Procedural generation of feathers. The purpose of this script is to create individual feathers via precise control of the shapes and features, for the rapid generation of anatomically accurate plumage. The script produces a graphic user interface (GUI) window within the Maya interface that allows the researcher to input parameters at each step of the process, and then texture, scale, and place these feathers in bulk along a virtual feather tract. The process is as follows:

i. *Generate rachis* (stem of the feather): this allows the user to specify the length, radius, and taper toward the distal end of the rachis. Additionally, it allows the user to specify the barb density, which controls the density of vertices on the generated rachis, to which barbs will be attached later.

ii. *Make barbs*: for each barb attachment point along the rachis (manually selected by the user), this will generate a barb following a B-Spline curve with four control points (a B-spline curve is a type of polynomial curve that is fit to a series of line segments, thus removing hard edges). Each point on this curve is given a length, start angle, and end angle, and is used to create a simple EP curve following these parameters (an EP or Edit Point curve, is a spline curve with vertices [points] that can be actively transformed [edited] to adjust the curvature). Once this is generated, the curve is fit to a B-Spline curve. This creates an acceptably accurate shape for individual barbs along the feather rachis.

iii. *Fill feather*: for each selected curve, this will create barb polygons that match the shape of the curve while tapering off toward the end. It also allows the user to control the resolution of the generated geometry, with the tradeoff between higher accuracy and rendering performance. The polygons are extruded edges of a user-supplied object, so the user can control the resultant geometry of the feather barbs. In our visualization, we chose simple planes in the interest of reducing rendering cost.

iv. *Texture barbs*: this will apply a user-specified material to all barb geometries. Each barb is then UV mapped with Maya's built-in *Planar Mapping* preset.

v. *Place feathers*: from a source feather, this will duplicate and attach the feather to a series of user-specified vertices. This allows mass placement of feathers on the body quickly. (However, for our *Archaeopteryx* reconstruction we did this manually)

vi. *Scale feathers*: this allows for the mass scaling of feather objects, relative to their current scales.