

not been taken from the woods, but from humid meadows, because the moss from the woods contains too many insects. I also lay under the gills of the fish a thin slice of apple or potato, so as to keep the gill-covers moist and prevent them from becoming pasted together, which would cause the fish to choke. When the weather is very hot I kill the fish and lay them in large ox-bladders between pieces of ice. These bladders I tie securely and pack them in a box filled with damp moss. These boxes I send by mail.

The carp is subject to a species of eruption, caused by the sting of an insect. When suffering from this disease the carp does not look well and does not fetch a good price. For a long time I searched in vain for the cause of this disease, and only three years ago I succeeded in finding it. This disease is caused by the circumstance that after a sudden thaw or violent rain-storm the water feeding the pond becomes very muddy, and this muddy water is the real cause of the eruption. Our ancestors, who engaged in carp culture more than we do, knew this very well; and in all the ancient carp ponds I found at the place of influx a side ditch for the purpose of drawing the turbid water from the pond and carrying it outside of the dikes into the outflow canal.

We have the following kinds of carp: 1. The *common carp* with yellow scales, and the so-called *silver carp* with whitish scales. Both these kinds should be cultivated in muddy, stagnant waters (or sky ponds). 2. The *mirror carp*, for ponds with a rich supply of water. 3. The *Silesian leather carp*, for ponds which are fed not only by river or lake water, but also by spring water. 4. The *Chinese gold carp* (goldfish), which should be placed in the smallest basins of the pits which have been formed near our brick-works. We should not despise any sheet of water, for it is the duty of every intelligent man to utilize every inch of ground. Even these small fish, which so far have only been considered as ornaments, will be of some use.

In conclusion, I have to state that fish-culture is exceedingly remunerative; and that even the most intelligent farmer cannot compete with us. We shall beat him by our results at every step, if we only take care to work unitedly.

#### 18.—METHODS OF PREPARING FISH-BLADDERS FOR MARKET.\*

In a former article† directions were given for preparing fish-bladders intended for isinglass or fish-glue. The bladders are also used as an article of food, especially in Spain, Italy, the West Indies, and China, either salted alone or salted and dried. The last-mentioned method of curing it is the same as that employed in preparing klip-fish, either

\* "*Tilvirkning af Sundmaver.*" From the *Norsk Fiskeritidende*, Vol. V, No. 1, Bergen, January, 1886. Translated from the Danish by HERMAN JACOBSON.

† See F. C. Bulletin, 1885, p. 295.

dry-salting or brine-salting being used. The latter is to be preferred under all circumstances, as it produces a thicker and heavier article.

As in all products of the fisheries, it is of the greatest importance that the raw material should be fresh, as stale fish will produce a dark article of second-rate quality. If the bladders of such fish are used they should be salted by themselves, but on the whole it is advisable not to use them, because the expense of preparing them is so great that it hardly pays. Nothing but fresh bladders should be used, and they should, therefore, be taken from the fish as soon as possible.

In this method of preparing bladders cleanliness and great care are essential for obtaining a good article. The bladder should not be torn out, but should be cut from the backbone with a thin-bladed knife, letting the blade follow the hollow portion of the bone by pressing it with the thumb. In doing this one does not run the risk of having the bone come loose at the same time. A skilled man can cut from 4,200 to 4,400 bladders a day. As soon as the bladder has been separated from the bone, it must be well cleaned and all blood and impurities removed, which are found especially on the inside. If time allows it, both the black skin on the outside and the white skin on the inside should be removed. By doing this, a whiter article is obtained than if this process is deferred until the bladder has lain in brine. After it has been well cleaned it is laid over night in sea-water, which gives it a whiter color. The following day the bladders are salted, after they have been well rinsed and the water has been allowed to run off. The salting is done in tubs, which should not be tight, if dry-salting is used. In either case—whether dry-salting or brine-salting is used—at least one-fourth barrel of salt is used, rather too much than too little, as there is no danger of the bladders becoming too strongly salted (“burnt”), even if they are buried deep in the salt. Generally white and clean common Liverpool salt is used. When salted, bladders will keep for a long time, often for several months. They should, however, be looked after from time to time. As soon as there is the slightest indication of their “souring,” the old brine should be changed for new and strong brine; or if dry-salting is used, the bladders should be salted over again. In the first case, the bladders should be relaid; and in both cases they should be well rinsed in strong brine.

If there has been no chance to remove the skins while the bladders are fresh, they can be scraped off as circumstances will allow. This is the most important part of the preparation, as the looks of the bladders when dried depend very much on the manner in which they have been scraped. The scraping, for which a common sharp knife is used, should be done very carefully, so that not a particle of the skin remains, while on the other hand great care should be taken not to scrape a hole in them. By soaking them in water the skins come off more easily; but this process should not be employed under any circumstances. If the bladders cannot be dried immediately after having been scraped,

they should again be laid in strong fresh brine, in which they can remain for several months without being injured.

When the drying process is to begin, the bladders are first laid in heaps on specially-arranged frames, so that the brine can run off. When the bladders are taken off the frames, they are well rinsed, best in new, pure, and strong brine. Each bladder is thereupon well spread out, smoothed down with the hand, and laid on shelves, which are arranged one above the other, about 7 inches apart. Instead of the shelves, frames may be used, about 8 feet long and 3 feet broad, covered with net-work, the meshes being the same size as those of mackerel nets. The frame itself is formed by laths about 2 inches thick, slightly bent, so the air can circulate freely, when one frame is placed above the other. Frames are preferable to shelves, as the bladders are exposed to a current of air on both sides,\* and as they dry better. When one has gone so far that the drying process is carried on out-of-doors, the bladders may simply be placed on the drying pile; while if shelves are used they must be spread out. In case of rain they can quickly be brought under shelter or be piled one above the other, and the whole covered with tarpaulins.

The first drying process should be carried on under shelter in a shed having doors opening south and east. The bladders cannot yet stand the sunshine, because, when exposed to it in the beginning of the drying process, they easily assume a yellowish color, which makes them a second-rate article. They are left on the frames or shelves until they begin to dry on the outside. After several days a crust forms on them, which can easily be ascertained by passing the hand over them. They are then laid in common Havana boxes, carefully spreading them out and smoothing them. They should rise about one-third of the height of the box over its upper edge. Four to five boxes are then placed one above the other, so that they may be suitably pressed. During the pressing, which lasts from five to seven days, the position of the boxes is changed every day, so the lower ones get at the top, and vice versa, so that each box receives the same amount of pressure. No rule can be laid down to determine when they are sufficiently pressed, as nothing but experience can teach this.

When the bladders appear to have been sufficiently pressed, the drying in the open air begins, during which either the frames referred to above are used or the bladders are carefully spread out on the rocks. The drying goes on gradually, alternating with pressing and stretching, so that the bladders do not lose their smooth appearance. As soon as they begin to shrivel in the sun they should be taken in and placed in boxes, by layers if possible, some weight being put on the top. The same should be done every evening. If the drying process has been

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\* When shelves are used, the bladders need not be turned, as they slightly shrivel when beginning to dry, so that the air can strike their lower sides.

very rapid, they should in the evening be placed in a press, and left in it until they have resumed their smooth appearance. It may be laid down as a general rule that the drying process should never be forced, but occupy from four to five weeks. The bladders should be protected against rain, as rain-drops cause spots, which make them a second-class article.

When the bladders, by being pressed hard, do not leave any spots, they may be considered completely dry, and can keep for years. Thoroughly dried bladders are not apt to mold. The main points aimed at are to give them a smooth, even appearance, and a pure, white color, without spots, which can be reached by a thorough and careful treatment. The preparation of dried bladders as an article of food, therefore, requires patient labor.

For shipping, the bladders are pressed into wooden boxes or tin cans holding from  $6\frac{1}{2}$  to 100 pounds. From a barrel of salted bladders weighing about 264 pounds and containing 4,200 to 4,400 bladders (about 16 bladders to a pound), from 100 to 110 pounds of dried bladders are obtained, that is, from  $37\frac{1}{2}$  to  $41\frac{2}{3}$  per cent.

Capt. J. W. Collins\* gives the following statement of weights: One thousand pounds of round cod yield from 9 to 10 pounds of bladders. When scraped they weigh  $6\frac{1}{2}$  pounds; salted,  $5\frac{3}{4}$ ; and when dried about  $1\frac{1}{2}$  pounds. According to this statement 100 pounds of salt bladders would yield 25 pounds of dried bladders.

During the past six years an average of about 30,000 pounds of fish bladders has been annually exported from Norway, at an average price of about 15 cents per pound. The price, however, fluctuates very much. The average price of a barrel of salt bladders is about \$3.22. Captain Collins stated that in 1879 the prices paid at Gloucester were about 4 cents per pound for salted bladders, and from 22 to 35 cents per pound for dried bladders.

According to Mr. Earll, in the United States, bladders are often salted together with tongues, the price being stated at from \$8 to \$12 per barrel.

In Canada, bladders and tongues are also salted together. The Canadian fishery statistics give the quantities of bladders as follows:

Years.	Quebec.	Nova Scotia.	New Brunswick.	Total.	Value.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	
1878 .....	670	2,604	1,217	4,500	\$11,082
1879 .....	396	3,141	1,076	4,613	11,361
1880 .....	118	4,075	1,698	5,886	14,498
1881 .....	396	3,311	793	4,500	11,082
1882 .....	509	3,566	538	4,613	11,361
1883 .....	1,160	3,934	425	5,519	18,501

\* See F. C. Report for 1878, p. 703.

In addition to the above, the following quantities of dried bladders were prepared :

Years.	Quantity.	Value.
	<i>Pounds.</i>	
1881.....	81,400	\$77,330
1882.....	147,400	117,920
1883.....	114,400	108,680

From Newfoundland there were exported, in 1881, 119 kegs of bladders and tongues, at \$1 per keg ; and in 1882, 46 barrels, at \$3 per barrel. The mode of preparing salt bladders is the same as that of cod in kegs. For both saltings about  $\frac{1}{3}$  barrel Cadiz salt per barrel of prepared bladders is used. To judge from the small quantities prepared, there cannot be a very great demand for this article.

In Iceland the bladders are generally salted on board the vessels, either in tubs or in boxes. When they are to be dried, they are first washed in salt water and the black skin is taken off, after which they are strung on hooks and hung around the walls of the house. The general method of preparation followed in Norway is this: The bladders are washed as soon as possible, cleaned of blood and skins, and spread out on frames where there is a good current of air, or on stone fences, but not on the rainy or sunny side. When they have become dry enough to be stiff, so as to keep apart, they are strung on a thread and dried in the wind. If they cannot be dried immediately, they are slightly sprinkled with salt. They should be soaked as soon as possible and dried in the usual manner. This article is of course used only in factories.

In conclusion, an account is given of the method of Rev. Mr. Deimboll,\* as it may prove of practical use in the household. It is as follows:

After the bladder has been cut from the backbone it is for some time laid in lime-water, so that fatty parts may be removed. Thereupon the outer skin and sinews are scraped off with a knife, the bladder is opened, rinsed well in warm water, and rolled in a linen cloth until it becomes as soft as dough, when it is formed in tablets, sticks, and other figures. A hole is then made in every piece, and they are hung on a string to be dried in a gentle heat, but not in the sun. Others cook the bladders, after they have been cleaned, in water over a slow and even fire until they become a slimy mass, which is cast in molds, in which they remain until cold, when they are rolled out on boards in small leaves, and when these are almost dry they are rolled together like strings.† They should be kept in a dry place, for in the air they easily become damp.

\* *Om Behandling og Tilvirkning af Saltvandfisk.* Christiania, 1839.

† Both methods are used in Russia.