

**34.—THE PRESERVATION OF NETS.\***

If nets and other fishing apparatus go to ruin in a short time, when not exposed to powerful external influences, the reason for this must be sought partly in the quantity of animal matter which adheres to the apparatus and which decays under certain conditions of temperature, and partly in the myriads of infusoria which penetrate among the fibers and there deposit their eggs. From these eggs, during summer, a new generation of infusoria is developed, which again in their turn lay eggs, and so forth. Not only is the fiber weakened by its component parts entering new chemical combinations, but portions of it certainly also serve as food for the infusoria. The looser the thread, the easier will they find their way into it, and the sooner will it be destroyed. With the view to preserve their nets, the fishermen use every opportunity to dry them; and for this purpose a place should be selected which is shady, and where there is a strong current of air.

Everybody knows that fishing apparatus should never be stored away when wet. If necessity compels one to do this, salt is sprinkled between every layer, or sea-water is poured over them. Nets (especially herring-nets and nets used during summer) should be cleaned often, or soaked in birch lye, or, as is done in Nova Scotia, in a decoction of pine or spruce bark. During the fishing season the nets in Nova Scotia are cleaned every week, being laid in the decoction Saturday night, and remaining in it till Monday morning. Apparatus can thus be preserved by killing the animalcules which attack the material of which the nets are made; but they may also be prepared in such a manner as to resist these attacks to a certain degree.

The simplest method of preserving nets consists in smoking them; thereby they become penetrated with creosote, whose antiseptic qualities are well known. If the smoking is repeated from time to time, this method of preserving nets, in spite of its simplicity, is not to be despised.†

Hot coal-tar will certainly prevent the nets from decaying during use, but it makes them hard and stiff, and the twine becomes brittle at the knots and is apt to break.

Hot wood-tar or coal-tar thinned with oil of turpentine also makes the nets stiff and brittle. The same is the case with boiled linseed-oil.‡

Charcoal-tar is apt to "burn" the nets.

\* "*Bevaring af Garn.*" From the *Norsk Fiskeritidende*, Vol. V, No. 2, Bergen, April, 1886. Translated from the Danish by HERMAN JACOBSON.

† *Mittheilungen des Deutschen Fischerei-Vereins*. Berlin, 1885.

‡ *Fishing Gazette*, March, 1884.

The Scotch formerly used tar and oil of turpentine. The tar was first boiled for one hour, whereby it lost some of its "burning" quality, when an equal quantity of oil of turpentine was added, heated to a temperature of 104°-122° Fahr. The nets were then drawn through the mixture. Instead of tar, thick turpentine was also used, and the superfluous moisture was pressed out by letting the nets pass through a machine with two cylinders. When treated in this manner they kept their natural color.

In Newfoundland pine, spruce, or birch bark is boiled until the liquor has the required strength. It is then drawn off and tar is added in the proportion of one part tar to twenty parts of the mixture.

In France the fishermen use a solution (2 to 4 per cent strong) of alum and water, or sulphureted copper or oxide of zinc. From England we have received the suggestion to use alum dissolved in water and buttermilk (2 ounces or 62 grains per gallon), in which the nets are laid for six hours.

In Europe nets at present are generally tanned. Especially has catechu \* (*Terra japonica*) found great favor during the last 30 years for tanning nets.

There are 3 kinds of catechu: †

(1) *Gambier catechu*.—This is obtained by boiling the branches and leaves of the gambier plant which grows in Farther India and on the islands of the Indian Ocean. When it has evaporated it forms a clay-colored mass, which is cut in inch cubes. When these cubes are dry they are dark brown on the outside and light brown inside. Occasionally much smaller cubes find their way into the market; but these are frequently adulterated with dried blood, flour, &c.

(2) *Palm catechu*.—This is obtained by boiling the fresh nuts of the betel palm. There are two kinds, namely, the *Kassu*, which is formed into round bricks, dark brown, 2 inches broad and one-half inch thick, often covered on one side with rice-husks; and the *Coury*, which has a yellowish brown color, and which when broken shows an earthy surface, easily distinguishable from the *Kassu*, which shines on the broken surface. Both these kinds are of an inferior quality.

(3) *Cutsch*.—This is obtained from a species of acacia growing in India, but now cultivated also in the West Indies. Pegu catechu comes in dark brown lumps packed in leaves. It is heavier than water, has a bitter taste, and is said to contain 55 to 58 per cent of tannin. Bengal catechu has a grayish brown color, and when broken shows shining streaks or layers. It generally comes in lumps of 1 to 3 inches in diameter. It contains about 50 per cent of tannin.

Purified catechu comes in cakes weighing about one pound each. It is generally adulterated.

The characteristics of good catechu are that it has a brown color, and

\* It became known in Europe in the sixteenth century and was used in medicine.

† Danish Fiskeritidende, 1885.

when broken shows a fatty, shining surface. When in greater masses catechu should be close and of uniform quality, and have as few holes as possible. Good catechu dissolves slowly in hot water.

The Association for the Promotion of the Danish Fisheries has chemically examined 9 samples of catechu, which contained from 12.15 to 18.25 per cent of water, from 77.05 to 83.94 per cent of organic matter, and from 1.10 to 7.40 per cent of inorganic matter. In five of the samples the quantity of tannin varied from 48 to 61 per cent. The retail price varied from 6½ to 9½ cents per pound.

Catechu is often adulterated by mixing it with potato starch, red clay, sand, alum, &c.\* When mixed with inferior catechu or other substances, this may be recognized by the color, which is dark brown, almost black; and by the taste, as it does not have the pleasant sweet after-taste which is peculiar to good catechu. The adulteration can also be ascertained chemically. A solution of good catechu in water assumes, when iron vitriol is added, a green color, while when mixed with other substances it turns violet or black. When earth, sand,† or similar substances are added to give it a heavier weight, these substances will sink to the bottom when the catechu is dissolved in water, vinegar, wine, or spirits of wine. When the catechu is burned these substances remain. The presence of starch can be proved by a tincture of iodine, which gives the sediment a blue color. After the catechu has been dissolved, first in cold water and then in spirits of wine, the starch sinks to the bottom.

For tanning with catechu Mr. A. E. Maas, the Norwegian consul at Scheveningen, has given the following directions: One kilogram [2¼ pounds] of the best catechu is dissolved in 40 liters [42¼ quarts] of water, and this proportion is observed whatever the quantity of catechu which is boiled.‡ There must be enough of the solution to cover the nets entirely in the vessel in which they are tanned. Care should be taken that the nets lie as loose and easy one upon the other as possible. The solution is not poured upon the nets until the catechu is entirely dissolved; and it should be poured over them as hot as possible (about 140° to 158° Fahr.), but not boiling. The nets should lie in the solution for 24 hours, when they should be taken out and spread to dry. Great care should be observed not to take in the nets until they are entirely dry. The solution which remains in the tanning vat is carefully put back into the cooking vat and mixed with water, until there is enough liquor to dissolve the same quantity of catechu as during the first tanning, namely, 1 kilogram to 40 liters; and thereby a solution is obtained

\* Dr. Herman Klenke: "*Lexikon der Verfälschungen*" [Dictionary of adulterations], Leipsic, 1870.

† Sand is said to make the catechu keep better; and it has sometimes been found to contain as much as 26 per cent of sand.

‡ Mr. E. de Brauwer, the Belgian commissioner at the Amsterdam Exposition of 1861, says in his report that the liquor must not be boiled but heated to 176° Fahr., because boiling changes the nature of the liquor and makes it corrosive. Rev. Mr. Löberg, in his book *Norges Fiskerier* [the Fisheries of Norway], says the same.

for the second tanning. In the same manner a solution may be prepared for each subsequent tanning.

Cotton nets, which are to be laid in oil, should first have been tanned three times in the manner described above, whereupon they must be well dried before they are laid in unmixed linseed-oil which has not been boiled. The oil should not be heated at all, but should rather be as cold as possible. The oil is poured into a vat in the proportion of 1 pound of oil to 1 pound of nets, therefore as many pounds of oil should be used as are equal to the weight of all the nets which are to be laid in it. After the nets have been laid in the oil they are taken up again and passed between two rollers, so that as much oil as possible may flow off and remain in the vat. The nets are then laid in a vat with a double bottom, so as to catch the oil which may still run off them, and to prevent the lowest layer of nets from remaining in the oil. The nets are left in the vats until no oil drips off them, which generally requires 12 hours. The nets are then spread out to dry on flat ground in the open air, and remain there until they are thoroughly dry. If oil is still dripping from them they may be turned from time to time, but they should never be hung up to dry, and should never be packed one upon the other; even if it rains and storms they should be left undisturbed, for if they are packed together too soon they may take fire. Much rain will hurt nets soaked in oil, but there is no remedy for it.

When the nets are thoroughly dry they are again soaked in catechu once or twice more and dried in the manner described above. When this has been done they may be kept in a cool place.

The rule therefore is: Tan the nets three times in catechu, then soak them in oil, and then tan them once or twice more. After every trip the nets are tanned again, but are not soaked in oil; but some linseed-oil is added to the catechu solution. Cotton nets which are to be tanned only in catechu, but are not to be soaked in oil, should be tanned five times in catechu. Hemp nets need be tanned only three times.

Mr. William Hearder\* recommends the following method:

Take 1 pound of catechu to 2½ gallons of water, and dissolve the catechu in the water by boiling.

The nets are to be laid in the solution over night, care being taken that the fire is out before the nets are put into the kettle. As a general rule, ½ ounce of sulphureted oxide of copper is added to 1 gallon of water, and occasionally some glue, which the author, however, does not recommend, as it is soon washed out, and takes out some of the tanning. When the nets have been taken out of the kettle they are washed in pure water and dried.

Mr. Arthur Evans gives the following method in a pamphlet which gained a prize in 1874, and was published by the Baroness Burdett-Coutts:

The essential condition of success is that the nets should be well tanned from the beginning; for, if this is not done, they are soon ruined,

\*Fishing Gazette, March, 1884.

and the damage cannot be repaired later. It is therefore necessary first to remove all fatty and oily substances which may have been used in the manufacture of the nets, as they prevent the liquor from penetrating the nets.\* This is done by putting the nets, without pressing them too much, into a kettle with boiling water and letting them cook for about an hour, stirring them from time to time to prevent them from sticking to the bottom. When taken out they are laid on a slanting board and pressed, so as to get the water out of them as much as possible. They are finally spread out to dry, and when thoroughly dry they are ready for tanning. The tanning is repeated four times before the net is considered ready for use.

*First tanning.*—A kettle is filled with as much water as is necessary to keep the nets under water, when they are laid in it, without being pressed too hard. One need not fear that the first solution is too weak, for it is better that it should be too weak than too strong, as in the latter case it will not sufficiently penetrate the twine, but form a sort of crust over it, which will crumble off when the net is used. For the entire tanning process 1 pound of the best kind of catechu is used to every pound of nets. For the first tanning one-half is taken and dissolved in water in a kettle. When the catechu is completely dissolved no more fire is kept under the kettle than is necessary to keep the liquor simmering. The nets are then laid in the kettle and boiled for two hours, stirring them well. When they have boiled the required time they are taken out, laid in tight vats and pressed, and the solution is poured over them, and the vats are covered up. They remain in the vats for forty-eight hours, when they are taken out, wrung, and laid out to dry. When they are thoroughly dry they are ready for the second tanning. Care should, of course, be taken not to spill any of the solution, as this is to be used for future tannings.

*Second tanning.*—The solution from the first tanning is put into the kettle, and water is added if there is not enough to cover the nets. Half of the remaining catechu is put into the kettle, and when it is completely dissolved, the solution, when boiling hot, is poured over the nets, which have meanwhile been piled up in a water-tight vat. The remaining process is the same as in the first tanning.

*Third tanning.*—The same process is followed as in the second, the remainder of the catechu being used, and if necessary some water is added.

When the nets are dry, after the third tanning, they are well washed in sea-water, to which is added about a gallon of lime-water, prepared the day beforehand, so that the lime has time to sink to the bottom. The object of the washing is to remove all catechu particles which may have adhered to the twine, as they may cause the fourth tanning to be a failure, and the object of the lime-water is to fix the color. The nets are then again well dried and are hung up.

\* In Norway the fishermen sometimes boil the twine before it is used; but it is under all circumstances better to boil the nets.

*Fourth tanning.*—The remaining catechu solution is poured into the kettle, and if the quantity is not sufficient, some water is added. As a general rule 9 quarts are used for a net 100 yards long and 300 meshes deep. To the solution are added  $2\frac{1}{2}$  quarts of Stockholm tar, and as much coal-tar for every net of the above dimensions. When the solution begins to boil, the fire is kept low, so as to keep it simmering during the operation. It should be constantly stirred, as otherwise the first nets will absorb all the tar.

The tanning is done in this way, so that the net is drawn through the solution either by hand or by means of a winch, one man drawing the net, one stirring the solution, and the third helping the net along. To scrape off the superfluous solution, a piece of wood 4 or 5 inches broad, is laid across the kettle and fastened to it. In the middle of the piece of wood is a semicircular notch, about 1 inch deep and  $1\frac{1}{2}$  inch broad. Over this notch there are placed 2 iron cramps about 5 inches long; the one having a width of 2 inches is placed inside (towards the middle of the kettle), the other, having a width of  $1\frac{1}{2}$  inch, on the outside (towards the edge or towards the person who draws the net). The net thus passes over the piece of wood between the notch below and the cramps above. The size of the opening or the pressure can be regulated by driving the cramps in further. During the night the nets are laid to dry, and are then ready for use.

As regards the treatment of the nets during the fisheries, the same author says that they should be covered up when not in use, and be dried at least once a week. Before they are dried they should be washed so as to be free from all impurities; and while being dried they should be spread out well, so that the drying process may be accomplished rapidly. As soon as they are dry they must be taken in, as bleaching will hurt them. If a rich haul has been made, they should be washed, even if there is no occasion to dry them later. If one thinks that there will be no occasion to use them for twenty-four hours or more, they should be freely sprinkled with coarse salt. If they are left idle for some time, they should be aired both in the morning and evening, and be sprinkled with salt. This is especially necessary in summer, when the air is warm, the sea is full of organic substances, and the fish are fatter. When the nets are in daily use, they should be tanned over again every month in summer, and every six weeks in winter. During the first year they are in use, 14 pounds of the best catechu is used for 3 nets 100 yards long and 400 meshes deep; when the nets have been in use longer, the same quantity will suffice for 4 nets. The catechu is placed in a wicker basket, so that any leaves and impurities which may adhere do not find their way into the solution; and this basket is hung in the water in the kettle, a few inches from the bottom. Only pure water should be used, and never any solution which has been used before. When the catechu has dissolved, the boiling solution is poured into a vat, and the nets are dipped into it. For this sticks are used,

as also for taking the nets out, the main point being that the solution should get on the nets as hot as possible, and it would take too long to wait till it has cooled off sufficiently to use the hands. When the process is finished, the nets are laid in a pile and covered up. Thus they should be left to lie for a few hours. If the work is finished in the evening they may remain lying over night.

When nets are to be stored away all the lines should be kept separate from the nets. Before being laid away the nets should be soaked in fresh water for twenty-four hours, so that all the salt may come out, for salt will attract moisture. While drying they should be taken in every evening and during rainy weather. The best place to keep them is an airy loft, where they are either hung up or piled up loosely. In the latter case they should be aired every now and then, especially in damp weather.

In conclusion we will mention the following methods of preserving nets or of employing catechu:

To 1 quart of water take  $\frac{1}{2}$  pound of catechu; in this solution, when cooled off, the nets are laid over night. Before they are dried they are well rinsed in fresh water, which makes them softer than if they had not been rinsed. Occasionally  $\frac{1}{2}$  ounce of sulphureted oxide of copper is added to each quart of water. In some places a solution of  $4\frac{1}{2}$  pounds of catechu and 3 gallons of oak bark is used for 20 gallons of water.

In Sweden they use, especially for cotton nets, a decoction of birch bark, cut fine. If the bark is fresh it can be boiled immediately, while old and dry bark is first soaked for three days. To 26 gallons of water take 4 gallons of bark and about 13 pounds of soda, and boil the whole for three or four hours. When the solution has cooled off it is poured over the nets, which are laid in vats or barrels. When they have been thoroughly penetrated by the solution they are dried. If the nets are in use they should be tanned every month. For new nets, the first time,  $2\frac{1}{2}$  pounds of catechu are used to 26 gallons of water.

In many places bark is used instead of catechu, and in Norway bark is used almost exclusively. All kinds of bark are used; the tannin and the coloring matter may be extracted from it both by boiling and by cold water. In England oak bark is generally used, and in Norway birch bark. As a rule, the weight of the nets and of the bark used should be the same, and 30 gallons water should be used to 40 pounds of bark. If the bark is boiled, a little less may be used. Tanning in a boiling solution will make the nets more durable, and will take less time, as the nets need not be left in the solution more than 24 hours. In this case they should be well covered. Owing to lack of suitable vats for large nets, cold tanning is generally employed, and the process is carried on either in the tanning vat itself or in a special vat, sometimes even in a boat. The soaking of the bark, so as to give the solution the necessary strength, takes 4 or 5 days in summer, and about 14 days in winter. When the solution is ready, tanning begins, the nets

being laid in the solution for 3 days, when they are taken out and dried. Generally the tanning is repeated twice; and there are therefore in all 3 tannings. The old bark in the vat is stirred each time and new bark is added until the solution regains its original strength. Occasionally fine lime (1 part to 100 parts water) is used for fixing the solution. In this solution, which should be prepared the day beforehand, the nets should be dipped. The color will show as soon as the net is put into salt water. After every fishing the tanning should be repeated once; and care should be taken, first to clean the net, and especially to remove all fatty substances. As regards the treatment of the nets during the fisheries, the same rules apply as are given above.

#### METHODS USED IN FAGERHEIM'S NET FACTORY, BERGEN, NORWAY.

*Tanning nets.*—For every 132 pounds of nets 14½ pounds of catechu are dissolved in 38 quarts of boiling water. The solution is poured over the nets, and they remain in it until it has grown cold. The tanning is repeated three times, the nets being dried after each tanning, and a fresh solution is used every time. An experiment has been made in using fine lime with birch bark. It gives the net a purplish color.

*Galvanizing nets.*—A solution of ¾ pound of copper vitriol and 120 quarts of cold water is used, in which the nets are laid for 24 hours. To make the solution requires 24 hours. For 36 pounds of nets 1 pound of the vitriol is used.

### 35.—SALMON FISHERIES OF HALLAND, SWEDEN, ESPECIALLY IN THE RIVER VISKAN.\*

By **FILIP TRYBOM.**

From various sources I have obtained data relative to the salmon fisheries in the river Viskan during thirty-seven years ending with 1884. From these data it appears that the smallest average weight of the salmon per month was found most frequently (in eighteen years) in August, and in eight years each in September and July, twice in October, and once in April. It should be noted that in more than one-half of the years when the smallest monthly average weight was found in August, the fisheries came to an end in that month. This applies not only to the Viskan, but to all the rivers of Halland. The salmon had the largest average weight in July in eighteen years, in May in nine years, in April in five, in March in three, and in February and August in one year each. In the rivers Nissan and Lagan the average weight in 1884 was largest in June; while in the river Rhine the largest salmon are caught during the period from December to April.

\* "*Laxfisket i åarne, särskilt det i Viskan.*" From "*Om Fiskerierna i Halland 1884*," Lund, Sweden, 1885. Translated from the Swedish by HERMAN JACOBSON.