especially when a closer examination of the problem reveals the fundamental difficulties which lie in the way of these efforts. It may not be uninteresting to consider the matter a little further.

When we examine the natural productions of the animal and vegetable kingdoms, it is necessary to make a clear distinction between the chemical products which we extract from nature and the organic materials which she holds at our disposal. With regard to the first, there is no reason why we should not succeed in producing every one of these substances synthetically in our laboratories in at least as profitable a way as nature produces them and in even better quality, for nature very seldom yields them in a pure condition. In most cases they contain various admixtures which impede their useful employment. Artificially produced alizarine and purpurine are much purer than the corresponding constituents of madder-root, and they yield much cleaner and finer dyes. The same thing has been observed in the case of artificially prepared indigo; in fact, its great purity and the resulting freshness of the dyes produced by its aid were for a time obstacles to its general use. Artificial vanilline is known to possess a much more perfect aroma than the vanilla beans still used by some people—the latter containing, in addition to the matter which gives them their characteristic flavor, certain rancid and bitter substances.

There are, of course, many substances which, in spite of our efforts, we have been hitherto unable to imitate. The chemical composition of India-rubber, for instance, is still a mystery, and the synthesis of sugar can be regarded as a success only from a scientific, not from a practical point of view. In fact, the synthesis of sugar is not likely ever to be of any practical use, as this substance is found in unlimited quantities in nature, and is consequently so cheap that it is most improbable that the artificial product will ever be able to compete with it. Very applicable to the question of the manufacture of sugar on a large scale is the reply made to a celebrated scientist who had asserted that when once we have succeeded in extracting starch from cellulose (which is by no means impossible in view of the close affinity between the two substances), the problem of the synthetic production of food will be solved! He had quite overlooked the fact that a fairly pure cellulose, such as would be necessary for the process in question, would be dearer than good starch, and that therefore there would be no object whatever in making starch from cellulose. The reverse operation would have a far greater prospect of practical utility.

But although economic considerations, as we have seen, play an important part in the question as to the practicability of every proposed synthesis, there can be no doubt that every chemical product which nature supplies can be artificially reproduced, and will be so reproduced sooner or later. It is quite otherwise with organic substances. These we shall never be able to reproduce and shall be obliged to confine ourselves to imitations and substitutes. The reason is explained by the word which we have had to prefix to the term "substances" to express our meaning. By no artificial means shall we ever be able to produce ivory, tortoise-shell, horn, bone, whalebone, leather, the numerous kinds of wood, the endless varieties of textile vegetable fibers, catgut, horsehair, eiderdown, ostrich-feathers, vegetable ivory, and mother-of-pearl. This can be said with absolute certainty, because these substances owe their properties not only to the matter of which they are composed, but, and in many cases principally, to the structure and configuration which nature has given to this matter. In the substances which we have mentioned it is the fine texture, visible only under the microscope, which is the really important thing. Ivory and bone are chemically the same thing, namely, cartilage interspersed with fine granules of calcium phosphate, but how different are these two substances in their properties and their value! Who would imagine from their external appearance that wool, horn, and tortoise shell, or cotton, vegetable ivory, and cork are, in essentials, chemically almost identical? It is the special and peculiar arrangement of the cells, the smallest elements of which these bodies are built up, that gives them their characteristic properties, and determines their utility and value.

It is perfectly possible, though it has not yet been accomplished, that cellulose, of which cotton, flax, and many other useful materials are composed, will be produced synthetically, but when we have succeeded in doing this, the result will not bear the remotest resemblance to cotton and flax and will be useless as a substitute for them. All we shall get will be shapeless white lumps drying up to a horny mass. The peculiar properties of the fibers of cotton and flax are due to the conformation which nature has given to the cellulose in these substances.

This being so, all we can hope for in our efforts to supplement the scanty supply of organic material in nature by the produce of human industry is to make more or less successful imitations and substitutes. But, as we have already said, the progress that has been made in this direction is astonishing.

Take tortoise-shell, for instance. We are not able to make kerdline, of which this material is composed; still less can we imitate the texture of tortoise-shell. We have, however, got a substance which, though homogeneous and inorganic, possesses the same horny quality and the same elasticity as tortoise-shell; this is celluloid, a substance obtained by mixing gun-cotton and camphor and which, when freshly prepared and warm, is a pasty and plastic mass. Any required color can be given to it, and we can obtain a veined and transparent mass by kneading together variously colored portions of celluloid. In this way we are able to make a substitute for tortoise-shell, so closely resembling the natural product that either can quite easily be mistaken for the other. Of course, the differences in the qualities of the two substances, arising from fundamental dissimilarity of composition and structure, can be detected, but the fact remains that we have in this case succeeded in obtaining a substitute, quite good enough for many purposes and welcome on account of its moderate cost.

The same substance has been used, though not so successfully, as a substitute for ivory. To obtain the white color, celluloid in a pasty condition is kneaded together with large quantities of zinc white. It is of course hopeless to attempt to reproduce the microscopic structure of ivory, but the characteristic texture of the valuable product, recognizable by the eye, has been imitated in the most successful manner by laying sheets of celluloid impregnated with varying quantities of white pigment one on the top of the other and forming the whole into blocks by powerful pressure. The same method has been applied to other materials which perhaps resemble ivory still more closely as regards specific weight and the feeling to the touch, but without success.

The number of substances adapted to the more or less successful imitation of valuable natural products is legion, and their utilization for such purposes has often been the result of considerable inventive capacity and thoughtful scientific work. What a variety of articles can be made of viscose, for example, a cellulose deprived in the most ingenious way of its organic form and precipitated as a homogeneous mass! Consider the numerous uses to which gelatine, albumine and casein can be put! The Harburger Gummikammfabrik has recently used the last-named substance for making imitations of horn, bones, ivory, vulcanite, and valuable stones, which are said to be highly successful.

Some of these materials, originally regarded merely as imitations of natural products, have won for themselves a recognized and independent position in the scientific world by reason of their excellent and peculiar properties. Ebonite has ceased to be valued merely as a substitute for a natural product and has a sphere of usefulness of its own. What would applied electricity do, if deprived of its most valuable insulating material, vulcanite-fiber?

It is clear, therefore, that substantial progress has been made in this region also, where a consideration of fundamental principles would appear to forbid us to indulge in any great hopes of success. Fortunately inventors of the genuine stamp do not concern themselves to any great extent with fundamental principles. They quietly go on inventing, leaving to other minds, more logical, perhaps, but not gifted with much inventive capacity, the task of afterward developing the theory of their work. That is as it should be.

The boldest inventor, however earnestly he may endeavor to realize apparently impossible ideals, will not attempt to impress upon artificial products the conformation which nature gives to organic bodies. But between this insoluble problem and the mere substitution of homogeneous masses for organic materials lies an extensive region, which science from the earliest times has frequently encroached upon and with unquestionable success. The results obtained in this region and the principles on which they depend will form the subject of my next article.—From the German of Dr. Otto N. Witt, in *Prometheus*.

PETROLEUM AS A SUBSTITUTE FOR TURPENTINE IN PAINTS.

For some time past experiments have been carried out with a view to discovering a petroleum product which would prove equivalent to turpentine in the manufacture of paints. The great difficulty, however, is that in paints, especially of the cheaper kinds, substitutes and adulterants are so freely used that every particle of coherence that turpentine can supply is required. Benzoline is used for this purpose, but it evaporates with no residue or none of the required drying faculty. Substitutes also for linseed oil have been tried, but with indifferent success. What is required is a cheap process, by which an abundant oil can be made to dry, in order that the finished oil can undersell linseed oil in the markets. Experiments in improving the siccative qualities of cheaper vegetable oils with this in view have failed thus far to obtain any advantage in price.

In the manufacture of printing ink a large demand for fine linseed oil is required, but in manufacturing the common black ink for printing newspapers, there is need for an oil considerably less costly. Resin oil and fir oil are extensively used in the latter, as well as