59. WHY THE ELEPHANT HAS INTRA-ABDOMINAL TESTES

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The intra-abdominal testes of the elephant have been cause for comment since the time of Aristotle, in 350 BC, but no satisfactory explanation has been forthcoming. Our recent work on the embryology of the African elephant I think provides the answer; elephants are aquatic mammals that have only relatively recently colonised dry land. There are many facts that point to this simple but surprising conclusion. The paleontological evidence leaves no doubt that the elephant's earlier ancestors were aquatic. Fossils of some recent ancestral elephants are found on islands that have never had any connection with the mainland, such as those off the West coast of California. Mitochondrial DNA sequencing of the elephant's aquatic relatives, the dugong and the manatees of Africa and America, confirm their close relatedness. We have recently come to realize that the elephant's trunk almost certainly evolved as a snorkel, and the complete obliteration of the pleural cavity before birth enabled it to snorkel without rupturing its parietal pleural blood vessels. Even the infrasonic vocalizations of elephants, using a frequency similar to whales, and the fact that they continue to grow in height throughout most of their lives, also fits with this aquatic ancestry. But the testes are the icing on the cake. Physiologically, the testes are more threatened by cold stress than heat stress. Thus the Cetaceans (whales and dolphins), whose terrestrial ancestor entered the water 60 million years ago, were forced to retract their scrotal testes back into the abdominal cavity, together with the epididymis and pampiniform plexus. The elephant embryo (like the dugong and manatee) has no gubernaculum, no processus vaginalis, no pampiniform plexus, no scrotum, and hence no means of effecting testicular descent. In a coldwater environment, it made sense to keep its testes warm at all times, and spermatogenesis occurs quite normally at a body temperature of around 37 degrees Centigrade.