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## Body size in *Triturus cristatus*- Artenkreis (Amphibia: Caudata: Salamandridae)

### ABSTRACT

Data on the body size in the superspecies *Triturus cristatus*. The greatest total length so far known is 209 mm, reached in captivity by a female of *Triturus carnifex* from Florence (Italy).

*Key words:* Body size, *Triturus dobrogicus*, *Triturus carnifex*, *Triturus cristatus*, *Triturus karelinii*.

Up to a few years ago *Triturus cristatus* (Laurenti, 1768) was unanimously considered a polytypic species with four valid subspecies: *T. cristatus cristatus*, *T. cristatus dobrogicus* (Kiritzescu, 1903), *T. cristatus carnifex* (Laurenti, 1768), and *T. cristatus karelinii* (Strauch, 1870)<sup>1</sup>.

However, though some authors still treat them as subspecies, probably overrating the occurrence of hybrid belts, it is preferable at present to regard them as full species<sup>2</sup>, as first suggested by Bucci-Innocenti *et al.* (1983). In fact, apart from their morphology (thoroughly investigated by Herre, 1933) and colouration, much cytologic, hybridological and biochemical data supports the opinion of Bucci-Innocenti *et al.*: White, 1946; Spurway & Callan, 1950; Callan & Spurway, 1951; Spurway, 1953; Lantz & Callan, 1954; Vallée, 1960; Callan & Lloyd, 1960; White, 1973; Mancino *et al.*, 1977, 1979; Kalezic & Hedgecock, 1980; Mancino *et al.*, 1987; Rafinski & Arntzen, 1987; Borkin, 1987; Mancino, 1988).

All the books on European and southwest Asian herpetofauna consulted by us<sup>3</sup> assign to the members of the Artenkreis a total length not exceeding 180 mm, reached exclusively by the females. Only Klingelhöffer (1956: 24) writes that *T. karelinii* may reach a total length of 200 mm, but this figure, almost surely represents a gratuitous «rounding» of the 190 mm cited by Buresch & Zonkov (1941; see below).

According to our original data, and hopefully exhaustive bibliographical review which also embraces many magazine articles<sup>3</sup>, in nature the four species may attain the following maximum total length (in mm):

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1. It is noteworthy that all these forms had been correctly described as full species, except *T. c. dobrogicus*, originally regarded as a variety of *Triton cristatus*.

2. See, for example, Ballasina (1984 a-d); Brame (1985); Mancino (1988); Busack *et al.* (1988); Giacoma (1988); Andreone & Giacoma (1989); Arntzen (1989); Arntzen & Sparreboom (1989); Wallis (1989); Lanza *et al.* (1991); MacGregor *et al.* (1990).

3. For the sake of brevity most of these are quoted only in the «References».



	♂♂	♀♀
<i>T. dobrogicus</i>	140 (Vienna, collection number 8747: 6 Naturhist. Museum Wien; original)	164 (Budapest; Fuhn & Freytag, 1961: 164)
<i>T. cristatus</i>	150 (Poland; Berger, 1975: 38 & 64)	180 (seemingly Mitteleuropa; Mertens, 1952: 29)
<i>T. karelinii</i> <sup>4</sup>	145 (Sofia; Buresch & Zonkov 1941: 210 & fig. 16)	160 (Sofia; Buresch & Zonkov, (1941: 209)
<i>T. carnifex</i>	150 (Mertens, 1952: 30)	180 (Mertens, 1952: 30)

In captivity the crested newt may exceed the size of those found in the wild; Mertens (1941:51), for example, reports that a female *T. cristatus* from the Rhine Valley, where the species rarely grows longer than 140 mm, reached a size of 163 mm after 10 years of captivity. Also a giant female of *T. karelinii* from Sofia, quoted by Buresch & Zonkov (1941:210)<sup>5</sup>, reached its total length of 190 mm after 2 and half years of captivity, when a little less than 3 years old (*as specified only in the Bulgarian text*).

An even larger female crested newt, belonging to the species *T. carnifex*, was raised in captivity by one of us (B. C.). This specimen was collected during the spring of 1984, with two other females, in a marsh between Sesto Fiorentino and Peretola airport, at the western periphery of Florence, 40 m above sea level. When captured the animals were 10-12 cm long and thereafter were reared indoors in a spacious vivarium.<sup>6</sup>

4. According to Terent'ev & Cernov (1949) and Bannikov et al. (1977) the Russian specimens of *T. cristatus* (sensu lato, i.e. *T. cristatus* + *T. karelinii*) may reach a maximum standard length (tip of snout - anterior edge of cloaca) of 97 mm and have a standard length/tail length ratio of 0.95 to 1.27 mm; this means that, potentially, the largest specimen with the longest tail «could» reach a total length of 199 mm.

5. We deem it our duty to point out that Radek's note on the Bulgarian salamanders (1969) is no more than a summary of the German summary of Buresch & Zonkov's contribution on the Bulgarian Caudata; also all the figures come from the same source. Moreover, Radek's few «original» lines are wrong; in fact, he would have found further data on the subject at least in Beškov's (1961) and Beškov & Beron's (1964) papers.

6. Vivarium 240 cm long, 40 cm high and 30 cm wide, with a frontal glass and a pond 70 cm long and 10 cm deep; water pumped continuously from pond to the substrate. Well-drained floor consisting of a gently sloping glass sheet, on which a plastic grid, was first placed and then layers of peat and gravel. Shelters afforded by pieces of bark, flat stones and shoots of the gesneriaceous *Episcia* sp.. Ventilation was by vents on lid and sides, and fissure close to the bottom. Lighting was by fluorescent and incandescent bulbs, with a photoperiod of 10-12 hs. Constant temperature: 20-25 °C. The newts - cohabiting with a few specimens of *Salamandra salamandra gigliolii* Eiselt & Lanza, 1956, *Bombina pachypus* (Bonaparte, 1838), *Rana esculenta* Linnaeus, 1758 - complex and *Bufo viridis viridis* Laurenti, 1768 - were fed with liver, meat, and larvae of fly and mealworm.



The largest specimen, anesthetized, had a total length of 198 mm on 24.V. 1987, while about a year later (8.V. 1988) it had reached a total length of 209 mm (standard length: 102 mm; tail: 107 mm) and a weight of 29 g (Fig. 1). This specimen and one of the other two females, about 18 cm long, have 15 presacral vertebrae (atlas excluded), i.e. the usual number for *T. carnifex* (Lanza *et al.*, 1990), and, respectively, 48 and 37 postsacral vertebrae.

The amphibians, even though their body size and age are not so strongly correlated as usually assumed (Hagström, 1980; Halliday & Verrel, 1988), show indeterminate growth. For sentimental reasons and also hoping in further growth, as captive newts occasionally live close to 30 years, we decided to let our giant live. Unfortunately it was found in a moderate state of decomposition on 22.X.1989; the specimen, still easily recognizable by its ventral pattern (cf. Fig. 1), is preserved with the collection number 20100 in the Zoological Museum of the University of Florence.

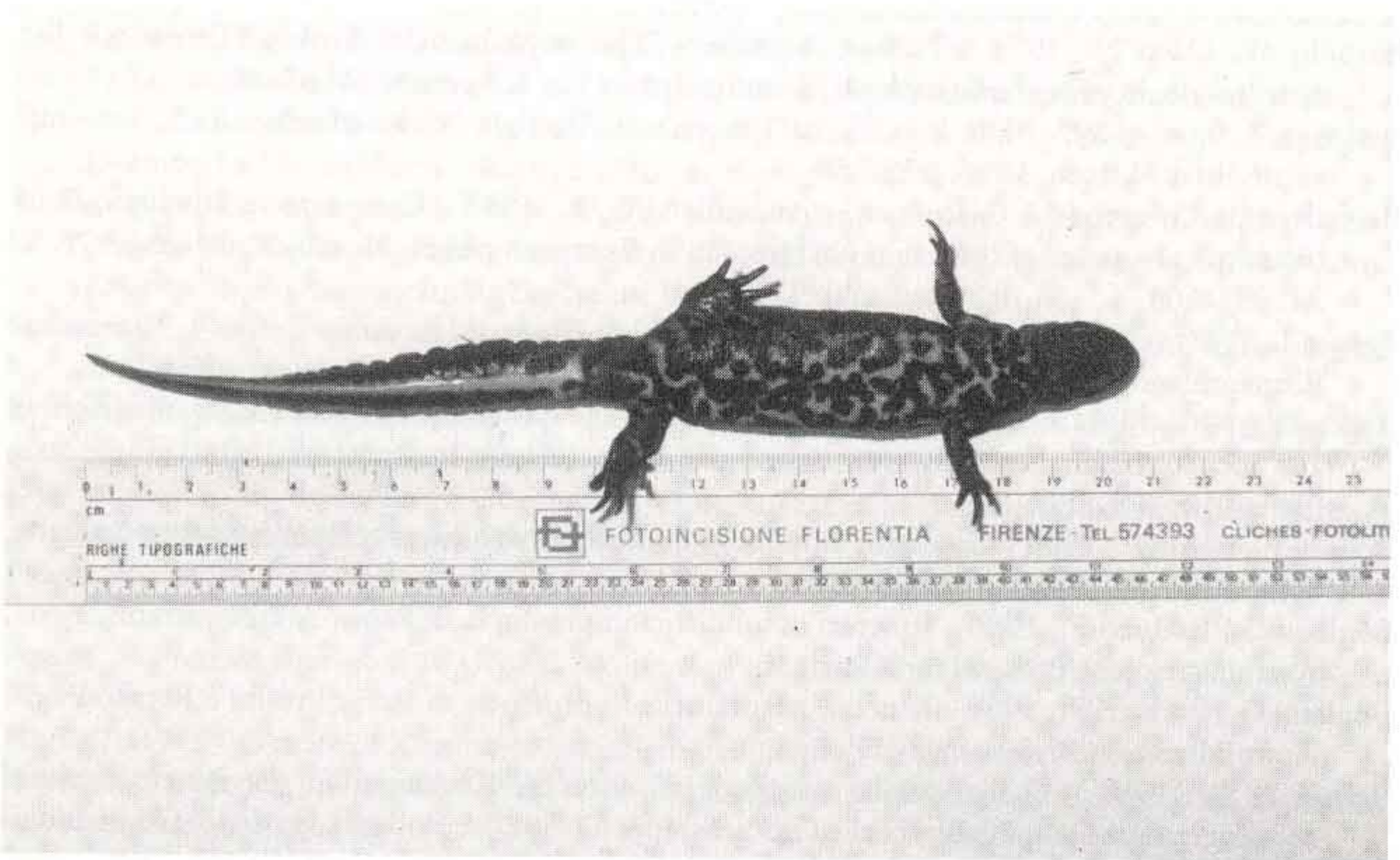


Fig. 1 - The largest known members of the *Triturus cristatus* - Artenkreis, a female *T. carnifex* from Florence, 209 mm long (collection number 20100 M. Z. U. F.; anaesthetized by immersion in 0.05% metane-sulphonate salt A.5040 SIGMA solution; photograph by Bruno Campolmi, 8. V. 1988).

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