89.—SOME FACTS CONCERNING ISINGLASS.

By HENRIK KNUDSEN.

It is probably well known that one of the most important qualities of common glue is that it can gelatinate. As regards this property of gelatinating, isinglass prepared from fish-skins and heads differs very materially from common glue, as it will but rarely, and only under certain conditions, form an incomplete jelly, which, during the succeeding drying process, at a heat of 8° Celsius, will again become fluid or dissolve, which prevents its being formed in tablets like the common glue. It must therefore be considered as a characteristic quality of isinglass that it does not easily turn to jelly, but that when strongly concentrated, and at a low temperature, will stiffen so as to form a tough mass.

The usual process of preparing isinglass is as follows: When fresh, the air-bladder is taken from the back of the fish by striking the fish several blows with a wooden club, whereby the sound is loosened, after which it is torn from the back and cut open lengthwise, so that it is freed from any bones which may adhere to it. It is then placed in cold water—sometimes in lime-water—where it remains some time. It is then carefully cleaned of all blood, and the black outer skin is removed with a knife; whereupon it is again washed in fresh water, and spread out on a board to dry in the open air, the inner shining skin being turned outside. To prevent the sound from shriveling during the drying process, whereby it would lose its smoothness, it should at once be fastened to the drying-board by small pegs or tacks. For obtaining a good article of isinglass it is considered absolutely necessary that the sound should be dried in the sun; and for this reason swims cleaned in winter are kept under the snow till spring. After the drying process is finished the sound is again moistened by drawing over it a brush dipped in warm water, whereupon the inner shining skin is removed by hammering or rubbing. Finally it is rolled between two polished iron rollers.

Isinglass which is to be made into gelatine, before undergoing the above-mentioned processes and while still in a moist condition, is bleached in a solution of sulphuric acid, in which it swells up to a colorless jelly, which, after having been dissolved in warm water and after the jelly formed in cooling has become dry, will make a clear and colorless gelatine.

To avoid the drying process, which cannot very well be done in winter and during the busy fishing season, the sounds are salted and sold in

* "*Lidt om Fiskelim.*" From *Fiskeritidende*, No. 23, Copenhagen, June 9, 1885. Translated from the Danish by HERMAN JACOBSON.

that condition. It should be stated, however, that before being salted they should be cleaned very thoroughly, as it is very difficult to remove blood and muscle-tissue from a salted swim. Cleaned sounds, of course, sell much higher, and they are far preferable in every respect to those which have not been cleaned. The most troublesome and time-consuming work in the preparation of isinglass is to remove the sound from the backbone, which is still done by hand. This is also the principal reason why more general use has not yet been made of the sounds. This work must be done very slowly, and to produce large amounts of isinglass would require much labor, which is hard to obtain during the fishing season. If it was possible to use for this work some sort of machine which would meet all the requirements, the manufacture of isinglass would receive a new impetus.

Good isinglass should be of a bright (or at least a light yellow) color, thin and transparent, and without any odor or taste, which will invariably indicate the presence of impurities. When dissolved in boiling water (in cold water it does not dissolve, but merely turns to a clear jelly) there should remain but a very small insoluble residue, and the jelly which is formed should be clear and colorless.

A great portion of the isinglass which is at present brought into the market comes from North America. Like the Norwegian fish-glue, it is prepared from the air-bladders of cod, and does not easily dissolve in water, and a greater quantity remains undissolved than in the Russian isinglass. The method of preparing it is like the one described above, only with this difference, that immediately after having been cleaned, while still in a moist condition, it is pressed between iron rollers, after which it is spread out and dried in the sun. America has of late years made rapid progress in the manufacture of isinglass from fish refuse. The raw material consists to some extent of fish-heads, and especially of fish-skins—the waste products of "boneless fish." The skins are soaked and washed in order to remove salt and all impurities and to prepare them for the following bleaching process, when the isinglass is obtained by boiling them in water, and by clearing the liquid glue and concentrating it in vacuum-pans. Entirely pure liquid fish-glue is colorless, and, like the pure isinglass, has neither odor nor taste.

The light and most strongly concentrated fish-glue is used in the manufacture of pianos and various kinds of wooden ware; a light and less concentrated grade is used in the manufacture of paper; and a dark and highly concentrated grade is used in the manufacture of hats and shoes.

Sweden occupies a prominent place among the countries producing isinglass. Manufacturers in Lysekil have sent us excellent specimens of dried isinglass in thick but clear tablets, having a slight yellowish tinge, and gelatine in thin tablets, clear as water. We have been informed that these articles have been specially prepared from sounds that had first been subjected to a bleaching process, after which they

were dissolved in warm water whose temperature varied between 30° and 60° Celsius. The dissolving process takes place in wooden vessels with hair bottoms, and surrounded by poor heat conductors. After having been allowed to stand in these vessels for twenty-four hours the solution of glue, which is still warm, is drawn off and placed in smaller wooden vessels to cool, when it forms a clear and colorless jelly, which is cut into tablets and dried on nets stretched out on frames, as is done with the common cabinet-makers' glue.

90.—SPAWNING OF SPRING HERRING NEAR NORWAY.*

By S. A. BUCH.

[From report to the Norwegian Department of the Interior, 1884.]

As early as December 7, 1883, some specimens of herring were sent to me from Ekersund. The 10 specimens which I examined were all spring herring. The sexual organs, whose average weight was 37.05 grams, were not yet developed; so that it was not improbable that considerable time would elapse before the herring would come close to the coast. To judge from the specimens which I received, the majority of these fish were females.

Ten days later I received some specimens from Skudesnæs, but they consisted exclusively of so-called "blood-herring," which do not at this time visit our coast for the purpose of spawning.

On December 22 I received from Frederikshald 24 "Hvalöer herring," which were said to be genuine average specimens of a large quantity of herring caught in nets. Of these 24 herring 20 were of different age, and but very few were ready to spawn. Only 4 were spring herring, and had well-developed sexual organs (average weight 40.1 grams), which certainly were somewhat larger than those of the "Ekeröe herring;" nevertheless these herring were by no means ready to spawn. Of these herring 14 were females and 10 males.

On December 24 some herring came from the Hvitings Islands. The average weight of the sexual organs was 47.17 grams, but they were not fully developed, although more so than those which I had received previously.

The herring which I had occasion to examine later I received between February 1 and the middle of March. On February 1 I received 5 specimens from Rövær, all small herring, still firm and full. One was a "blood-herring," and the rest spring herring, whose sexual organs had an average weight of 25.75 grams.

On February 5 herring that were ready to spawn were this year found for the first time near Utsire. Some of the females had even cast some

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* "*Vaarsildens Gydning.*" Translated from the Danish by HERMAN JACOBSON.