A Poxvirus in a Marsupial Papilloma

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We wish to present some evidence for the implication of an as yet uncharacterized member of the pox group of viruses in producing epidermal papillomata in a marsupial, *Setonix brachyurus*. Generally neoplasms in marsupials have not been investigated in any great detail (Barker, Calaby & Sharman, 1963), and it is interesting that in the population of *S. brachyurus* studied, animals with papillomata associated with poxvirus were frequently found. Apart from the lesions of molluscum contagiosum in humans, no other member of the poxvirus group is known to induce the formation of epidermal papillomata, although they may induce a few mesodermal neoplasms (Gross, 1970).

This particular population of *S. brachyurus* (or ‘quokka’) has been confined for some seven thousand years to Rottnest, a little island off the coast of Western Australia, and indeed, the species is found only in one or two other areas of this state (Main, 1963).

The papillomata were most commonly found on the dorsum of the distal end of the tail. They were usually single, but occasionally multiple, and varied in size from a few mm. to 4 to 5 cm. There were no macroscopic similarities with the appearance of molluscum contagiosum or any of the other known lesions induced by poxvirus.

Histologically, these lesions were papillomatous, displaying hyperkeratosis and acanthosis (Fig. 1). The rete ridges were thickened, elongated, clubbed and bent inwards at the periphery of the lesion. Parakeratotic cells were present in the stratum corneum. A few vacuolated cells were found in the upper layers of the stratum granulosum. These contained few or no kerato-hyaline granules and intercellular bridges; their nuclei were pushed to one side by eosinophilic, cytoplasmic inclusions (Fig. 2). There were no inclusions in the basal layer. Epithelial degeneration and basophilic inclusions characteristic of molluscum contagiosum were not seen in this papilloma. There was no morphological evidence of malignancy.

By electron microscopy particles resembling both the mature and immature poxviruses (Higashi, Ozaki & Ichimiya, 1960; Dales & Siminovitch, 1961; Leduc & Bernhard, 1962; Avakyan & Bychnovsky, 1965; Rabin et al. 1965) were seen in the cytoplasm of many cells in the stratum granulosum (Fig. 3). Particles at various stages of development were embedded in the finely fibrillar material of the virus ‘factories’. Fibrillar nuclear inclusions were present in several nuclei in cells containing the virus; this is a novel feature in cells infected with poxvirus. Kerato-hyaline granules were not found in these cells and tonofilaments were infrequently observed. Only a few desmosomes were present. Some cells were swollen while others were necrotic and surrounded by virus particles lying free in the extracellular space. Basal cells did not show virus replication.

The exact biological behaviour of this virus has not as yet been defined. Generally, however, the papilloma viruses are species specific, although most of them do not belong to the poxvirus group. Perhaps this particular member is specific to this rather unique and evolutionary isolated marsupial and induces the formation of papillomata. The lesions of molluscum contagiosum, the only papilloma-like lesions induced by a poxvirus in humans, possess many macroscopic and histological differences from these marsupial papillomata.
It would seem that epidermal invasion by poxvirus can range from cellular lysis to the cellular proliferation described in this study. Virological studies are now in progress in order to document further the characteristics of this virus.

**REFERENCES**


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**Fig. 1.** Low-power micrograph of a papilloma of the marsupial, *Setonix brachyurus*.

**Fig. 2.** Micrograph showing the presence of cytoplasmic inclusions in the stratum granulosum of the papilloma.

**Fig. 3.** Electron micrograph of the cytoplasmic inclusion. Mature and immature poxvirus particles can be seen.