SOME OBSERVATIONS ON THE BREEDING OF FIGHTING FISH BY LUANG CHOOLA.

Introduction

The fighting fish is a fish well known for its fighting abilities and its beautiful coloration. There are at present about 13 recognized species. The species that is so common in Siam is *Betta splendens* Regan, locally called pla kad ($\tan n n$). This species is found both in a wild as well as in a cultivated stated. Measuring from the tip of the mouth to the base of the caudal fin it is about 4 cm. in length. When properly cultivated it may reach a length of 5 cm. Up to the present there has been little recorded of its method of reproduction, its growth, etc. Therefore, I hope, what I am about to describe will add a little, if not much, to the knowledge of this famous fish. *Selection of Male and Female for Mating*

In selecting the male and female fighting fish for mating there are certain important characteristics to observe, in order to insure that they will mate with one another.

The male fish which is ready to mate, if left in a glass bottle over a night or two, will make a thick foam of bubbles. This foam is the result of bubble after bubble being blown by the male fish. The bubbles are more or less colourless, but the thick foam appears more or less white. This foam is slimy and adhesive in character. From my experience I have found that the male of about three and half to four months old, provided the growth is quite normal, will start to make this characteristic foam. It then usually reaches a length of 3.5 cm. (measuring from the tip of the mouth to the base of the caudal fin). In case the male fish is too old to mate, the characteristic foam will not be made and only ordinary bubbles will be found.

The female fish which is ready to mate, that is having ripe eggs, can be spotted by the characteristics of the vent. It is distended and the eggs are partly protruded. If growth has been normal the age of the mature female is about the same as that of the male. Its length is also more or less the same as that of the male, perhaps a little bit larger about this time. When it is put in a glass bottle and placed side by side with the male, it will show its colours to its full extent, and spread out its fins. It will also swim around in excitement. The male does the same.

Taming Process

When a mature male and female are placed together in the same bottle or jar one will see that both of them spread their fins and show their colour to the full extent. They will fan one another for a while and swim around in excitement. Then the male will start to tame and subdue the female by force, that is by attacking the latter. The female when tamed is more or less hurt. It is usually observed that parts of the fins are mutilated. From repeated experiments I have found that it usually takes about 18 to 20 hours before the female is tamed. During this taming process bubbles after bubbles are being blown by the male to make the foam. This foam is to be the nest to keep the eggs, which will be laid by the female later on. It is interesting to note that in case the female possesses unripe eggs, and is not ready to spawn the male will keep on attacking and the female will not be tamed.

Egg Pressing, Collecting and Fertilizing Processes

When the female is tamed one will notice that the male and female will swim side by side again on intimate terms. Then the male will attempt to press, or squeeze the eggs out from the female In doing this the male will grasp the female by bending its body in such a manner that its operculum will touch one side of the abdomen of the latter while the posterior part of its body will press on the other side. The result of which is that the female will turn upside down, that is with its abdomen upwards and the male with its bended body on top. Such a position will be held for a while until the male relaxes its grip on the female and tries to hunt for and pick up the eggs which are pressed out. Eggs thus collected will be gargled and blown out together with adhesive bubbles and are carefully placed under the foam. The female will remain in such an upside down position for a second or two, and then it will start to help the male to collect the eggs and place them under the foam. These processes of pressing and collecting will be repeated over and over again, until all the ripe eggs are squeezed out, which requires from two to three hours. This process of pressing out and collecting the eggs rarely takes place at night, at least I have not been able to observe it then.

While the male is pressing out the eggs, perhaps the fluid containing the spermatozoa is also ejected. The spermatozoa are then scattered around and thus the chance of the eggs being fertilized is great. Owing to the adhesive character of the foam the spermatozoa are usually found under it in great numbers, and therefore the eggs thus collected by the male and female, which are placed under the foam, are easily fertilized. Perhaps the eggs are also fertilized while being gargled in the mouth of the male.

From repeated experiments and observations I have found that only one of the ovaries contains ripe eggs. The eggs in the other ovary will ripen about a week later. There are about 400 to 500 eggs laid at one time, but this depends more or less on the size of the female; the number of eggs may be as low as 200 or may be as high as 700.

The size of the eggs when fully fertilized is about .8 to .9 mm. in diameter.

Chasing the Female away

As soon as all the ripe eggs are pressed out and no more can be obtained, the male will then start to attack the female again, and try to chase the latter away when she attempts to come near the eggs. This is due to the fact that the female will eat the eggs if she be allowed to come near. It would be very interesting if we could find out why the female does not eat the eggs during the act of spawning but would do so after the eggs are laid.

Taking Care of the Eggs

It is the male fish that takes care of the eggs, and it is surprising to find that the male fish will not eat the eggs while the female does. I have not yet been able to attribute any other reason for this act but instinct. At first I thought that during this process the oesophagus of the male automatically closed, thus preventing it eating the eggs. But this was proved not to be the case, for many times I have fed the male fish with mosquito larvae, which are its proper food, while it was guarding and taking care of the eggs, and it ate the mosquito larvae as usual. But if one observes very closely while it is taking the larva of the mosquito in its mouth one will notice that it does not swallow the food at once as it used to, the food will be kept in the mouth for a second so as to be tasted, and if in doubt, the food thus taken will be expelled. While the male is taking care of the eggs it will take the eggs in its mouth and then gargle them and blow them out again with bubbles. This act is repeated and kept on with until the young fry are hatched. By this act of taking in and blowing out, the eggs are thus continually aerated and incubated. Should any of the eggs fall to the bottom the male will pick them up and place them under the adhesive foam. In order to try to find out whether it is necessary to have the male take care of the eggs or not, I have many times taken the male out and left the eggs alone in the bottle, the result of which was that most of the eggs fell to the bottom and died. This is due to the fact that when the bubbles which make up the foam become old they loose their adhesive character. They have to be continually renewed. The other fact is that the eggs have not received a proper incubation and aeration. Another important fact is that when disturbed they fall to the bottom and are not picked up, and therefore die.

The time required for hatching is from 30 to 40 hours when the temperature of the air and the water ranges from 80 to 85 degrees F. In one case I found that the incubation period took about 28 hours, but during that time the temperature, both of the air and the water, was quite high and it was quite unusual. If the temperature is low it may take as long as 50 hours.

Taking Care of the Young Fry

The male fish not only plays an important role in taking care of the eggs and keeping them aerated, as well as guarding them, but it plays a very vital part in taking care of the young fry and guarding them as well. When just hatched the young fry are not able to swim, they simply hang on to the adhesive foam. When disturbed they will spin around and perhaps may fall to the bottom and be drowned. This is due to the fact that the pectoral fins are not well developed and the young fish are thus unable to dash around. During this time great care is exercised by the male fish in keeping

No. 2, 1930. LUANG CHOOLA: Breeding of Fighting Fish.

the young fry from drowning. Whenever young ones fall to the bottom the male will go and pick them up with its mouth and blow them out again with adhesive bubbles. It will also try to guard them from their enemies. The male will keep on taking care of the young fry until the food yolks are absorbed and the pectoral fins are well developed. It requires about three to four days before the young fry are able to dash around and to come up to the surface when needed.

It is interesting to note the instinct of the male fish in distinguishing its young from its food. During this time if one will observe carefully while the male fish is taking its food, one will note that as soon as it takes the young one in the mouth with its food it will blow both the food and the young one out immediately. It is also interesting to note that it can distinguish only between its food and the young fry. It cannot distinguish between its young and young of other parents. I have, many times, placed with it young fry belonging to other parents, and it took care of them as of its own. The male can be left with the young ones for a long time. But they must be kept together continually without any long interval of interruption. If the male is taken away from the young ones for a few days and then put back again it will eat them. This is, perhaps, due to the fact that when taken away its instinct of caring and distinguishing its young is temporarily lost. There is more to be learned about this.

Growth of the Fighting Fish

When just hatched the young fry of the fighting fish has a length of about 3 mm. Its shape is more or less like a tadpole. It is unable to swim but simply hangs on to the bubbles which are blown by the male parent. It obtains its food from the food yolk. About three to four days later the food yolk is entirely absorbed, and by this time the pectoral fins are developed to such an extent as to enable the young fry to dash around to hunt for food. Its food consists entirely of microscopic animals. When about one month old it reaches a length of about .75–l cm. The caudal fin is quite large; the pectoral fins are getting larger than before. By this time it is able to take as its food copepods and very small mosquito larvae. The most delicate period of the young of the fighting fish is during this first month. Usually the mortality is quite high and more than 60%. It is well known that the fighting fish is a great mosquito-larva eater, but perhaps it will be surprising to learn that the mosquito larva will eat the fighting fish when it is less than three weeks old. I had occasion to observe this fact many times.

After the first month the increase in size can be appreciably noticed. All the fins are developed. When about two months old, male and female can be distinguished from one another by the characteristics of the ventral fins and the display of the colour; the ventral fins of the male are a little bit longer than those of the female; the colour of the male when displayed is more marked than that of the female. The fighting instinct has already developed. If they are kept together in a glass bottle or jar, one will notice that they will occasionally take a nip at one another, and as a result the fins of some of them will be mutilated. After the first month, until the time of maturity, that is a little bit over three months, the female grows quicker than the male. But after the fourth month the male grows much quicker, and, as a result, when it reaches full size, which is about the sixth month, it is larger than the female.

The mortality after the first month until the time of maturity is quite low and, if the fish are properly taken care of, is not more than five per cent.

Conclusions.

From repeated observations it is learned that

- (1) The eggs cannot be laid by the female fighting fish alone, it requires a male fish to press them out.
- (2) The eggs are fertilized outside.
- (3) The male plays an important role in aerating and incubating the eggs.
- (4) The male guards and takes care of the eggs and the young.
- (5) The male does not eat the eggs and the young while it is taking care of them, but the female does.
- (6) While taking care of the eggs and the young the oesophagus of the male is not automatically closed, and therefore there must be other reasons which keep the male from

eating the eggs and the young ones. Perhaps it may be due to instinct.

97

- (7) It is further learned that if the male is taken away from its young for a few days and then put back again it does eat the young ones.
- (8) The male fish can distinguish its young ones from its food, but it cannot distinguish its young ones from the young ones of other parents.
- (9) When the growth is normal the male and female fighting fish become mature within four months.

