SASTA OLIPHANT SCIENCE AWARDS

SOUTH AUSTRALIAN SCIENCE TEACHERS ASSOCIATION

Prize Winner

Models & Inventions

Year 9-10

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Government of South Australia
Department for Education

SASTA South Australian Science Teachers Association

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The scientific principle demonstrated in this model is Darwin's theory of evolution by natural selection, specifically human evolution. Three species were chosen from a human evolution timeline based on physical changes (American Museum of Natural History, 2018).

Figure 1:

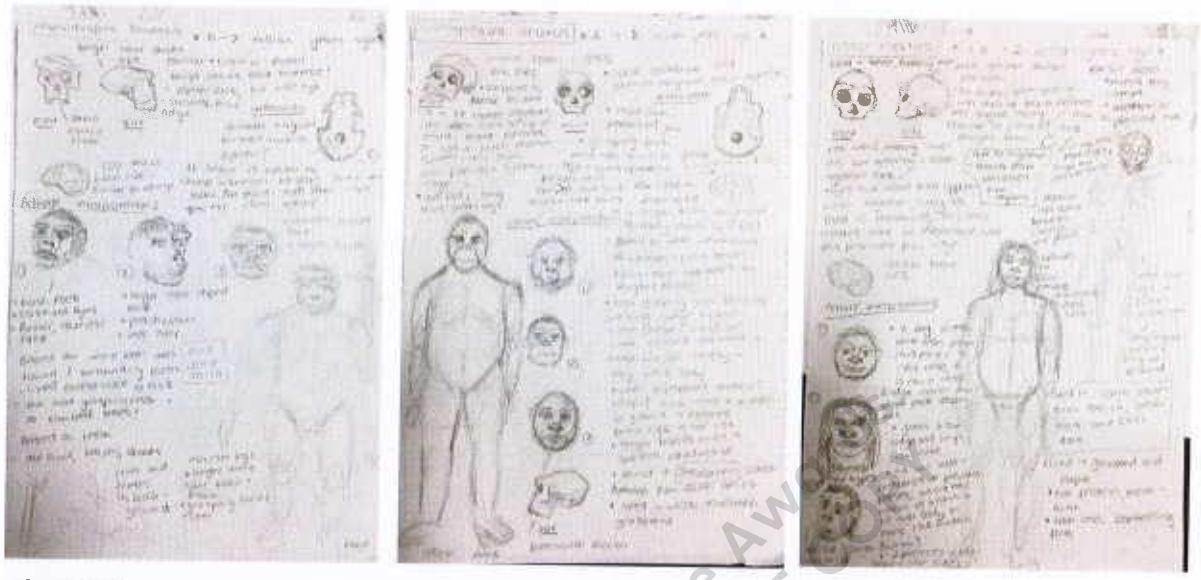
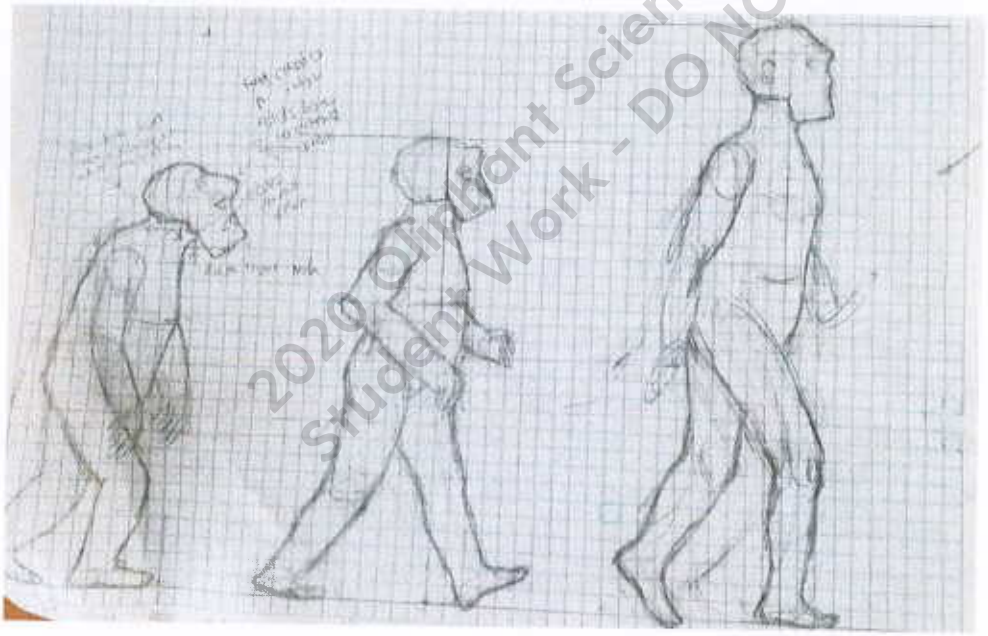


Figure 2:



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As seen in Figures 1 and 2, physical traits change across species. The first one appears ape-like with a large brow ridge and elongated back skull (Wayman, 2012). The foramen magnum has moved inwards in the later species - holding the head up and straightening the back (Nature, 2002). Bipedalism was influenced by change of environment from woodlands to savanna (CrashCourse, 2014). With trees no longer available, one had to be fast on foot to escape predators. Thus, those with longer legs and/or foramen magnums further inwards, were the ones who survived and reproduced. The cranial base angle also curves more over time, so the face protrudes less (Welker, n.d.). The model begins with traits of Sahelanthropus Tchadensis, then transforms to Australopithecus africanus and ends in Homo Erectus.

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The shrinking eyebrow ridge, angle of jaw, rounder skull, straightening of back, growth of legs and removal of grasping thumb are shown in the model. Cardboard nets were drawn for the basic forms and masking taped together. In order for the leg to grow, a series of cardboard cylinders that fit within one another were made. Two holes were put in each cylinder and wool was threaded through to hold them loosely together (Figure 3). A hole in the side of the foot allows the big toe to be moved inwards and outwards from a wire (Figure 4). A toothpick was used like an axel for both the jaw and head to move up and down on (Figure 5). A longer string was attached to the parts and pulled up above the puppet. This was hot glued into the tree branch above, and the feet glued to the base.

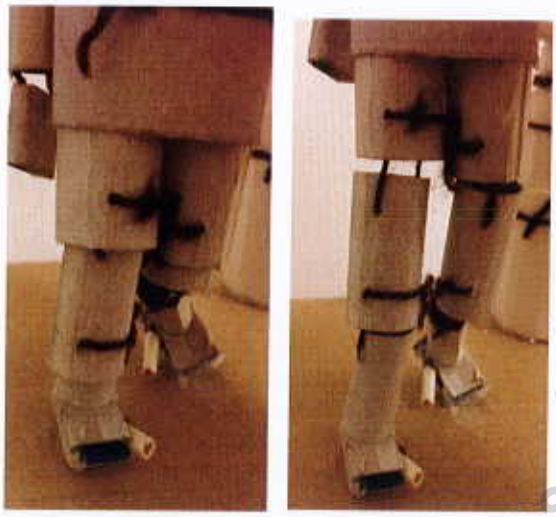
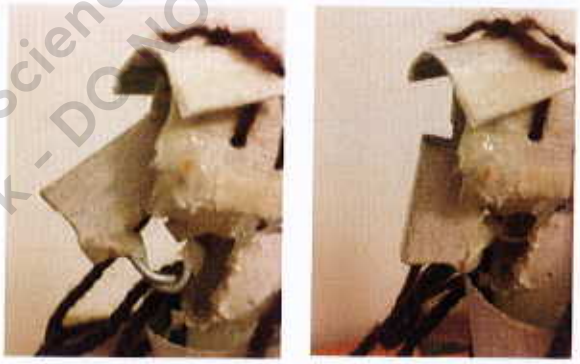


Figure 3:

This model was difficult to conceptualise due to the transformations. Different movement methods were experimented with piece by piece.

Figure 4:

Figure 5:



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Correct measurements were important; if the wool was too tight, the components wouldn't move, but if it were too loose it would have no shape at all. This was solved by constantly readjusting. All movements could not be conducted by one string because they needed to be pulled in different directions. Therefore, some components have to be interreacted with separately. The model is quite flimsy, but if it had been made of clay, would not be easily movable. The design couldn't have too much detail, as everything had to fit each species. All the pieces are held together, so nothing is falling off.

Lift model out of box. For the figure to stand – 'transform' - pull the tree branch with wool attached upwards. The jaw and skull can be brought back and forth manually, while moving the wire from heel moves the toe. Lower the branch down (some components must be slotted back into original position).