***TRITURUS ALPESTRIS* (Alpine newt): POLYMELY**. Extra-numerary limbs in free-living amphibians have long aroused scientific attention and curiosity (e.g. Colton, 1922; Bishop & Hamilton, 1947). Potential causes of polymely – as well as other kinds of limb deformities – encompass genetic factors, injuries and developmental disturbances, which can also derive from environmental contamination with biocides, retinoids, increased exposure to ultraviolet-B and parasitic infection (Ouellet, 2000; Blaustein & Johnson, 2003).

Polymely has been reported in many species of amphibians, although more frequently in anurans than in urodeles. In particular, only a few cases have been described to date for the family Salamandridae (see Recuero-Gil & Campos-Asenjo, 2002 and references therein). In the present note we document the first occurrence of polymely in the Alpine newt, *Triturus alpestris* Laurenti. The species is a medium-sized newt widely distributed over central and south-central Europe (Gasch *et al.*, 1997), inhabiting a variety of both deep and shallow water bodies and showing a wide altitudinal distribution (Griffiths, 1996).

The studied individual was found on 21st May 2005 near a pond located in a woody area dominated by beeches (*Fagus sylvatica*), close to the Camaldoli Hermitage (northern Apennines, Italy; latitude: 43° 48' 24'' N; longitude: 11° 49' 11'' E; altitude 1080 m a.s.l.). The existence of an Alpine newt population at this site was first reported by Lanza (1965), and it is considered of particular interest due to the abundance of paedomorphic individuals, and also because of recent conservation concerns (Tedaldi & Scaravelli, 1994). The studied individual (Figure 1) was a 108 mm long adult female (total length, measured with steel calliper; ± 0.1 mm), gravid, and showing a metamorphic phenotype. It presented an extra-numerary left hind limb, pointing backward, between the normal hind limb and the base of the tail. This extra limb appeared a little underdeveloped, with a total length (18 mm) which was 82% of the normal one (22 mm), and a generally thinner shape. Apart from this, it was normally shaped, and was provided with a foot with five toes. The movements of this extra limb appeared to passively follow those of the normal limb, without contributing to the animal's terrestrial locomotion. Thus, the extra limb appeared non-functional, and did not seem to worsen the general conditions of the individual, whose body size was at the upper bound of that observed for adult females of its species (e.g. Lanza, 1983), and which was otherwise healthy.

At the site where the polymelic Alpine newt was found, we also observed several hundred individuals of both the same species and two other newt species: *Triturus carnifex* (Italian crested newt) and *T. vulgaris* (Smooth newt). No other individuals were found showing the same or any other evident morphological abnormalities.

Since the studied individual was released a few after being found and examined, causal factors underlying the observed morphological anomaly cannot be indicated unequivocally. Nevertheless, the absence of chemical contamination at the study

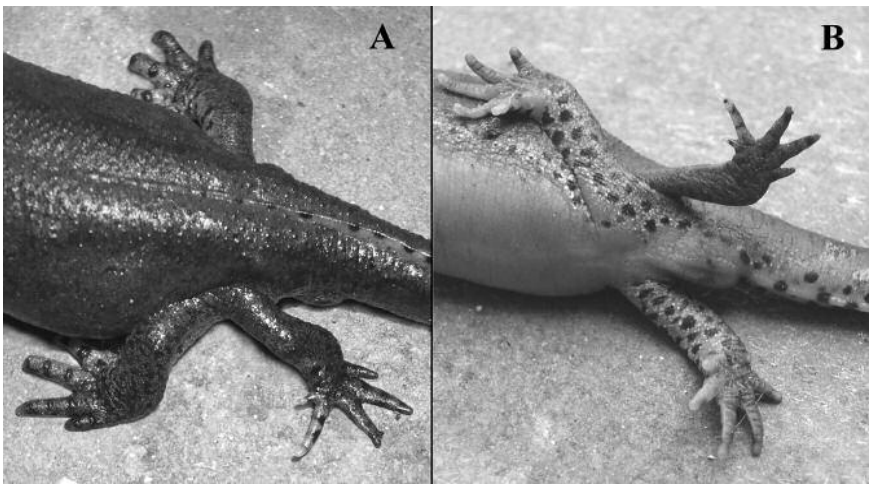

Figure 1. Pelvic region of the polymelic Alpine newt individual. A: dorso-lateral view; B: ventro-lateral view.

site (unpublished data), its overall structure with abundant shields against direct UV-B radiation, both in terrestrial and aquatic habitats, and the lack of further malformed newts among the several hundred examined at this site, lead us to regard environmental factors or parasitic infections as unlikely, and to favour endogenous causes or injuries as the most likely explanations. In particular we cannot rule out the possibility that the extra-numerary limb derived from an abnormal regeneration process. Newts and salamanders are able to regenerate a wide range of complex structures, such as limbs (reviewed in Nye *et al.*, 2003), after their removal. During the regeneration process a sub group of stem cells migrates to cover the wound surface. Many different cell types accumulate under the wound epidermis and dedifferentiate, leading to the formation of a regeneration blastema. This structure gradually grows and proliferates, and the cells that compose it differentiate and reproduce the missing structure. It is possible to speculate that repeated injuries occurring during this process could lead to an abnormal regeneration process and eventually to an extra-numerary limb (Nye *et al.*, 2003).

REFERENCES

Bishop, D.W. & Hamilton, R. (1947). Polydactyly and limb duplication occurring naturally in the tiger salamander, *Ambystoma tigrinum*. *Science* **106**, 641–642.

Blaustein, A. R. & Johnson, P. T. J. (2003). The complexity of deformed amphibians. *Front. Ecol. Envir.* **2**, 87–94.

Colton, H. S. (1922). The anatomy of a five legged frog. *Anat. Rec.* **24**, 247–253.

Gasc, J.-P., Cabela, A., Crnobrnja-Isailovic, J., Dolmen, D., Grossenbacher, K., Haffner, P., Lescure, J., Martens, H., Martinez Rica, J. P., Maurin, H., Oliveira, M. E., Sofianidou, T. S., Veith, M. & Zuiderwijk, A. (1997). *Atlas of Amphibians and Reptiles in Europe*. Paris: Societas Europaea Herpetologica & Muséum National d´Histoire Naturelle. 496 pp.

Griffiths, R. A. (1996). *Newts and Salamanders of Europe*. London: Poyser Natural History. 188 pp.

Lanza, B. (1966). Il *Triturus alpestris* (Laurenti) e la *Rana temporaria* L. sull'Appennino. *Arch. bot. biogeogr. ital*. **10**[1965], 261–272.

Lanza, B. (1983). *Anfibi, Rettili*. CNR, Rome. 196 pp.

Nye, H., Cameron, J.A., Chernoff, E.A. & Stocum, D.L. (2003). Regeneration of the urodele limb: a review. *Dev. Dyn.* **226**, 280–294.

Ouellet, M. (2000). Amphibian deformities: current state of knowledge. In *Ecotoxicology of amphibians and reptiles*, pp. 617–661. Sparling D. W., Linder, G. & Bishop C.A. (Eds). Pensacola, FL: Society of Environmental Toxicology & Chemistry.

Recuero-Gil, E. & Campos Asenjo, O. (2002). *Triturus marmoratus* (Marbled Newt): Polymely. *Herpetol. Bull.* **82**, 31–32.

Tedaldi, G. & Scaravelli, D. (1994). Primo contributo alla conoscenza degli anfibi e dei rettili delle Foreste Casentinesi. *Parchi* **13**, 70–79.

DANIELE CANESTRELLI[1], VERA COSTANTINI[1] and FULVIO CHIACCHIERA[1,2]

[1] *Dipartimento di Ecologia e Sviluppo Economico Sostenibile, Università della Tuscia, Via San Giovanni Decollato 1, I-01100 Viterbo, Italy.* E-mail: *canestrelli@unitus.it*

[2] *Molecular Oncology unit, National laboratory of CIB, Area Science Park, Padriciano 99, 34012 Trieste, Italy.*