

# **E** LAPHE SCALARIS MEETS ELAPHE GUTTATA

## **A RARE CASE OF HYBRIDIZATION**

*Dr. Emanuele Cimatti, Via Volterra 7,  
I-40135 Bologna. Italy.*

*Tel. +39 051 6447492.*

*Email: tov9602@iperbole.bologna.it*

*Photo's by: Dr. Stefano Pavan,*

*Via Pirona 43,*

*I-33100 Udine. Italy.*

*Tel. +39 0432 602163*

## **HYBRIDIZATION, A GENETIC MIX**

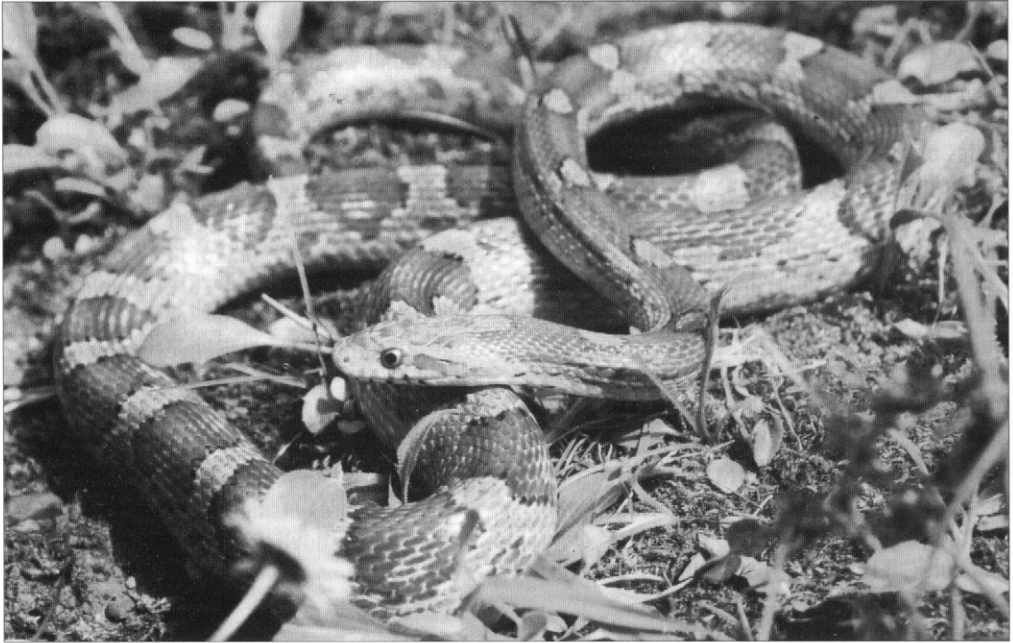
Hybridization is the breeding between individuals that differ genetically in at least one characteristic. They can be from different races, varieties or subspecies, and the resultant

hybrids may be genetically stronger than pure parents (Heterosis or Hybrid Vigour). Hybridization can occur between different species, and this can cause problems. Hybrids of different species can lack some structural and/or physiological function, (i.e. be sterile). The principle reason for this deficiency is caused by genetic hybridization. Inside the nucleus of all somatic cells, there are chromosomes, threadlike structures of DNA and proteins, which carry the linearly arranged genetic units.

The number of chromosomes is even ( $2n$ ) in diploid organisms, because it consists of 'n' pairs of homologous chromosomes. Every paternal chromosome forms a pair with its homologous maternal chromosome. The num-



*Elaphe scalaris. Photo by: Dr. Stefano Pavan.*



*Elaphe guttata.* Photo by: Dr. Stefano Pavan.

ber of chromosomes is specific and characteristic of each species. In haploid cells such as gametes (spermatozoon and ovum), the number of chromosomes is 'n'. During meiosis, (a type of cell division), the chromosomes can not pair themselves correctly (between two different species) because of the lack of homologous chromosomes, so the production of vital gametes is lost. In this way, hybrids from different species may grow normally, but they are not able to breed because their chromosomes are not able to pair during meiosis.

In fact, hybridization between different races, varieties or subspecies is a genetic event which is quite frequent in the wild. The resulting hybrids are genetically 'strong' and they can breed. In contrary to the hybridization

between different species which is rare in the wild, because progeny are often invalid, sterile or weak. For this reason, there are natural barriers which isolate different species and limit or prevent the formation of hybrids of different species, which would have a poor biological success rate and are often destined to premature death or infertility. The barriers can be geographic (when the different species are separated by oceans, mountains, deserts etc.), ecological (when species live in the same area, but they are separated by environmental factors (such as different biotope or niche), biological (variations of climate, different behavior, physiological factors, genetic factors etc.). When one or more of these barriers are removed then hybridization between different species is possible.

## EUROPE MEETS NORTH AMERICA

The prolonged and massive importation of the corn snake *Elaphe guttata* from the United States of America into Europe has created an 'artificial' population of this species in many areas of Europe (Germany, Italy, France etc.). This population is artificial because it doesn't live in the wild but only in the terrarium. The great geographic barrier, the Atlantic Ocean, which separates the Old World from New World, has been crossed by man so, a north American species *Elaphe guttata*, has been able to meet an European species, the ladder snake *Elaphe scalaris*, which naturally occurs in southern France, Spain and Portugal, and in Italy (Liguria). It is strong and fierce, agile and quick, it is able to reach a length of about

150-180 centimetres. It is diurnal and it lives in dry and warm areas (wood, prairie, field). Its diet consists of various small mammals (field mice), birds and lizards. In captivity *Elaphe scalaris* is hardy and usually bites if seized. It requires a dry and warm terrarium, temperatures between 25-30°C are appropriate during the day, and at night it should be a few degrees cooler (18-20°C). *Elaphe guttata* occurs in the eastern, south-eastern and central United States. It lives in open and sunny spots, such as pine forests, rock piles and corn fields. It is quite tame and it can attain a length of 150-170 centimetres. It preys upon small mammals and birds. In captivity it requires a small-medium sized terrarium, with a daytime temperature between 22-28°C and at night between 18-20°C.



Hybrids 'A' and 'B' *Elaphe scalaris* x *Elaphe guttata*. Photo by: Dr. Stefano Pavan.



Hybride 'type A' after 7 months *Elaphe scalaris* x *Elaphe guttata*. Photo by: Dr. Stefano Pavan.

### LADDER RATSNAKE MEETS CORN SNAKE

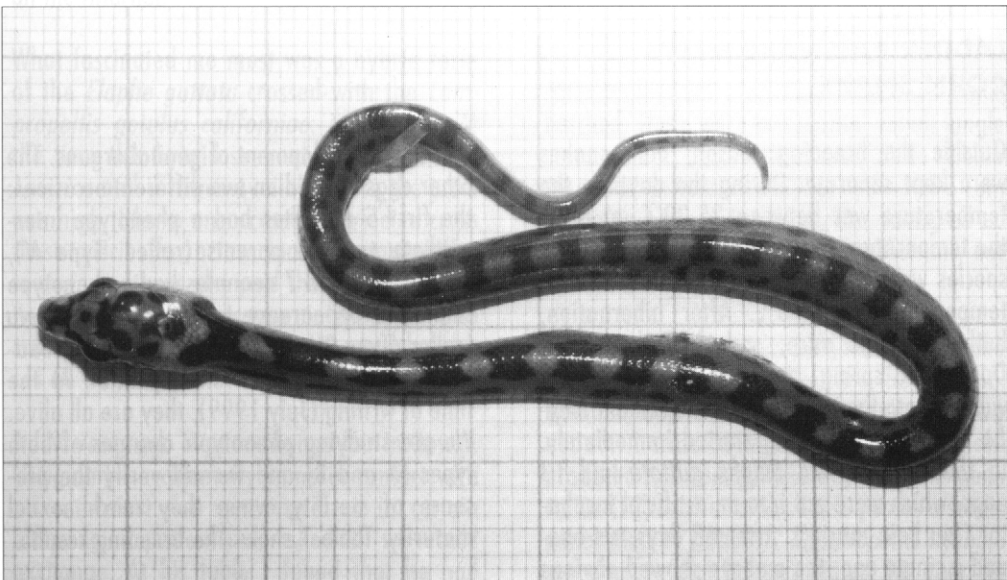
Outside the breeding season, both snakes were kept separate. During the daytime the temperature was between 25-30°C, at night the temperature dropped to 20°C. Both snake species were hibernated for 4-6 months at a temperature of 5-10°C. After hibernation, both ate some mice, and shed their skin. During the spring, the male *Elaphe scalaris* was put into the terrarium of the female *Elaphe guttata*, and mating started immediately. In the summer, the *Elaphe guttata* laid 13 eggs, which were put into an artificial incubator ('au bain marie'). After 43 days, we opened a single egg, the embryo showed obvious hemipenes, so we were correct to think that

there was development of genital organs. The other eggs opened on two different occasions: the first 5 neonates had a phenotype intermediate to both parents (called 'Type A'), while the second 7 neonates had a phenotype similar in appearance to the *Elaphe guttata* (called 'Type B'). After a few days, all neonates shed and ate their first 'pinkie'. At the time of writing (July 1999), they are all alive. We are studying phenotypic changes of both types (A and B) and we will verify the presence of sterility, when they reach sexual maturity. Table 1 shows the breeding results.

Corrections: *Lawrence Smith*

	Date	Temperature(°C)	Humidity(%)
Hibernation	November 1997 to April 1998	5-10	-
Mating	April - May 1998	18-25	50-60
Egg-laying	5th July 1998	28	50-60
Number of eggs	13 (1 openend during incubation)	-	-
Incubation (‘au bain marie’)	-	29-30	100
Born	28th Augustus 1998	-	-
	5 hybrids ‘type A’	-	-
	7th September 1998	-	-
	7 hybrids ‘type B’	-	-
First slough	after seven days	26-28	50-70
First feeding	after ten days	26-28	50-70

Table 1. Breeding data of the hybridization between *Elaphe scalaris* and *Elaphe guttata*



Hybride embryo after 43 days *Elaphe scalaris* x *Elaphe guttata*. Photo by: Dr. Stefano Pavan.