



Tumors of the Illia of Modern and Tertiary Australian Frogs

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Tumors of the Iliac of Modern and Tertiary Australian Frogs

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To judge from the review of anuran pathology by Reichenbach-Klinke and Elkan (1965), frogs exhibit a low incidence of bone tumors. More specifically, tumors of the ilia of Australian frogs, recognized initially by localized expansion of the iliac shaft, seem to be a rare occurrence. Examination of at least 3000 ilia of modern and fossil specimens by one of us (MJT)

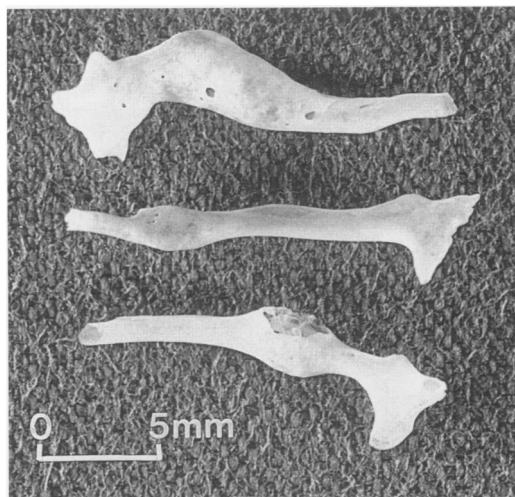


FIG. 1. Three iliac bones containing tumor masses of varying sizes.

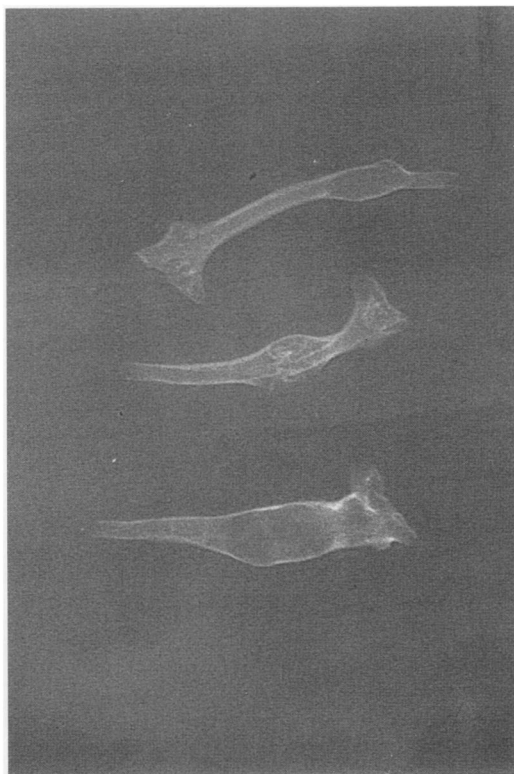


FIG. 2. Radiographs of the three bones shown in Fig. 1. Expansive intramedullary tumors are present. These are radiolucent with focal calcification. The overlying cortex is thinned.

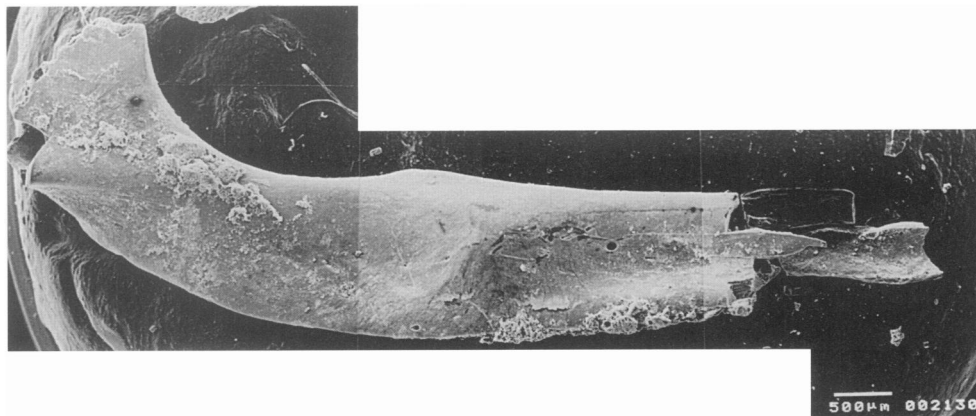


FIG. 3. Scanning electron micrograph of fossil ilium showing an expansion its mid portion similar to those seen in Figs. 1 and 2.

revealed only two instances of such a malformation. One was a high incidence (11) amongst a sample of 49 ilia of the Spotted Grass Frog, *Limnodynastes tasmaniensis*, obtained at least 70 yr ago at the Destitute Asylum, Kintore Avenue, Adelaide. This sample is probably amongst the vertebrate remains reported by Lea (1922) as obtained there from pellets of the owl *Tyto alba*, for he noted, "some of the bones of rats, mice, sparrows and frogs had curious spongy swellings, considered by Dr [A. M.] Morgan to be evidence of periostitis." This material has not been located, but the identities of the other vertebrates would be *Rattus rattus*, *Mus musculus*, and *Passer domesticus*, respectively.

This series of tumors has been compared with two fossil specimens obtained at the Oligo-Miocene sites "Two Trees" and "Upper Site" on Riversleigh Station in northwest Queensland. The nature of the distortion of the ilial shafts precludes identification. The specimens have been deposited in the South Australian Museum, Adelaide. The stratigraphy of these sites is described by Archer et al. (1989).

Four separate ilia of *Limnodynastes tasmaniensis* from Adelaide were examined. They were unfixed and had been air-dried for at least 70 yr. All four bones had expansive tumors of varying sizes located in the posterior half of the ilial shaft in three instances and in the fourth, anteriorly (Figs. 1, 2). X-rays of these bones showed radiolucent masses which expanded the medullary spaces producing thinning of the cortex. There were focal areas of calcification of variable densities within the tumor mass, and the overlying cortex showed variable sclerosis (Fig. 3). The largest of these tumors expanded the bone to slightly more than twice its normal width.

Histological examination revealed the tumor to be composed of cartilage with abrupt transition from the overlying lamella bone. The lacunar spaces were devoid of nuclei as the specimens had not been fixed. The lacunae were evenly spaced, apparently with an orderly arrangement. The control bone showed no cartilage at corresponding sites.

The tumors in the ilial bones were cartilaginous. The orderly arrangement of the cartilage and the even

distribution of lacuna spaces, albeit, empty, suggested that the tumor was benign. While a healed fracture was a possible consideration, this seems unlikely in view of the rather orderly arrangement of the cartilage, the excessively expansive nature of the lesions, and the high frequency in the sample. Therefore, it would seem that these lesions represented intra-osseous enchondromas. These are benign tumors of cartilage which, in humans, commonly occur in peripheral small bones such as those of the hands and feet. However, they can occur in long bones and in pelvic bones. Perhaps the lines of fusion between the ilium and ischial bones contained a plate of cartilage predisposing to enchondromatosis, although this is not an essential feature for the formation of such benign neoplasms.

We note that the other vertebrate prey included in the owl pellets also exhibited bone tumors (Lea, 1922). This fact suggests a local environmental causal agent.

The external appearance of the fossil ilia closely resembles that of the modern material, suggesting that these too exhibit tumors of a comparable nature. Essentially we interpret that in 25–30 million years there has been little change in the nature of bone pathology in frogs, although it is evident that there have been profound environmental changes throughout that period.

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