

# A case of bilateral polydactyly in the grey kangaroo (*Macropus giganteus*)

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## SUMMARY

We report a case of spontaneous bilateral polydactyly on the upper limbs of a *Macropus giganteus* (Grey kangaroo). The specimen was an adult male (11 years), and had died from natural causes. The occurrence of polydactyly is exceptional in this species and have not found any other case in the scientific literature.

In our specimen there was a supernumerary finger on the anterior side of both forepaws (preaxial polydactyly), a duplicated thumb, inserted between the 1<sup>st</sup> and the 2<sup>nd</sup> fingers, with two phalanges, and its corresponding metacarpal bone perfectly ossified, with the proximal articulate surface perfectly flat but showing no contact with the trapezium bone. The space between both bones was occupied by soft tissues. The supernumerary digits of both hands were virtually identical.

**Key words:** Congenital malformation – Grey kangaroo – Polydactyly – Digits

## INTRODUCTION

Supernumerary digits are the most common congenital malformations of the limb (Warkany, 1971); frequently, the extra finger

is incompletely formed and the appropriate muscular development is lacking. The extra digit is therefore often without function, and is called a hexadactylic polydactyly in one of the limbs (Newell, 1971).

This abnormality is classified as preaxial when the extra finger is located on the anterior side of the affected limb and postaxial when it is present on the posterior side. In humans postaxial polydactyly, whether on the feet or hands, is associated with several syndromes, such as the Laurence-Moon-Biedl syndrome; chondroectodermic displasia, or trisomy 13-15.

If the hand is affected, the extra finger is most commonly anterior or posterior, instead of central. On the foot, the extra toe is usually on the posterior side. Polydactyly is the most common congenital hand malformation in humans, with a frequency varying between 0.05 and 0.19% of live births, the most critical moment being limb development between the 24<sup>th</sup> and 36<sup>th</sup> day after fecundation.

Almost all limb abnormalities seem to depend on two genetic factors (polydactyly is inherited as a dominant character). However, it is possible that most defects are the result of an interaction between genetic and environmental factors (multifactorial inheritance). Polydactyly and other digit defects have been observed in several animal species after being exposed to

different toxic agents, such as non-human primates (Hendrickx and Binkerd, 1993). Some of these toxic agents are: *Thalidomide*, which elicits abnormal limb development in several species, and includes oligodactyly, syndactyly or polydactyly on the upper and/or lower limbs. Treatments using transretinoic acid are also associated with oligodactyly and syndactyly in primates such as the Rhesus macaque (*Macaca mulatta*) (Brignolo et al., 2002) and pig-tailed macaque (*Macaca nemestrina*) (Fantel et al., 1977). The synthetic corticosteroid triamcinolone acetonide induces syndactyly in the Rhesus macaque (*Macaca mulatta*) and bonnet macaque (*Macaca radiata*) (Hendrickx et al., 1980). Finally, the administration of valproic acid to Rhesus macaques during organogenesis causes hypoplasia and/or aplasia of the phalanges (Hendrickx et al., 1988).

#### CASE REPORT AND DISCUSSION

We report a case of bilateral polydactyly on the upper limbs of a *Macropus giganteus* (Grey kangaroo) from the Museum of Anatomy of

the University of Valladolid (Spain). The specimen was an adult male (11 years) that came from the Zoo-Aquarium of Madrid and it died from natural causes. The appearance of polydactyly seems to be exceptional in this species, because we failed to find any other case reported in the scientific literature.

In this specimen (Fig. 1), the supernumerary finger is located on the anterior side on both hands (preaxial polydactyly). The supernumerary digit is a duplicated thumb, inserted between the 1<sup>st</sup> and the 2<sup>nd</sup> fingers, with two phalanges, and its corresponding metacarpal bone perfectly ossified, with the proximal articulate surface perfectly flat but showing no contact with the trapezium bone. The space between both bones is occupied by soft tissues. The morphology of the supernumerary digits is virtually identical for both hands.

The first metacarpal of the supernumerary digit is slightly distal to the trapezium and, therefore, there is no proper carpo-metacarpal articulation. This implies that the supernumerary finger was probably not functional. Supernumerary digits are often incomplete and hence not, or not fully, functional.



Fig. 1. Antero-posterior radiography of the polydactylic grey Kangaroo's left hand.



Fig. 2. Antero-posterior radiography of a normal grey Kangaroo's left hand.

We can see an antero-posterior radiography of a normal grey Kangaroo's left hand in the Figure 2.

The etiology of the supernumerary digit could not be determined, and it was not associated with any other visible congenital malformations. In general, minor abnormalities have no major pathologic consequences, but they may be an indication of more important abnormalities, such as part of a specific malformation pattern. This did not seem to be the case here.

Apart from the supernumerary fingers, the skin and nails had a normal appearance.

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