

The Impact of Genetics on the Trout Industry

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Ever since the time of Mendel we have realized the importance that Genetics has in any breeding experiment. Genes are responsible for the living fish as we know them. They control the color, size, and morphology of the parts as well as of the entire fish. In addition, they are responsible for controlling the thousands of chemical reactions that occur in the cells. In short, genes make the process of life possible.

The authors conducted a study at the Benner Springs Fish Research Station, Pennsylvania, and at Buffalo State University College, New York, to determine the utilization of various species of trout for:

- a) selective breeding of fertile hybrids,
- b) typing of trout fry and young as to their species association, and
- c) a fundamental understanding of speciation in Salmonidae family.

Since each species of fish has unique attributes, the production of hybrid progeny may be used as a tool to transfer desired qualities from one species to another without losing the identity of the normal species. Through the production of fertile hybrids, it will be possible to:

- 1) Breed the initial growth rate of brook or rainbow trout into the brown trout;

- 2) Incorporate the maximum growth and longevity of the lake trout into the brook trout;
- 3) Transfer the rainbow trout's resistance to furunculosis to the brook or brown trout;
- 4) Transfer the unique and desirable bright color patterns of the rainbow trout to the other species of trout.

The technique for producing the hybrids is a simple one. During spawning season, mature males and females with desired qualities are acquired. Eggs are removed from the female and fertilized with sperm artificially removed from the male. More than one female should be used per lot of eggs to eliminate the possibility that the viability of the eggs would be subject to the characteristics of only one parent.

Typing Species and Hybrids

By means of simple chemical tests (electrophoretic) one can easily type the trout species and species hybrids. Many times when collecting fish samples from streams it is difficult, if not impossible, to determine their exact species. In addition, the observation of hybrids in nature will shed light upon the fundamental study of speciation among the trout. It is interesting that the chemical hybrid formed between the rainbow and brook

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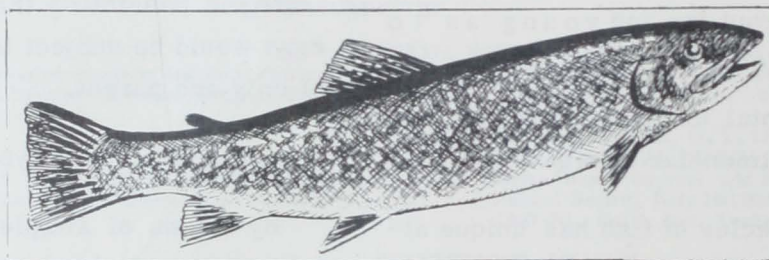
trout might indicate that these two trout might very well be members of the same species. The typing of the number of young fry of each species as compared to the number of adult fish will give us an understanding of survival-- and thereby shed light on special-purpose stocking fish. The possible recognition and use of fertile hybrids may well be used as a tool to transfer desired qualities from one species to another.

Almost all enzymes we have studied in trout thus far have shown discrete patterns. The increased amount of data on the electrophoresis of trout species will gain importance as more studies concern themselves with associated effects on biological activity and frequency within natural populations.

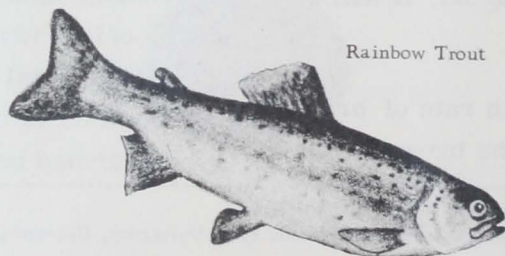
Advice to Breeder

The commercial fish breeder spends a good deal of time attempting to breed established varieties which are larger, healthier, more fertile, have aesthetic appeal to the fisherman, and better color development. The field of genetics can offer this advice to the breeder:

- 1) Breed only the very best specimens.
- 2) Never breed fish which are in any way deformed.
- 3) Avoid extensive inbreeding unless large numbers of breeders are involved because, when practiced over many generations with small numbers of breeders, the breed tends to degenerate.



Splake (hybrid trout)



Rainbow Trout