

# CONSIDERATIONS ON MARKING METHODS IN NEWTS, WITH PARTICULAR REFERENCE TO A VARIATION OF THE "BELLY PATTERN" MARKING TECHNIQUE.

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Studies on population dynamics and biometry often need a good method to identify animals.

There are in any case some ethical implications, since it is important that the marked animal shows a natural behaviour and that the marking is not painful (Ferner, 1979).

It is essential that the marking method makes individual recognition possible, is long lasting, easily observable and identifiable, and adaptable to animals of different sizes.

Cost is also important and if it can be utilized either in laboratory or in the field.

Unfortunately a marking method seldom satisfies all these standards.

Large anuran species can be marked with numbered rings, like those ones utilised in ornithological studies, and it is also possible to stick or to fasten with a thread, passing under the skin, a small plate, painted with a sign or a number.

Salamanders and other urodeles are often marked by 'toe clipping'. Results are not always very good, since these kinds of amphibians have a high regenerative capacity. Toe clipping is useful in short period studies, not exceeding one year. In large urodeles, for example *Ambystoma tigrinum*, it is possible to mark them with a label fixed to the tail.

Bearing in mind that a single method is not always sufficient it may be necessary to make a double marking (i.e. toe clipping and the recording of the animal belly or back pattern).

In this article I would like to describe the method I have used for a study on population dynamics of two sympatric species of newts (*Triturus vulgaris meridionalis* and *Triturus cristatus carnifex*) in a pond near Turin (north western Italy).

I have observed that the best species to study is the crested newt since it is large and it may be handled and marked easily. I always bring the animals to the laboratory and there I mark them after anaesthesia. This can be induced by total immersion of the animal in a 0.1% solution of Sandoz MS 222, a specific chemical compound for cold blooded animals (Rafinski, 1977).

There are many advantages to this kind of procedure: the newt is totally motionless, and therefore the measurements are more accurate, and furthermore it is clear that the animal suffers less than if it were conscious.

The first marking method I have utilized is 'toe clipping'. The limitations of this method are shown immediately: newts have a high regenerative capacity, and by the end of the breeding season the amputated toes were practically regrown. It is possible to recognize this new part by its paler colouration. This method should therefore be considered additional to the others described now.

These are the recording of belly pattern and the autotransplantation of skin.

The belly pattern method was described by Hagstrom (1973), and is based on the individual pattern of the black and orange spots of the belly. This kind of disposition doesn't change during life. The original method adopted by several herpetologists describes the use of a camera, the newt being usually put in a small transparent basin over the lens. This can be an expensive method.

I have modified this method by using a simple photocopying machine. There are many advantages to this technique: the anaesthetised animal is put motionless on a transparent plastic sheet, in order to keep the glass of the photocopying machine clean. It is then recorded in its real dimensions and in a relaxed position, making possible a better reproduction of the belly spots. The picture is immediate and the copy is ready to be utilised in the identification work, after having written on the sheet an appropriate number or sign. It is also possible to directly measure the photo of the newt.

The recording of the belly pattern is a sure method to identify newts, but unfortunately it is quite inconvenient, a photocopying machine must be available, and not very accurate when the number of animals is high.

It does in fact take a long time to examine very carefully hundreds of sheets in search of a particular spot, and it is sometimes possible to miss a specimen and thereafter impossible to recognize a newly caught newt.

The belly pattern technique must be used along with other methods. In my personal experience one of the best marking methods for newts is the so-called "autotransplantation" of the skin, described by Rafinski (1977) for *Triturus alpestris* but also applicable to *T. cristatus*. It requires the extirpation under anaesthesia of a piece of coloured belly skin, which is then transplanted on the back, where another piece of skin has been previously removed.

After this simple operation the newt must be put in a box with wet paper in the bottom, but without free water, whilst adhesion of the transplanted skin takes place. They must stay there for about 2-3 hours. The advantage of this method is that it is lasting, and the orange spot on the back is very visible in the field and during the night under torchlight. By changing the position of the pieces of the skin it is possible to recognize each individual. This is especially useful for studies on newt movements in the water, when it is not possible to pick up the animals. Rafinski (1977) in his article suggests transplanting a piece of skin from the back to the belly, but I have observed that this operation is difficult, as often the piece detaches. In my studies, after removing a piece of belly skin I leave the wound to heal, which provides an additional marker. I have noticed that in about 10% of the caught newts the skin graft detaches. They are then recognized by toe-clipping and the unpigmented spot of the belly.

The autotransplantation method is useful for immediate recognition, after which it is necessary to look at the belly pattern to know the identity of the animal.

Unfortunately all these methods are acceptable only for *Triturus cristatus*. *Triturus vulgaris* is very small and it is difficult to use the autotransplantation technique. The belly pattern is also less clear than for *T. cristatus* and it is impossible to photocopy it. The only remaining method for this species is to clip one or two toes, for a general marking, bearing in mind that they will grow in a short period (about 1 year), and therefore it is impossible to study a population for a longer time and to identify each specimen.

#### LITERATURE CITED

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