

DID FRY.

OTTAWA.

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immersed in sea-water too long die from hardening of the yolk-sac, which becomes dense like india-rubber. Recently another remedy has been advocated, viz., permanganate of potash, which sweetens the water and destroys organic gorms. The *Revue Scientifique* notes that at the Geneva Exhibition, 1896, permanganate of potash was used to clean the aquarium, and it is claimed that it prevented the specimens of the salmonidæ from being attacked by *Saprolegnia*. It is a matter, however, of experiment as yet, and farther trials are necessary to establish its success.

One recent experimenter tried a new method and with a small painter's brush or the thumb and finger, removed the fungus, and then with a solution of 18 grs. of bichloride of mercury diluted in a 6 oz. bottle, he applied with a camel-hair brush this solution over the parts affected, holding the fish a few seconds before returning them to the water, which was changed daily. The result, he states, is that after one application his fish entirely recovered, with but a few exceptions, which however, were cured by a second application.

There has been much controversy respecting the merits of planting small and helpless fry and planting yearlings or fingerlings, which have been kept in ponds and fed on artificial food. It is admitted that great loss results when fry are thus impounded, and the trouble and expense are serious if a great quantity of fry are being reared. Some of the best pisciculturists (like Mr. F. Francis) have advocated turning the fish out at once i. e., just before or at the time they begin to feed. The strongest argument in favour of this course, apart from the loss by death and the saving of time, money and labour, is that derived from the contention that fry if kept in artificial inclosures and fed become semi-domesticated after a few months and, when liberated amongst their wild companions already in their streams and lakes, fall victims either to starvation (from inexperience in foraging for food), or to predaceous enemies (from which they have been from the hatching stage carefully guarded). Very young salmon and trout attack their weaker brethren and artificially reared "yearlings" certainly do not commence free life on equal terms, with those reared by nature. There is much therefore to be said in favour of using all haste in planting these fry in suitable places after hatching and before the yolk is entirely absorbed. "They do not want any food" said Frank Buckland "for they are supported by the contents of the umbilical vesicle and at this time above all others require protection. You may at this time increase the flow of water, for I have discovered from painful experience, that water which is sufficient for a given number of eggs is not sufficient for the same number of young fish, when they come out of the eggs." It is, however, a fact that young fry frequently take food, and swallow small particles before the yolk sac has been entirely absorbed. As a rule the yolk has gone before the 35th or 40th day after hatching. If the yolk sac is half-absorbed, say on the 20th day, the fry may be safely planted. They have sufficient food to last them until they are thoroughly accustomed to their natural surroundings, and are able to shift for themselves.

The cool and favourable weather of April, May or early June, unless the season be later than usual, is adapted for distribution, and the risks of loss at that time from long or tedious journeys is reduced. Such long and perilous trips are as far as possible to be avoided; but they are often necessary in order to reach the shallow upper waters which are most suitable for planting the young fry.

The question has often been discussed whether fry whose incubation has been protracted are stronger than those which have been hatched earlier under a higher temperature. Certainly the mortality in broods of English trout hatched in water below 40° F. is far less than when the water is of a higher temperature. The same has been found to be true of the Canadian speckled trout and the Rainbow trout.

In a series of ova which had reached an advanced stage in water of 48° F., and were then placed in trays supplied with water 10° lower, the hatching out did not take place until the 120th day, though they are known to hatch in 50 or 60 days under a higher temperature. The resulting fry are more robust, and fewer die during the early stages after liberation from the egg than in those hatched at a tem-