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TAIL ABNORMALITIES IN REPTILES RESULTING FROM HIGH TEMPERATURE EGG INCUBATION

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Reptile eggs can be successfully incubated in the laboratory over a range of constant temperatures or at a temperature that fluctuates within certain limits. Temperature tolerances (both upper and lower limits) show marked interspecific variation in reptiles and these differences are correlated with geographical distribution. Thus the eggs of the tropical and sub-tropical green turtle (*Chelonia mydas*) do not develop at temperatures much below 27°C (Bustard and Greenham, 1968), whereas eggs of chelid terrapins in southern Australia normally incubate at mean temperatures of 16-23°C, and those of *Chelodina expansa* over-winter at near freezing temperatures (Goode and Russell, 1968).

It is well known that effective control of moisture is important for successful incubation of parchment-shelled eggs, which are prone to fungoid infections. I have successfully incubated many parchment-shelled reptile eggs in sterilized sand moistened with 8% water (by weight) (Bustard, 1967). Lynn and Ullrich (1950) have demonstrated the critical nature of adequate moisture at certain developmental stages of chelonian eggs and shown that many gross morphological abnormalities are due to moisture deficiency. In the present work all eggs were maintained at the adequate 8% water content by weekly additions, when necessary, of weighed amounts of water to the sand medium throughout the incubation period.

Ten eggs of the gecko *Oedura ocellata* Boulenger, which like all members of the sub-family Diplodactylinae lays parchment-shelled eggs (Bustard, 1968), were incubated at a constant temperature of 30°C. This was much higher (of the order of 10°C) than would be normal for this gecko in nature. Incubation period for those eggs which hatched was 54-55 days. Four eggs developed fungus. All the remainder developed to full term. One gecko slit the egg-shell but failed to emerge, two died without slitting the shell, one emerged with its yolk-sac extruded and two were normal hatchlings. The three which did not emerge from the eggs all possessed stumpy deformed tails. Failure to emerge from the egg, despite successful slitting of the egg-shell often occurs with eggs incubated near their upper temperature limit. A newly hatched individual and a full term embryo, with normal and deformed tails respectively, are shown in Plate 1A.

During work on temperature tolerances of incubating crocodile eggs, several eggs of the New Guinea freshwater crocodile (*Crocodylus novaeguineae*) were maintained at a constant temperature of 38°C. Of the five eggs at this temperature at least two proved to be infertile. Two of the remaining eggs failed to hatch. These eggs showed a normal weight gain initially, due to water uptake, but when subsequently opened were found to be decomposed with no trace of an embryo. Probably the embryos died during very early development. The remaining egg appeared to develop normally. The young crocodile slit the egg in the usual way but failed to emerge. After forty-eight hours it was removed, alive, and in apparent good health except for a deformed and stunted tail. This individual is illustrated together with a normal hatchling in Plate 1B.

This crocodile was the only specimen out of several dozen successfully incubated at a series of lower temperatures with a tail abnormality. It was incubated at 38°C, the highest temperature to produce a hatchling. The fact that it failed to emerge after slitting the egg-shell suggests that it was near its upper lethal temperature as mentioned above.

The crocodile situation closely paralleled that described for *Oedura* although the crocodile eggs had a considerably higher temperature tolerance as is to be expected on the basis of their geographical distribution. High temperature for each species produced a deformed (stunted) tail.

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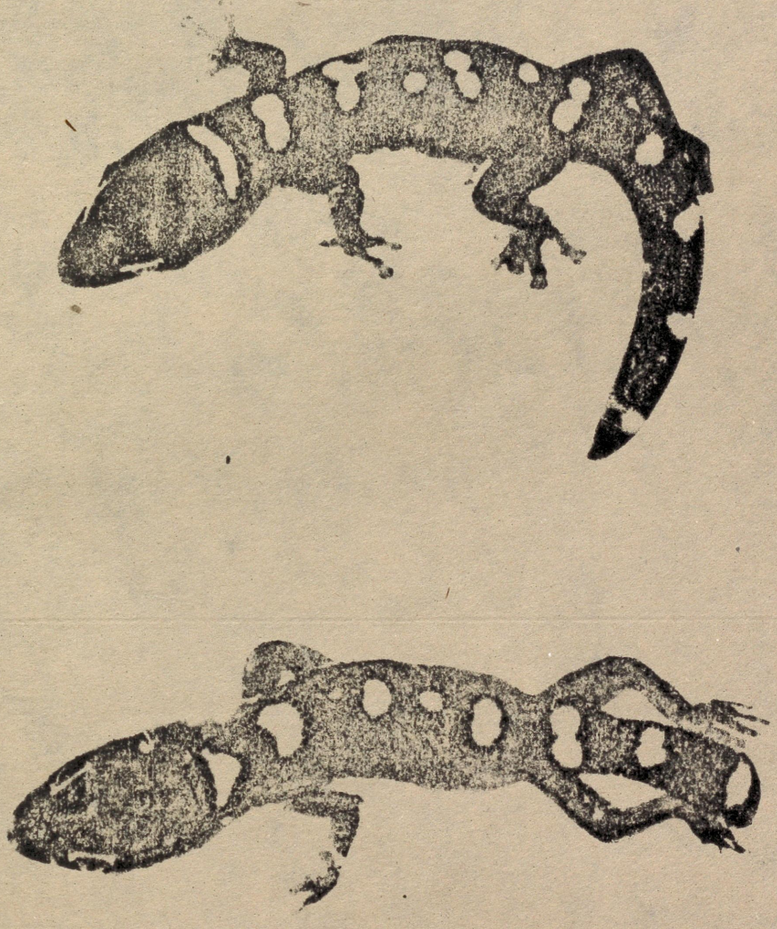

Plate IA. Abnormal and normal *Geckos* (see text).

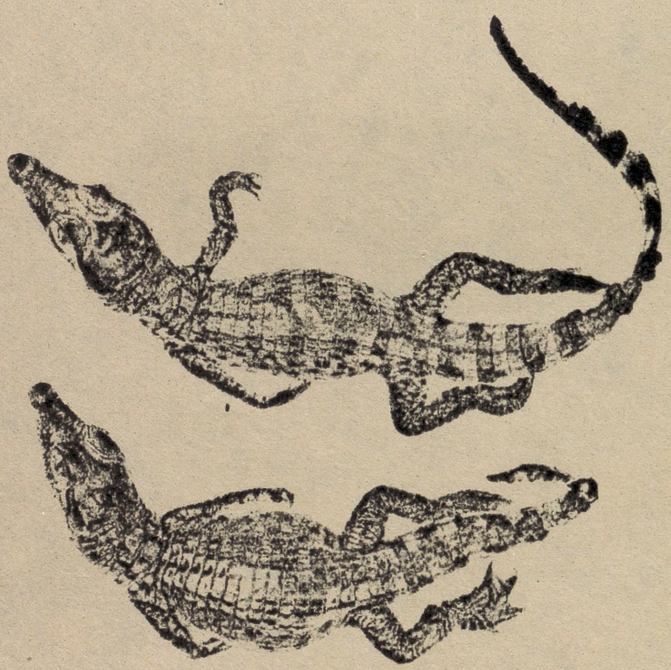

Plate 1B. Abnormal and normal *Crocodylus* specimens (see text).