

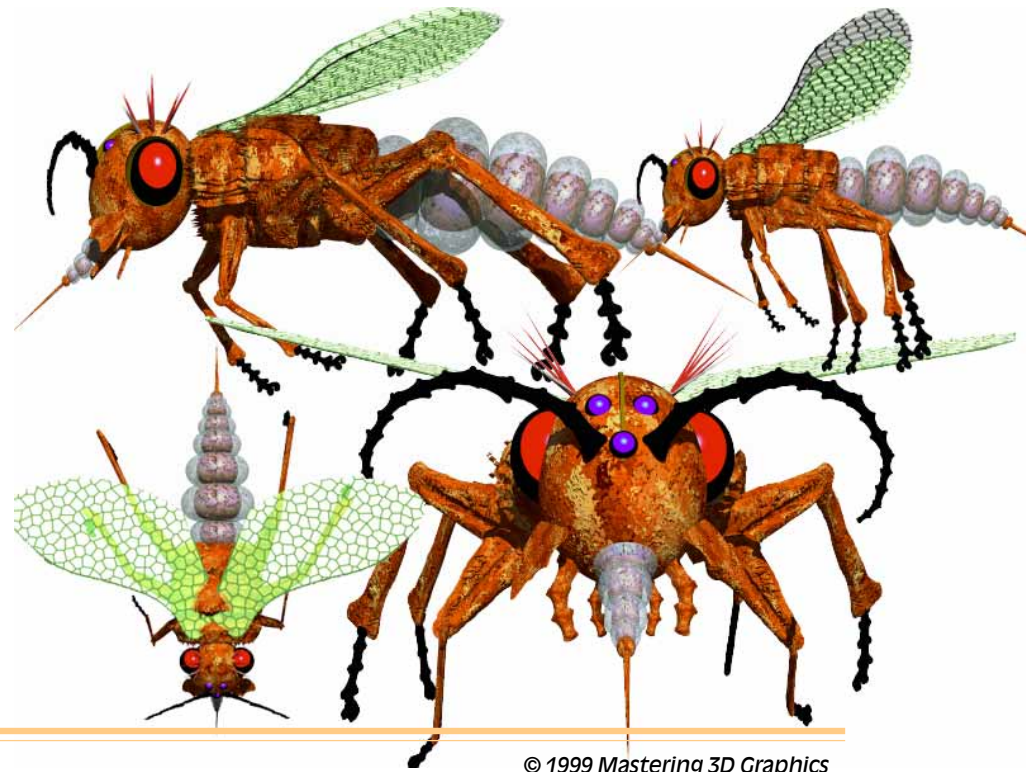
Creating a Creepy Insect

Mastering 3D Graphics ~ issue #3

Bryce
~ R. Shamms Mortier

Reference

Before we jump into the tutorial proper, allow me to tell you about a vital reference source that I use when it comes to modeling insects. It's called "Insects: a Petersen Field Guide". The authors/illustrators are Donald J. Borror and Richard E. White. It's a small paperback that covers insects in America north of Mexico, though I'll bet there are other sources that range in different environments. My creepy insect is based upon a composite of examples from this source, which I will list as the tutorial progresses.



Bryce Tools

The experienced Bryce user knows that Bryce is much more than it appears to be at first glance. If you think the Bryce PR speaks for the totality of this software, then you'll come away with the impression that while it can be used to create interesting photorealistic naturalistic environment, that's the extent of its usefulness. In this series of Bryce oriented articles for Mastering 3D Graphics, we will challenge that belief at every turn. Bryce, as you will discover if you don't know it already, is an infinitely variable 3D graphics and animation system.

Most of the computer graphics users who have a rather negative impression of Bryce call attention to its lack of modeling tools. At first glance, this seems like an honest appraisal. Bryce has a limited number and variety of primitive shapes, with no real tools for deformation except scaling. It also contains a Boolean mode, allowing you to use one model to re-shape another, and that looks like

about it. So how can we model an insect of any interest then, using this rather small number of modeling options. The answer lies in the mastery of another tool, or modeling environment that Bryce has: its Terrain Editor.

The Terrain Editor

It will be assumed that you own Bryce for this tutorial, and that you are familiar with how to locate its tools and modules. Also make sure you know how to open its Terrain Editor and how to move among the three tabbed area that contain its tools and other options (all displayed in [Figure 1](#)). We will not spend a lot of time walking you through these basics.

All of the appendages of our creepy insect will make use of the Terrain Editor. The rest of the model will use various Bryce primitives. The model will be fully animatable and will be textured using Bryce materials. Texture applications will be saved for the last steps.

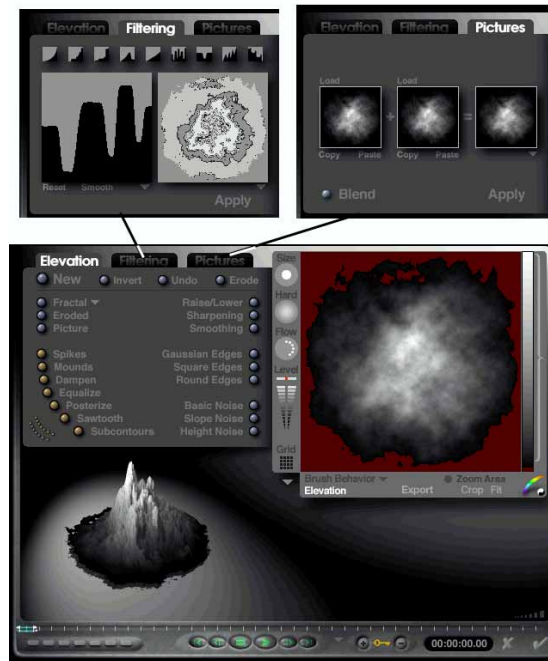


Figure 1: The Terrain Editor, showing its three tabbed areas.

Modeling the Head

Let's begin with a body part that is based upon non-Terrain Edited components: the insect's head. As the basis for the head, we'll use a sphere elongated on the Y-axis. Click on the Sphere Primitive to add it to the workspace and resize it so its final dimensions are X, Y, Z = 20, 26, 20, see [Figure 2](#).

Go to the Right View and rotate the elongated sphere (which we'll call the Head from here on) so that it is rotated 22 degrees on its X-axis, see [Figure 3](#).

Now we will create two eye sockets. Create another sphere and resize it to X, Y, Z = 13, 15, 13. Check Negative in its Object Attributes dialog. Click on the Head and check Positive in its Object Attributes dialog. When grouped, the smaller sphere will cut a hole in the Head when placed where it is supposed to be. Place the cutter sphere about 1/2 inside the Head (use the Top View) and Duplicate it. Place the cloned cutter on the other side of the Head. Group the Head and the two Cutters. Name this new grouped object BigHead_1, see [Figures 4](#) and [5](#).

Now for the eyes themselves. Create a sphere and resize it to X, Y, Z = 10, 12, 10. Center in the Right socket and name it Eye_R. Duplicate it, and set the

duplicate in the Left socket. Name it Eye_L. Link (not Group) both eyes to the BigHead_1 object, see [Figures 6](#) and [7](#).

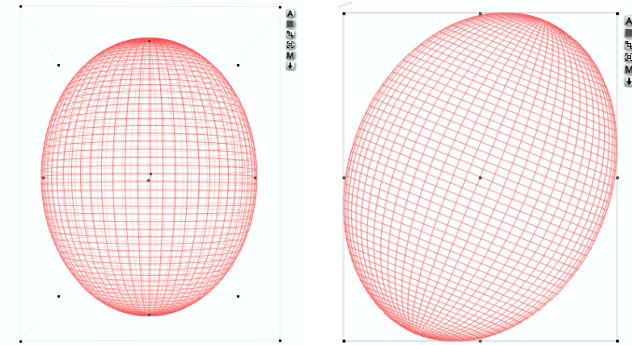


Figure 2 (left): A Sphere is added to the workspace and resized as described, as seen in the Camera View.
Figure 3 (right): The Head is rotated 22 degrees on its X-axis as seen in the Right View.

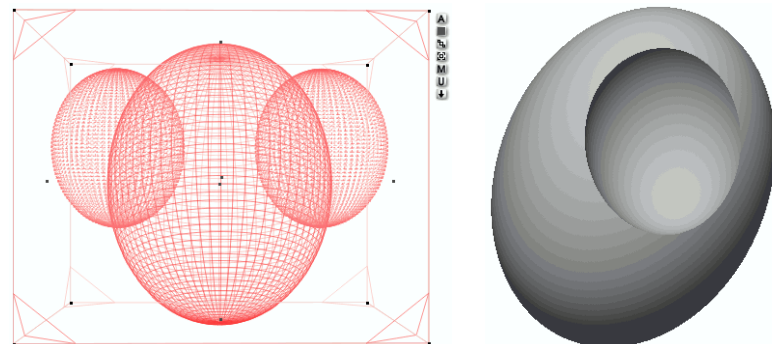


Figure 4 (left): As seen from the Front View, the two Cutter spheres are now Grouped with the Head.
Figure 5 (right): As rendered in the Right View, you can see how the Cutter creates a depressed area as a home for the eye.

For the rest of the elements of the Head, we'll use the Terrain Editor for their development.

Note! There are two important considerations when developing Terrain Editor organic elements: First, realize that objects developed in the Terrain Editor always contain some anomalies, usually seen as small spikes. These can be smoothed out, using the Terrain Editor's Smoothing operation. This is what you might do if developing machine parts, but NOT what you want to do if developing organic elements. These small irregularities – and even enhanced irregularities you might add – contribute to the natural look of organic components. Secondly, ALWAYS develop non-terrain components, organic or mechanical, by starting with a Symmetric Lattice and not a Terrain. This is because the Symmetric Lattice has no flat plane at its base, while a Terrain does. After the Terrain Editor is used to develop the Symmetric Lattice object, you may elect to substitute a Terrain for it in Bryce's substitution options. Substituting a Terrain for a Symmetric Lattice removes the mirror effect on the Y-axis that identifies the Symmetric Lattice and compensates by making a Terrain object twice its normal size on the Y-axis. If this sounds confusing, just do it a few times to get an intuitive idea of how this works. Never work for mechanistic or metallic looks when developing organic objects, in Bryce or anywhere else.

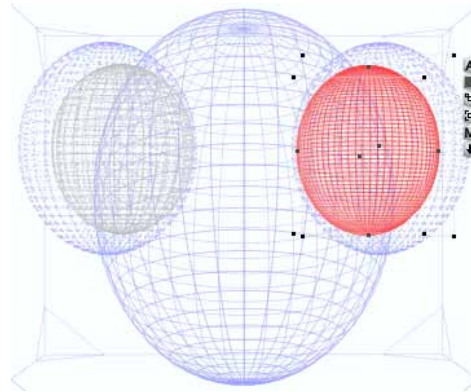


Figure 6 (left): As seen in the Camera View, the two eyes are placed in the sockets.

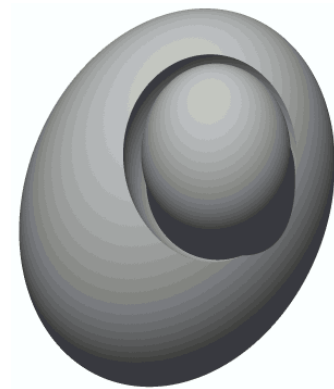


Figure 7 (right): From a rendered Right View, you can see that the eyes fit in the sockets, while showing just a bit of the depressions on all sides.

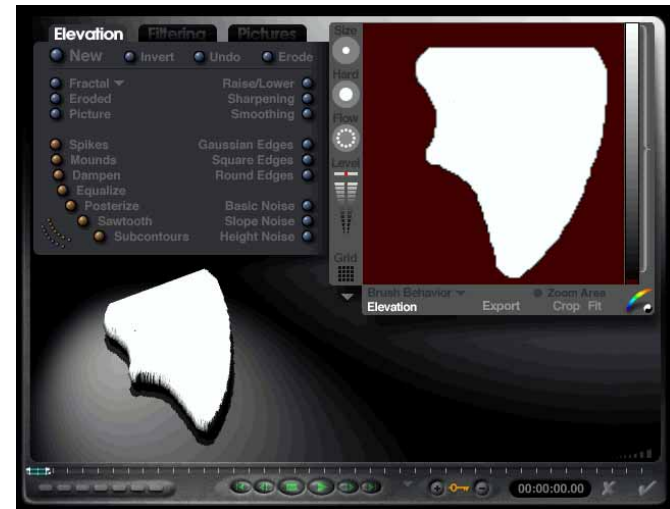


Figure 8: Create the Mandible object as illustrated here.

The Mandibles

Create a Symmetric Lattice and with it selected, go to the Terrain Editor. Click on NEW to erase it and with the Elevation Brush selected, paint the shape shown in [Figure 8](#). Reduce the height of the shape to about 1/4 and click on the check mark to write the mandible object to the screen.

For this model, I have set the dimensions at X, Y, Z = 11, .6 and 11, but you should look at [Figure 9](#) to determine the relative size for your model. I also rotated the Mandible in place (X, Y, Z = -76, -60 and -44 degrees) and reset the Origin Point at the top so it can be animated. (Make sure Show Origin Handle is checked in the Object Attributes dialog for each mandible, so you can place the Origin Handle at the top-center of this body part.) After doing this for the Right Mandible, it was Duplicated for the Left Mandible. Both were then Linked to the BigHead_1 object.

Remember that although the Insects guide I mentioned is

being used in a general way for the construction of this creepy insect, it is an original concept. This is not really a grasshopper or ant or scorpion, but my own altered model. This will especially become evident when the beastly is textured later on.

Labium

This is the lower lip and it is set back on the head. We will build it by using a Boolean method. Basically, two Boolean spheres, one positive and one negative, are Grouped in order to create a smoothly curved surface, see [Figure 10](#). The size of the positive sphere and the negative sphere are: X, Y, Z = 16, 21, 16 (positive) and 19, 21, 16 (negative). Then the Negative Sphere is moved so that about 1/5 of it extends to the front of the Positive sphere.

The result, when grouped, is a lip-like crescent surface. The Origin Handle is moved so that the labium is hinged at the top-center. The labium group is then reduced to about half size. The Labium is moved into place and Linked to the BigHead_1 object.

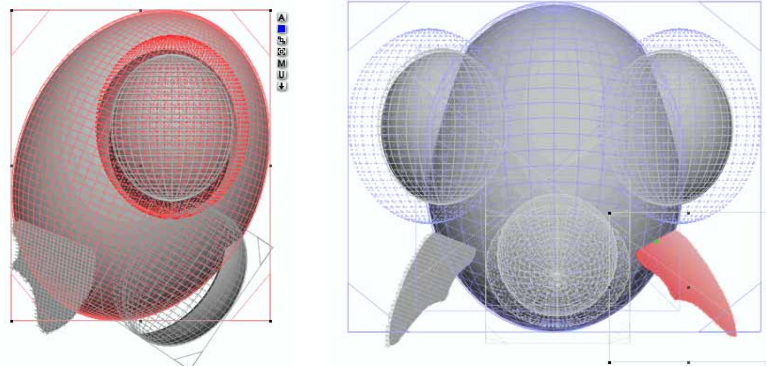


Figure 9 (left): The Mandibles are shown in place, Linked to the BigHead_1 object (Front View).

Figure 10 (right): The Labium is shown moved into place and Linked to BigHead_1 in this overlay preview render (Right View).

The Coronal Suture

Now resize a Cylinder to X, Y, Z = 20, .5, 17. Place this thin cylinder inside of the BigHead_1 so that it protrudes just a bit out of the Front of the head. This is the Coronal Suture. Link it to the BigHead_1 object. On real insects, it is a depression, but I have selected to make it protrude from my insect, see [Figure 11](#).

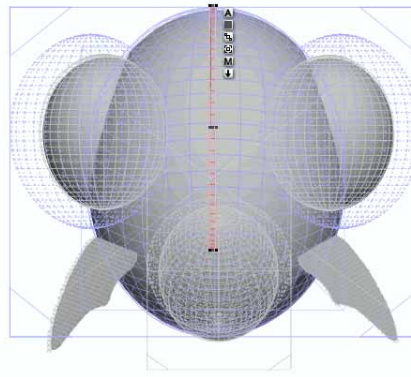


Figure 11: The Coronal Suture, shown from the Front View in an overlay preview render.

Palps

Palps are small arm-like appendages that reside on either side of the lower head, helping to guide food into the Labium. We will make the Palps for this insect larger than normal, to create a more menacing look. Do the following:

1. Create a Symmetric lattice, open the Terrain Editor and click on NEW to start a new object.
2. Create the shape illustrated in [Figure 12](#) with an Elevation Brush.
3. Click on the checkmark to write the object to the workspace. Substitute a Terrain for the Symmetric lattice and resize it to a Y-axis height of 1.

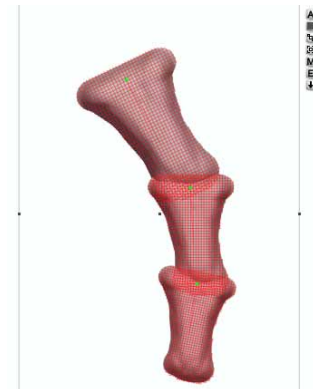
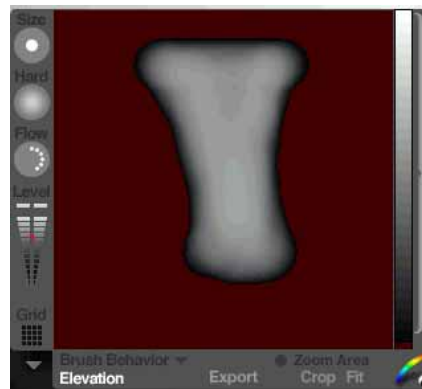


Figure 12 (left): This shape is a section of the Palp, as created in the Terrain Editor from a Symmetric lattice. It looks a bit like a dog treat. Figure 13 (right): The final Palp, with all parts Linked so they can be rotated like finger joints.

4. Resize the entire Palp element until it is about half the height of a Mandible.

5. Name it Palp_1 and make sure Show Origin Handle is checked in its Object Attributes dialog. Move the Origin Handle of this Palp element to the top center of the object. Duplicate it twice and Link both duplicates to each other in succession, so that the final Palp resembles a finger, which it is. Make the size of each descending element a bit smaller than the preceding one, see [Figure 13](#).

Now it's time to add four Palps to the BigHead_1 object. The first pair should be added just in front of the Labium as seen in the right view and a second pair (about 1/2 larger) farther towards the front of the head. By selecting the top Palp element, all of the duplicates can be easily created. All four palps must now be Linked to the BigHead_1 object, see [Figure 14](#).

Ocelli (Simple Eyes)

Many insects have three Ocelli, or Simple Eyes. Let's give our creepy critter three Ocelli by adding three Linked spheres, see [Figure 15](#).

Proboscis

Some sucking insects have a Proboscis, or sucking tongue. This often suffices for lips and mouth, but our insect will have both (the better to bite you with, my dear!). Look at [Figure 16](#). This is a Proboscis created in the Terrain Editor from a Symmetrical Lattice. Spikes are added and the objects Y-axis is shortened until it looks right. Then it is added to the head inside of the open mouth, and Linked, see [Figure 17](#).

The Last Head Element

The last items to be Linked to the head are the Antennae. Instead of constructing them from scratch, we'll use

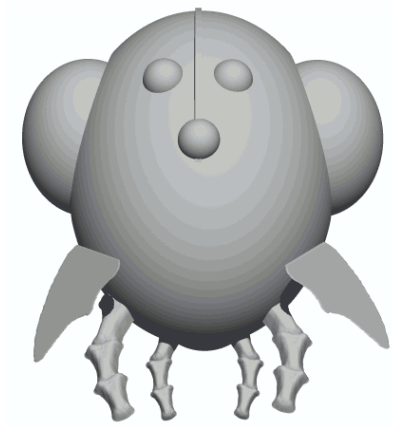
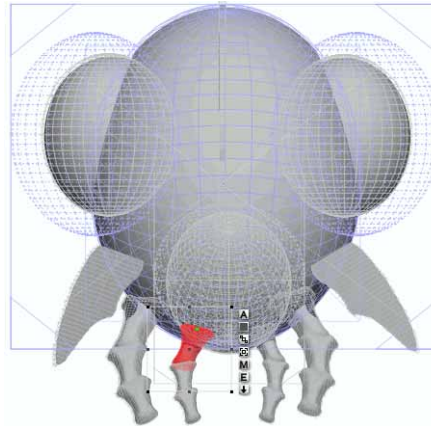


Figure 14 (left): The four Palps are moved into place and Linked to the BigHead_1 object, as shown in this overlay preview render.
Figure 15 (right): Three Linked Ocelli are added.

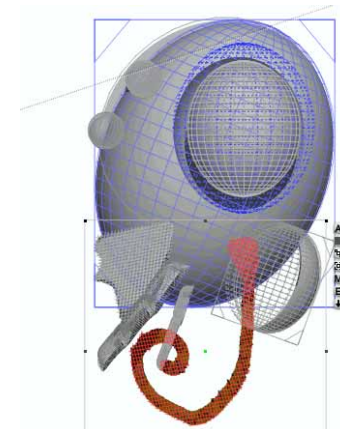
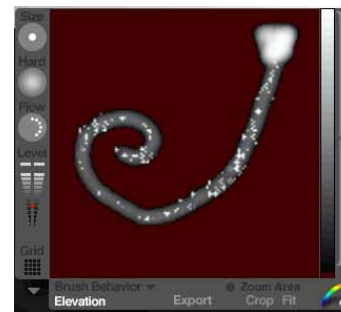


Figure 16 (left): The Proboscis is painted in the Terrain Editor with an Elevation Brush and Spikes are added.
Figure 17 (right): The Proboscis is placed inside of our insect's mouth, its spiky tongue protruding and ready for work.

the Palp element to create the Antennae. Simply duplicate one of the Palps and, for the present, un-Link the duplicate from the BigHead_1 object. Move the duplicate to a separate workspace and duplicate the parent section four more times. This duplicates the entire three-part Palp. Now build an Antenna, Linking all of the descending parts to each other. By using this method, you can curve the antenna (and animate it) in an infinite variety of positions and curls. Antennae act almost like eyebrows when giving expression to an insect, see [Figures 18](#).

What the heck! Let's make the insect just a bit more creepy and menacing. Using an Elongated Cone primitive that is resized to emulate a spikey hair, place four of these elements on top of the head and Link them. Now that's better! See [Figure 19](#).

Thorax

Set the head aside until later, when we'll add some textures to it. Now it's time to develop the Thorax, the body part that holds the head and legs. Create a Symmetric lattice and jump to the Terrain Editor. Click NEW and paint the form shown in [Figure 20](#) with the Elevation Brush. Select the Erode Brush and paint around the edges. This adds cracks and

other anomalies. Add Spikes by using the Spikes control and sliding the mouse to the right. When you are satis-

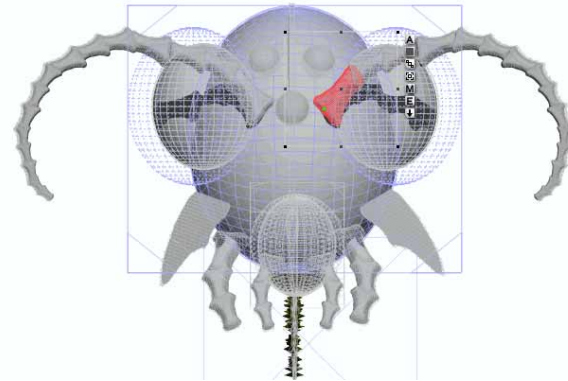


Figure 18: One Antenna is constructed from a string of Palps, all linked together. Then the Antenna is duplicated and both are placed in position. They are then Linked to the BigHead_1 object.

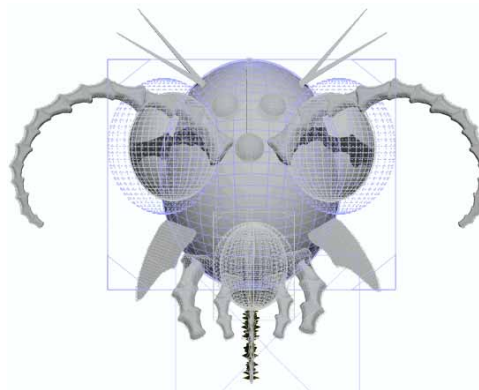


Figure 19 (left): The final touch is added, a quartet of spikey hairs. If you like, duplicate more hairs for the head.

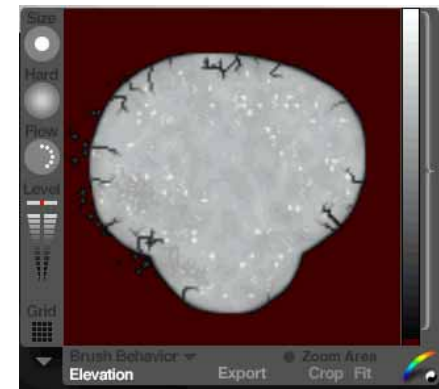


Figure 20 (right): The Thorax element is developed in the Terrain Editor.

fied with the look, click the checkmark and write the Thorax element to the workspace.

By resizing and rotating three duplicate Thorax elements as shown in [Figure 21](#), an organic looking Thorax is configured. Link the BigHead_1 object to the finished Thorax.

The Abdomen

The construction of the Abdomen is the next task. Don't be concerned if you fail to understand why we will model it as indicated at this juncture. That will become clear when we add textures later. Do the following:

1. Create a Torus. Click on the “E” button for Edit and click and drag the mouse to the right to close the Torus hole. The numerical indicator should read 530, see [Figure 22](#).
2. Duplicate the Torus, which places another one inside the first one. Resize the duplicate to about half of the source Torus. Resize it again to make it just as deep (Z-axis) as the source Torus. Name the source Torus “Outside_Ab” and the duplicate “Inside_Ab”. Group them as one, naming the group “Torus_Section”.
3. You will need to duplicate the Torus Section until you have seven of them. Link them together in descend-

ing order, resizing and rotating as you go, until you have a complete Abdomen as shown in [Figure 23](#). The “Stinger” on the end is a resized elongated cone, linked to the last Torus Section.

4. Move the Abdomen into place and Link it to the Thorax. The model should now resemble [Figure 24](#).

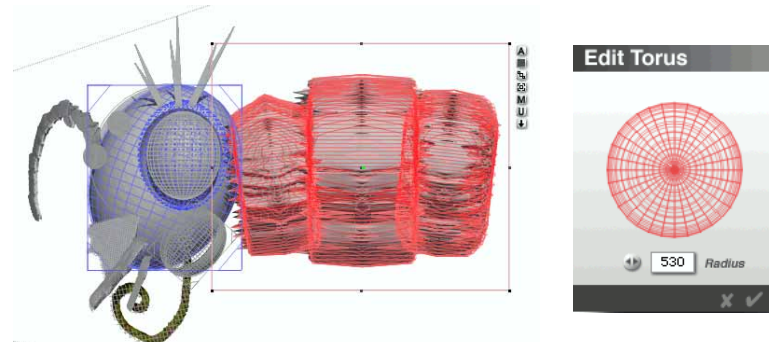


Figure 21 (left): As shown in this overlay preview render, the final Thorax is constructed from three separate Thorax elements.

Figure 22 (right): The hole in the Torus is closed in its Edit dialog.

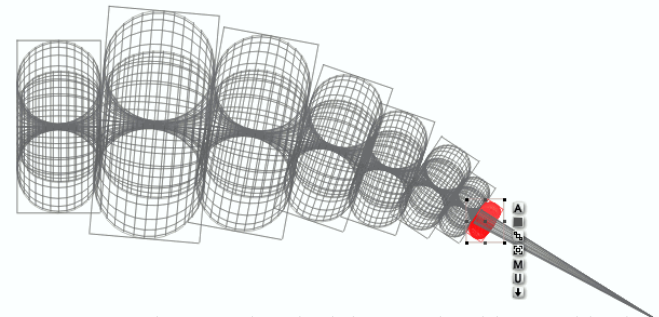


Figure 23: The completed Abdomen should resemble this wireframe preview render, as seen in the Right View.

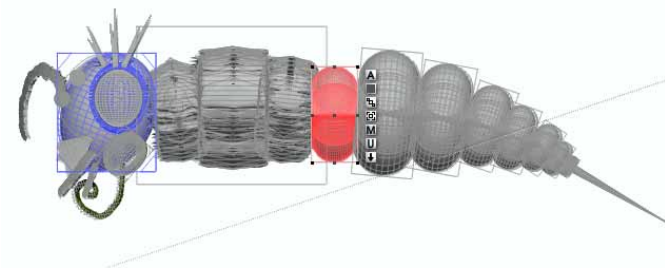


Figure 24: The Abdomen is moved into place and Linked to the Thorax, as shown in this overlay preview rendering.

The Legs

OK. Time to give this creature the capacity for locomotion. In modeling the Legs, all we have to do is to model one. The others are duplicates, in some cases resized and rotated from the initial construct. The Leg has three components, all modeled in the Terrain Editor from a Symmetric Lattice, with some Spikes and Erosion added to make it look less me-

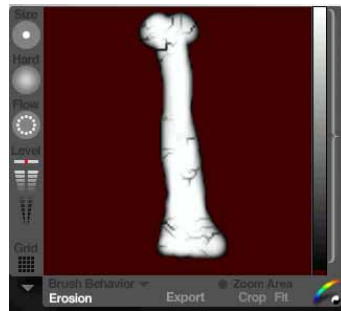


Figure 25 (left): The Top Leg section as modeled in the Terrain Editor.
Figure 26 (right): The Middle leg section as modeled in the Terrain Editor.

chanical. The three parts are then Linked together so that they can be rotated correctly. Obviously, their Origin Handles have to be moved to the top-center of each separate Leg part, see Figures 25 to 28.

When finished with the root Leg, it's time to create three pairs of legs for placement on the Thorax. Note that

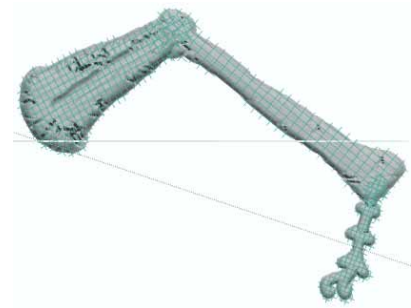
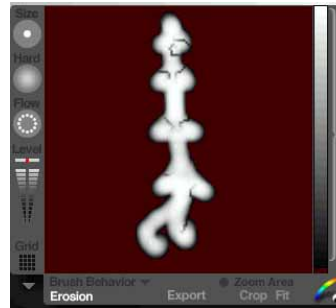


Figure 27 (left): The Lower leg section as modeled in the Terrain Editor.
Figure 28 (right): The completed Leg, with the three parts Linked together and ready for placement.

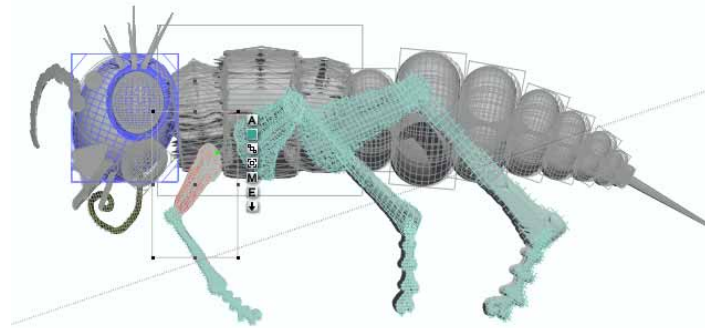


Figure 29: The Right View of the Leg pairs sized, rotated and placed.

each pair is attached (Linked) to one of the Thorax sections, as seen in the Right View (Figure 29) and the Top View (Figure 30).

Wings?

To me, a “creepy” insect is not limited to creeping, but can also flutter around with wings, increasing its potential for intervening in your space. In my mind, “creepy” means something that makes me feel creepy when I see it, so that I hope it doesn’t get any nearer. For that reason, I am going to give this insect the power of flight, making it more threatening.

Do the following:

1. Open Photoshop and draw a wing shape for the insect with the freehand marquee. In the Filters menu, select the Stained Glass option from the Textures list. Set Cell Size to 4 and Border Thickness to 2. Light Intensity isn’t required. Select OK and a pattern of interlaced hexagons will be written to the inside of the shape. Select Edit/Stroke and add a two pixel Stroke to the inside of the shape. Save it as Insect_Wing_1, see Figure 31.
2. Now make a white silhouette of the wing shape on a black background and save it as Insect_Wing_2. Go to

Bryce and place a Symmetric Lattice in the workspace and open the Terrain Editor. Import Insect_Wing_2

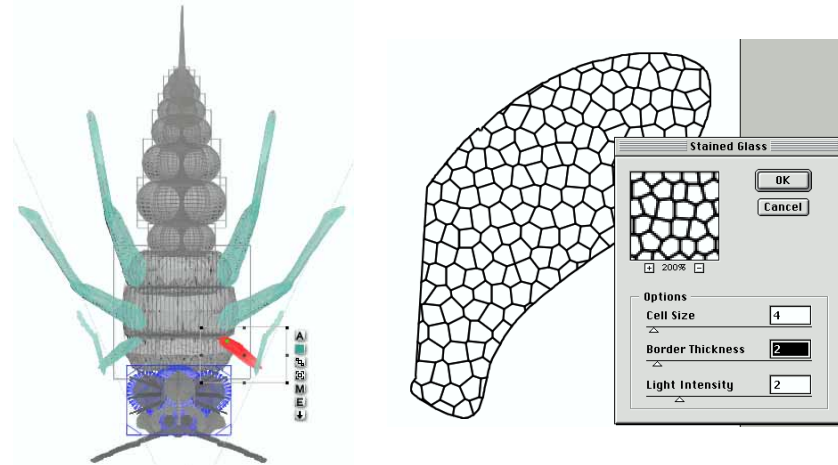


Figure 30 (left): The Top View of the Legs sized, rotated and placed.

Figure 31 (right): The Stained Glass pattern is written inside the marquee shape. The shape is saved after being rendered with the pattern for use in Bryce.

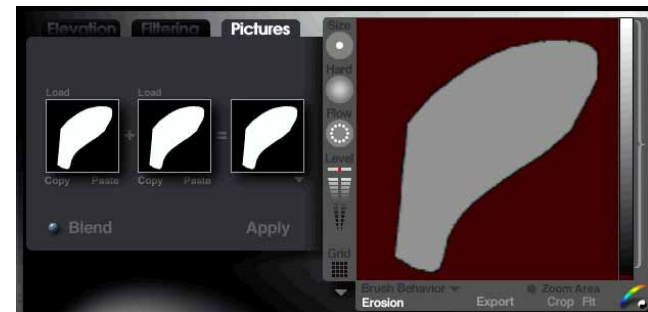


Figure 32: The Wing_2 silhouette is imported into the Terrain Editor as a picture, which creates a 3D shape.

into the Terrain Editor as a picture file (under Tab 3). Decrease the Y-axis to .5 to create a very thin wing, see [Figure 32](#).

Place the Wing at the top of the Thorax and Link it. Duplicate and flip on the X-axis to create the other Wing, see [Figure 33](#).

Texturing the Creepy Insect in Bryce

Textures and materials give personality to a model. Decide who the creature is first and how it acts, then textures will follow of their own accord.

The Wings

The wings have a special bitmap texture created in Photoshop. As detailed earlier, the Photoshop Stained Glass filter was used to create this texture. In Bryce, the texture was applied as an image map, using a size of 0% with Object Top mapping. A green Diffuse color was used, with only the Transparent Color and Transparency Optics relating to the image map. The Transparency Optics are set at 80%, so the wings have transparency.

Colors

Many of the elements of this creepy insect are textured with color alone. The lower feet segments of all six legs

are colored a non-reflective black, as are the antennae. The eyes are a special black. They have a Specular Red halo, so they always seem to glow. I also shut off their ability to Receive Shadows in the Materials Editor, so they always dominate in any view.

A Special Material

The Materials Editor was used to create a special material, created from the Autumn Leaves procedural with Object Space Mapping at a frequency of 25. This texture was plugged into the Diffuse and Ambient Color channels, at settings of 97 and 19 respectively. The texture was not placed in either the Diffusion or Ambience Value

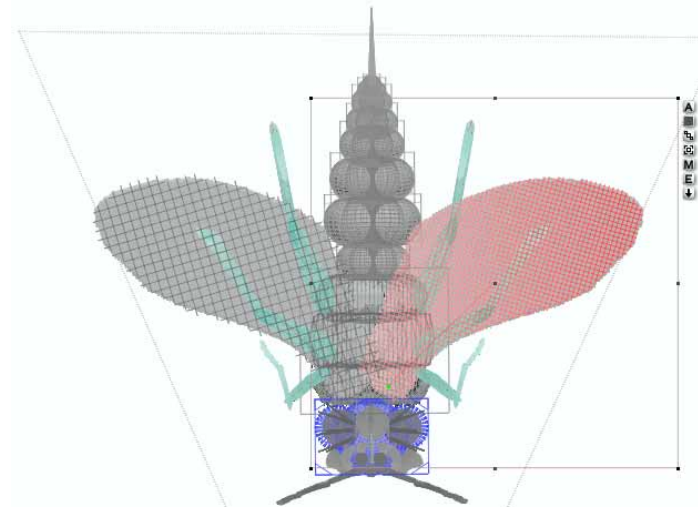


Figure 33: Both Wings are now placed and Linked, as shown in this overlay preview from the Top View.

slots. A Specularity value of 78 was used, making the texture gleam a bit. A Bump map of 10 also gave it some body. The result is a material that resembles mottled skin. This texture was used for the following elements: the Head, Palps, mandibles, Thorax, Upper and Middle leg parts, Stinger and the internal torus elements of the Abdomen.

The outer Torus segments of the Abdomen were mapped in another unique way. The only procedural used was a Beveled Tile in the Bump channel, and that was random mapped at a frequency of 7% (Bump Height -60). Everything else is color dependent, with a light gray Diffuse color and a light blue Ambient color. Value settings were as follows: Diffusion 100, Ambience 23.5, Specularity 90. The most important component was a Transparency Value of 55. What is the result? The outer Torus segments of the Abdomen look gelatinous and semi-transparent, allowing you to see the organs inside. A very eerie effect.

A Last Minute Decision

The Labium and Proboscis looked too sweet after I rendered the model, so I switched them both to Hidden in their Object Attribute dialogs. They are still there if I ever decide to render a less aggressive model. What I did instead was to Copy a section of the Abdomen with Stinger attached to the Head. This gave me a proboscis that re-

sembles a hypodermic needle, something I am deathly afraid of. Talk about creepy, this did the trick. See what you think of the finished model in [Figure 34](#).

Stay tuned for more Bryce 3D adventures in the coming issues of Mastering 3D Graphics. For more hints and tips about getting every drop of creative potential from Bryce, see the Bryce 4 f/x and Design book (Coriolis), authored by Shamms Mortier and on the shelves in the Fall of '99 and his Bryce 3D Handbook from Charles River Media (1998). The model of the Bryce Creepy Insect is contained on the CD-ROM for the Bryce 4 f/x and Design book (Coriolis).

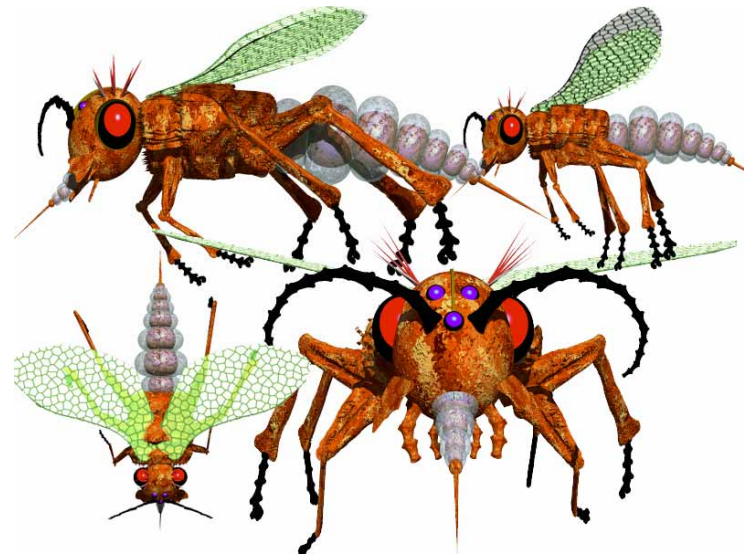
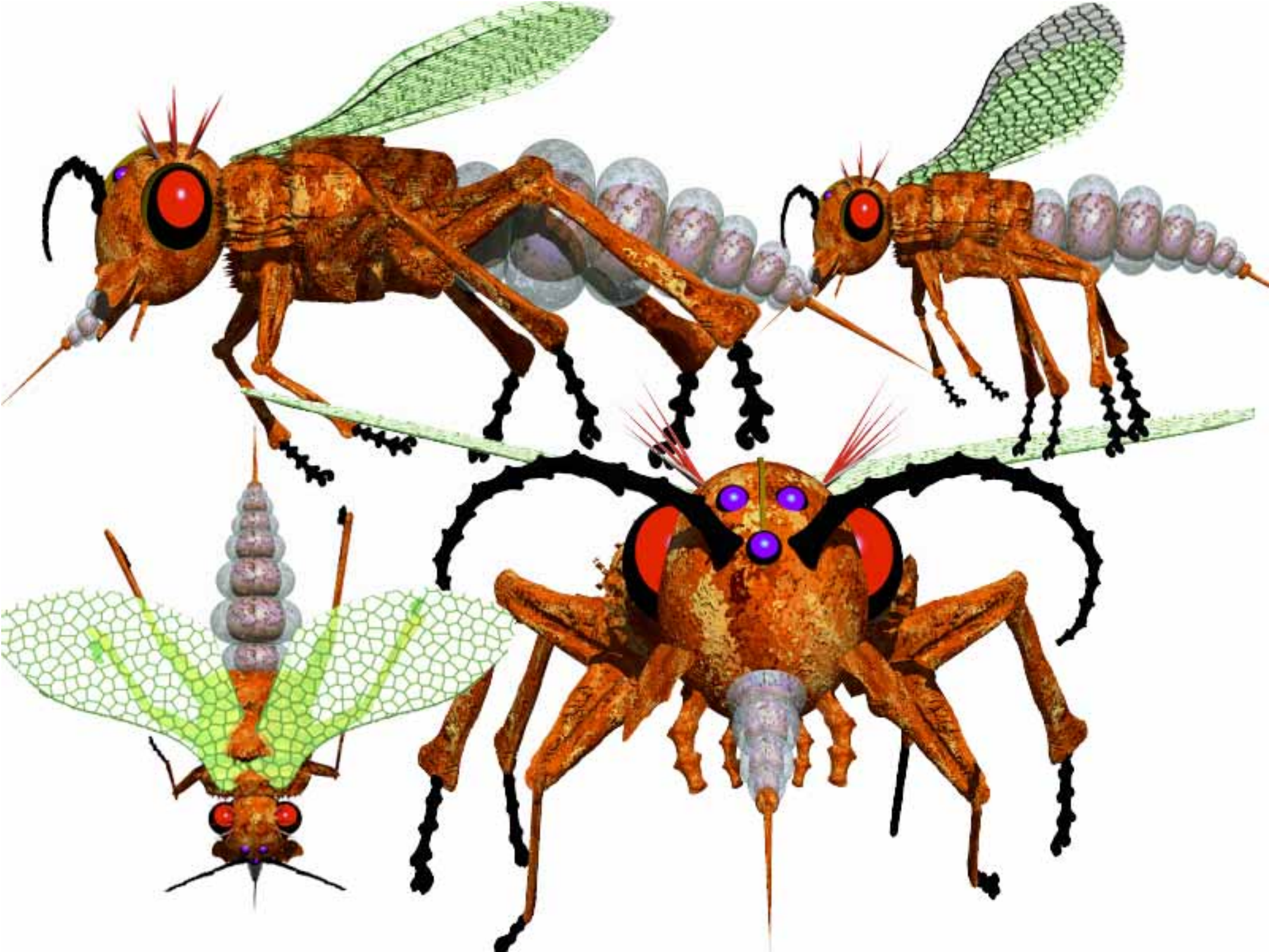
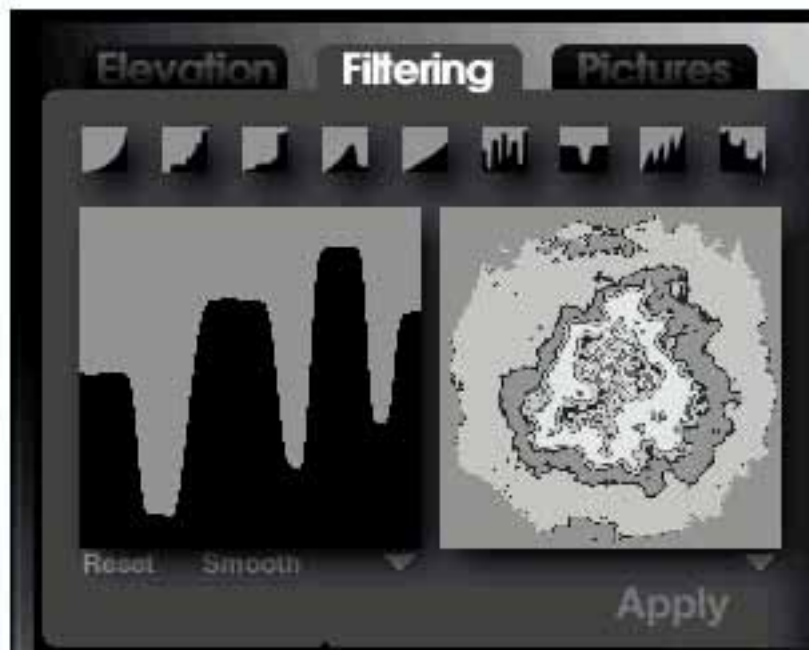
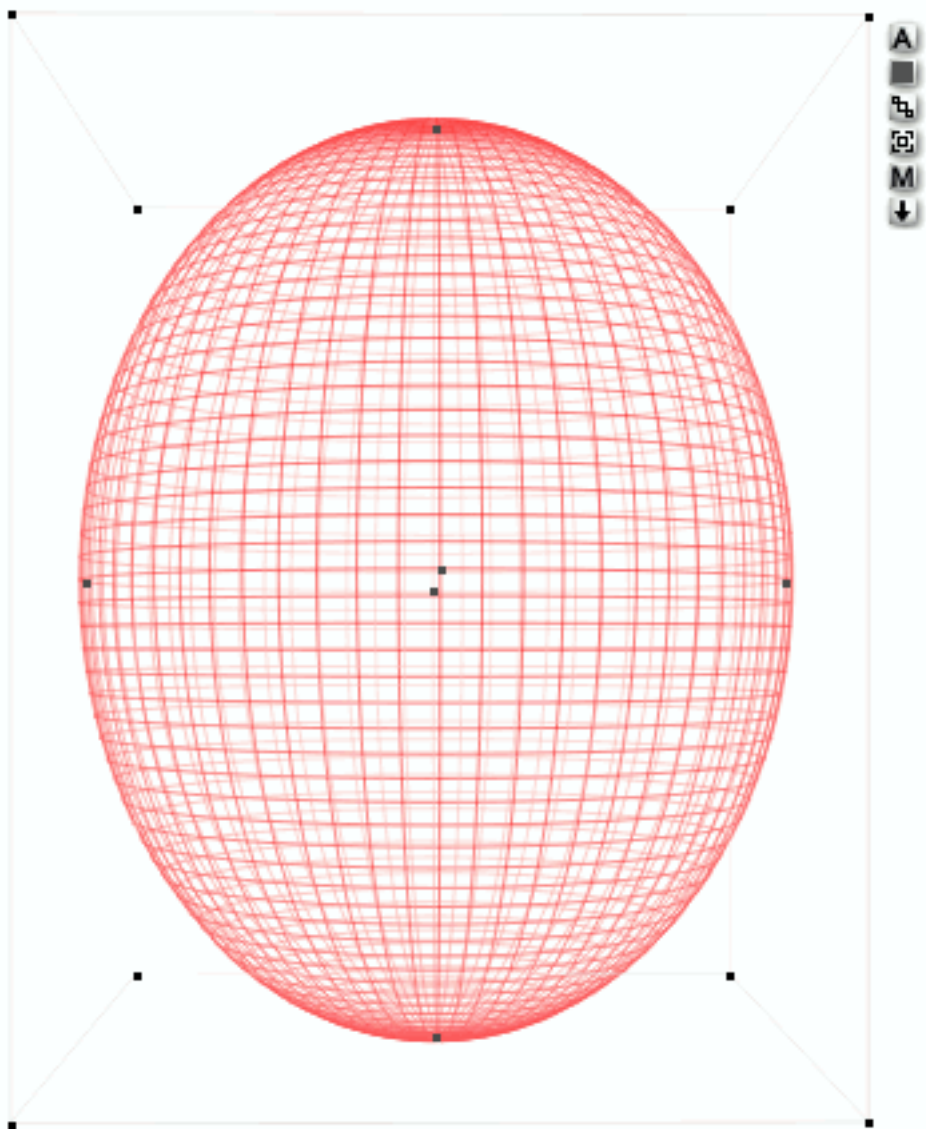
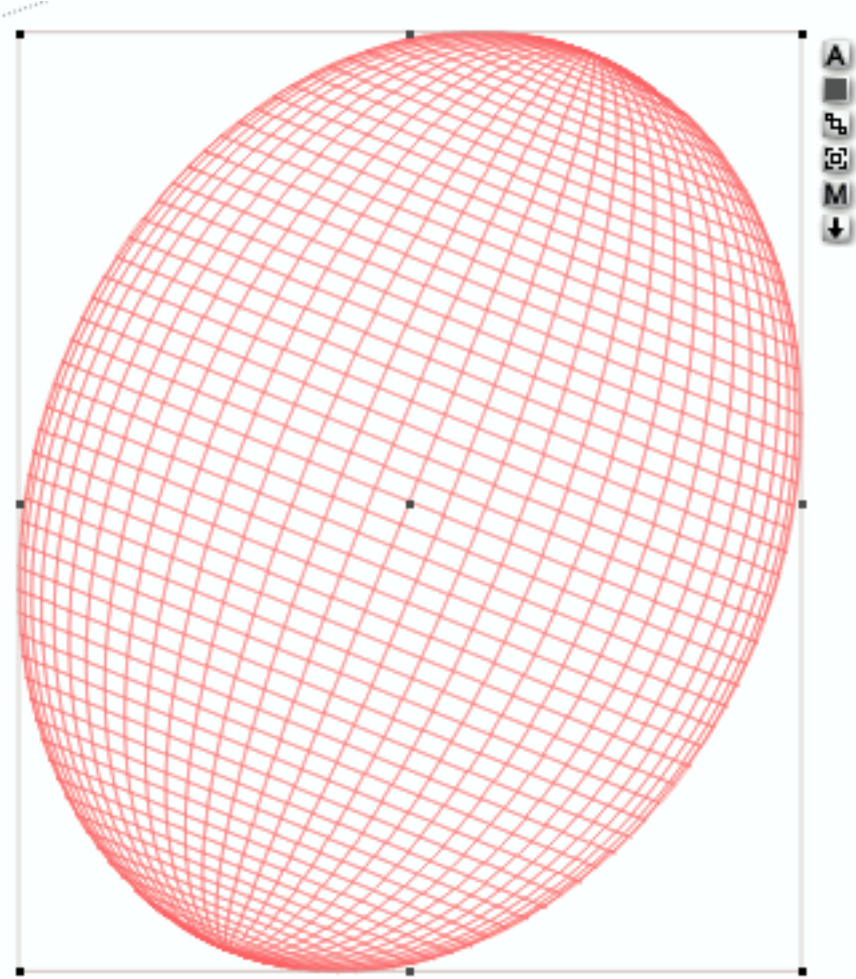


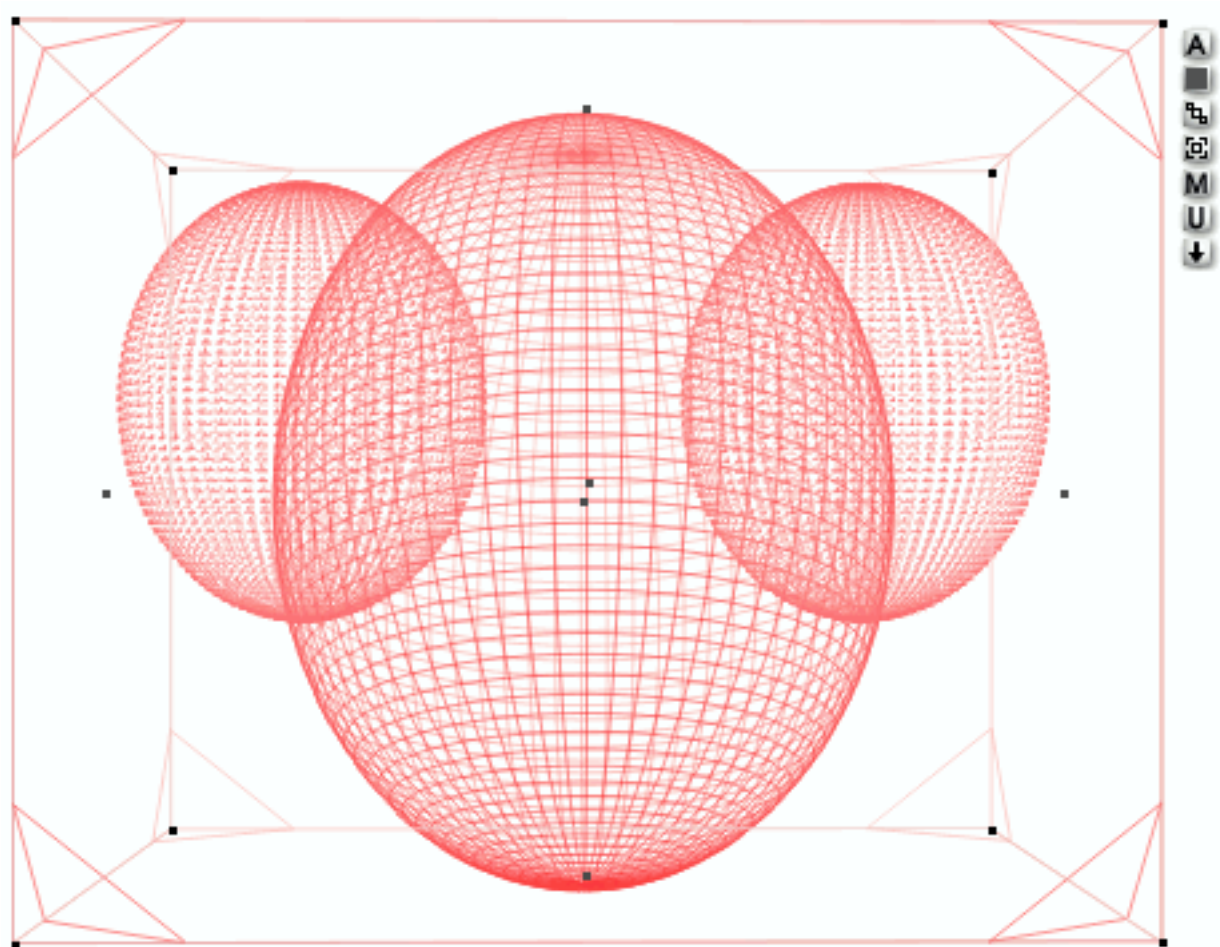
Figure 34: How big is this Bryce file? The fully articulated creepy insect is 3.5 MB.

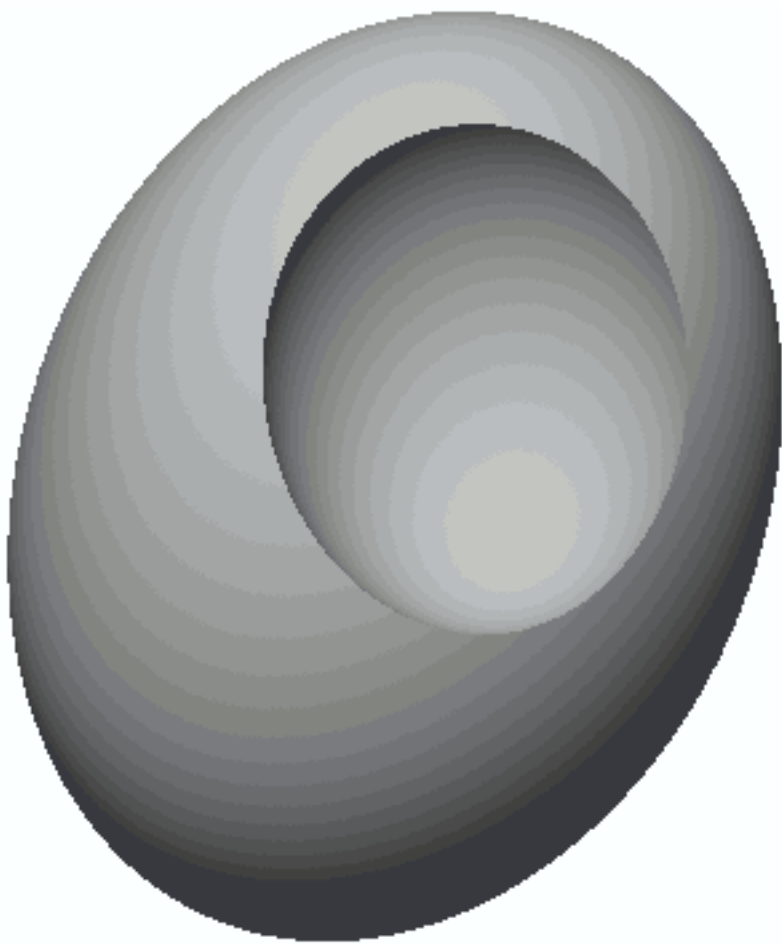


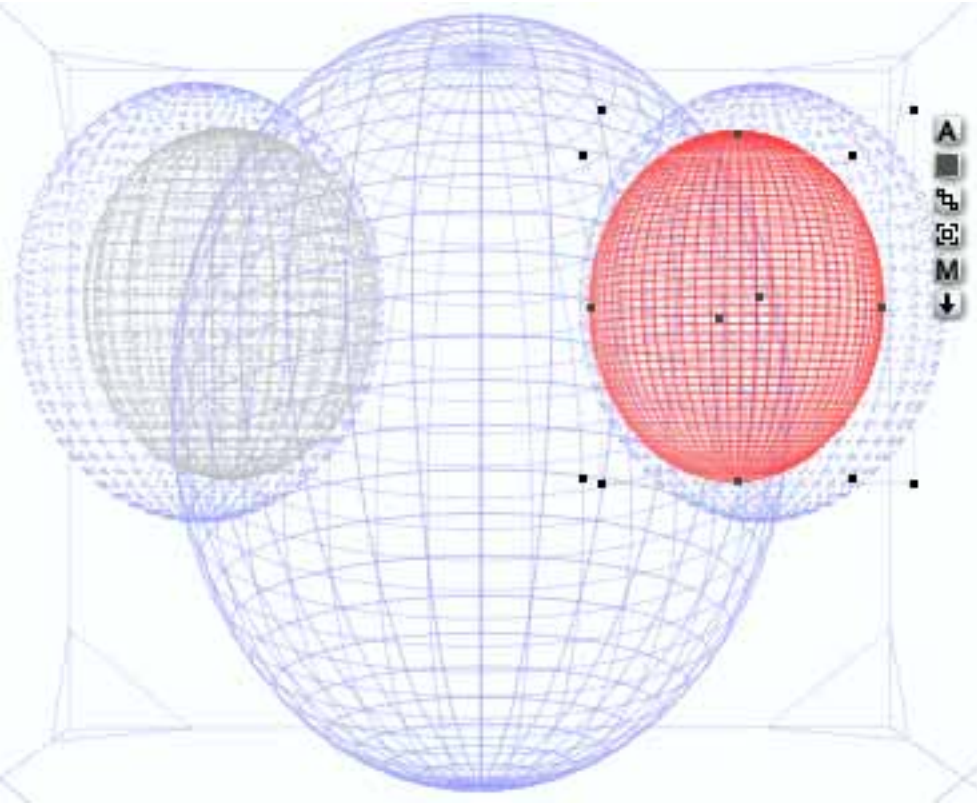


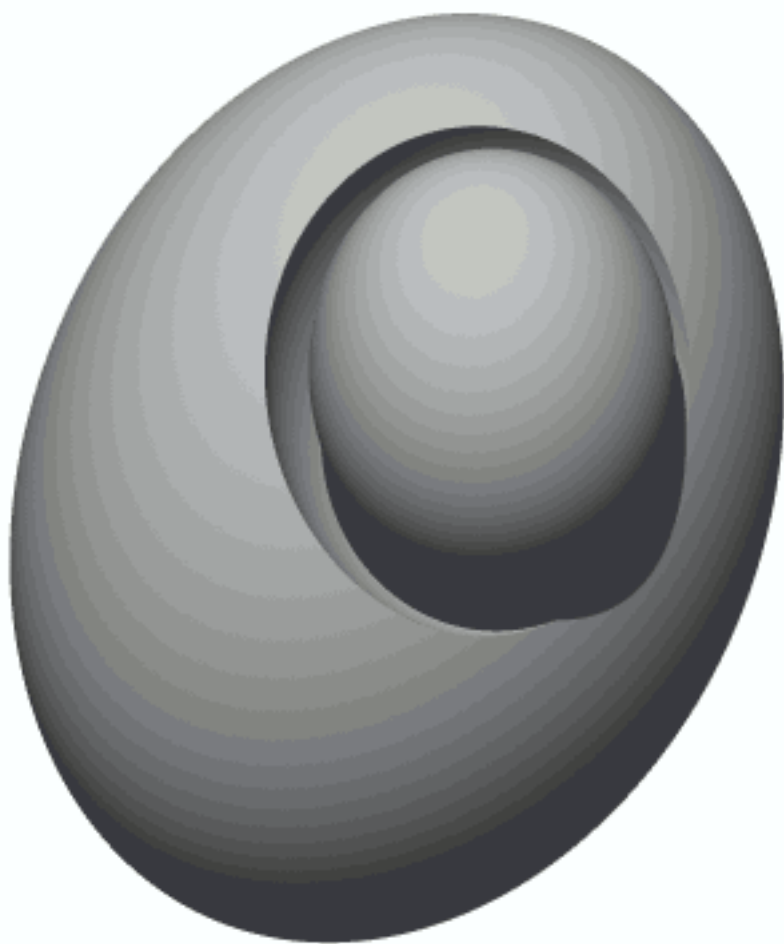












Elevation

Filtering

Pictures

Size

Hard

Flow

Level

Grid



Brush Behavior

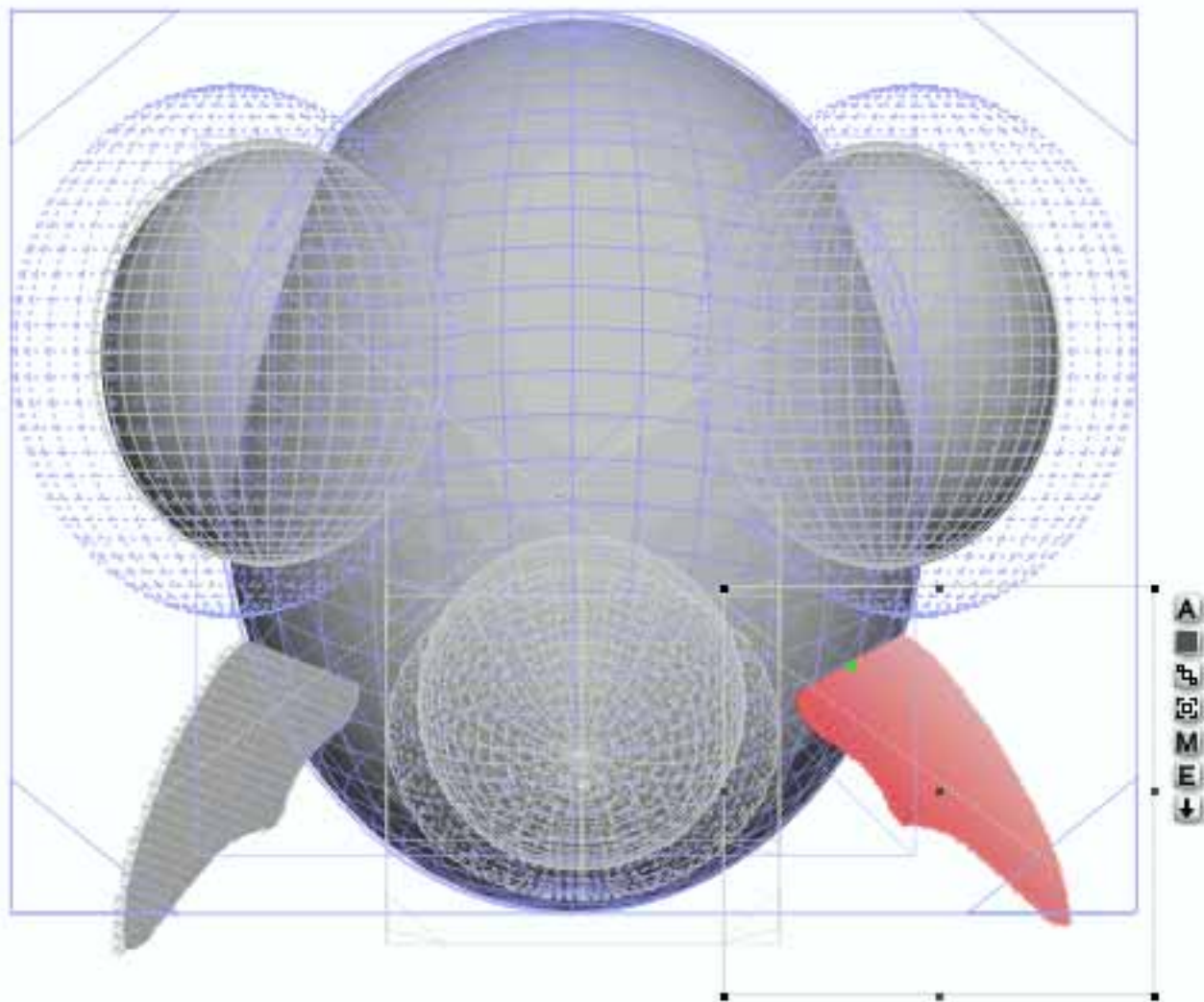
Elevation

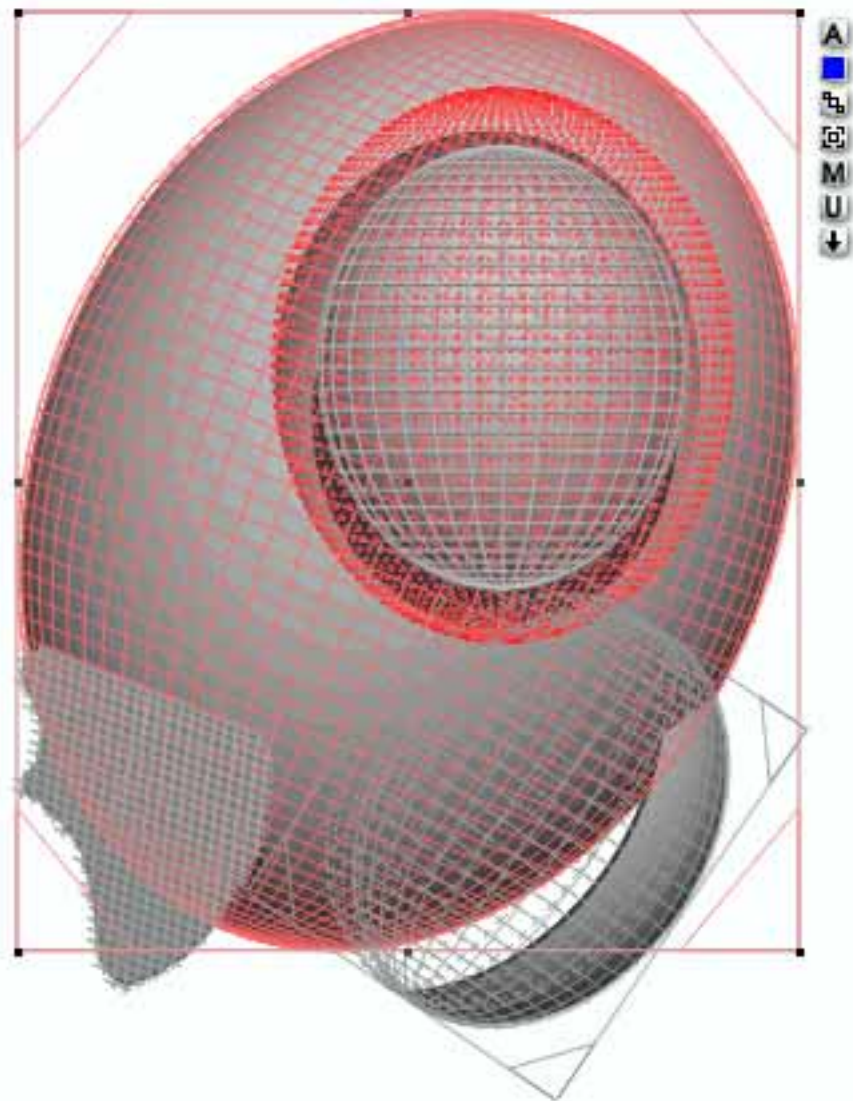
Export

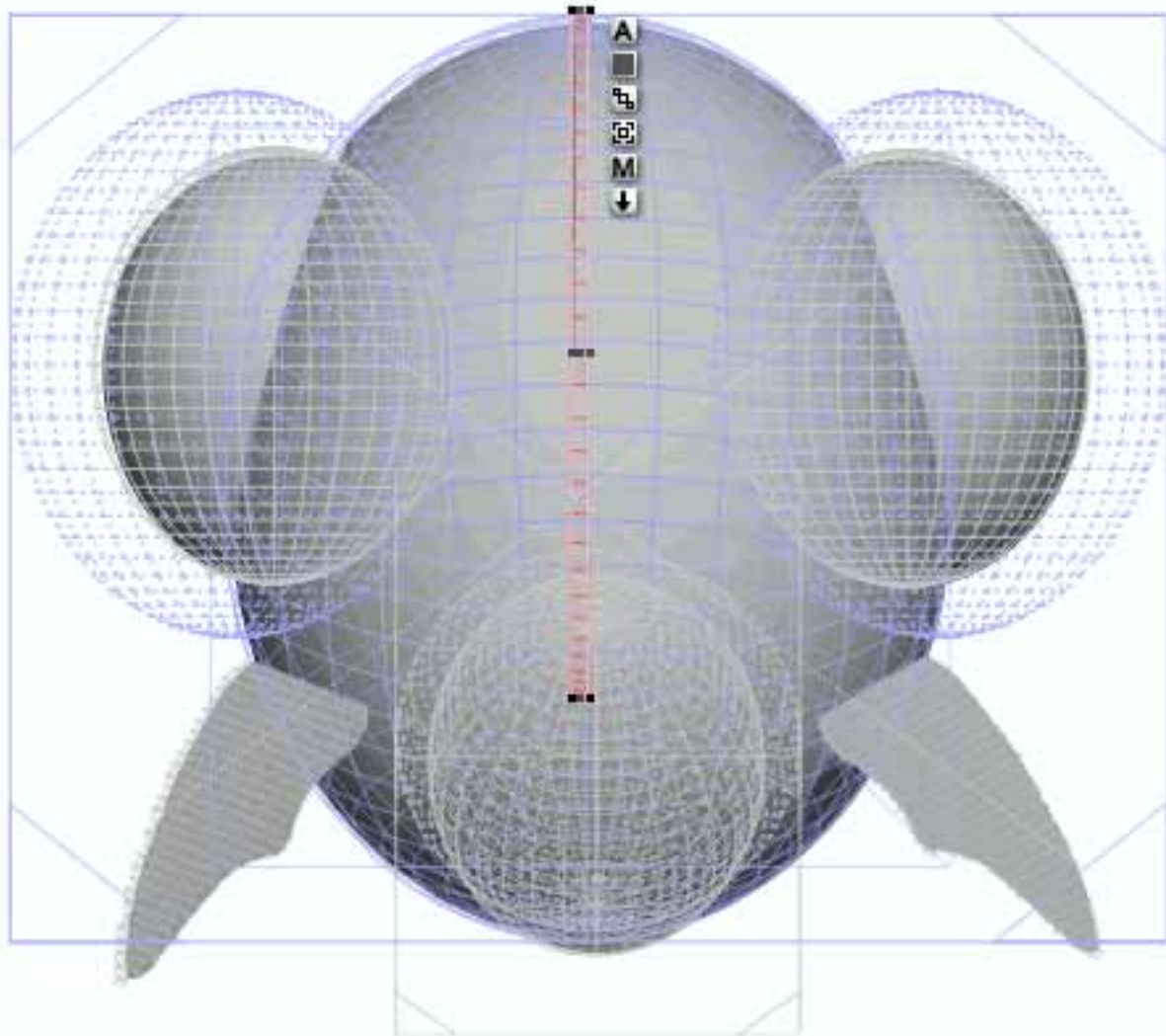
Zoom Area

Crop Fit









Size



Hard



Flow



Level



Grid



Brush Behavior ▾

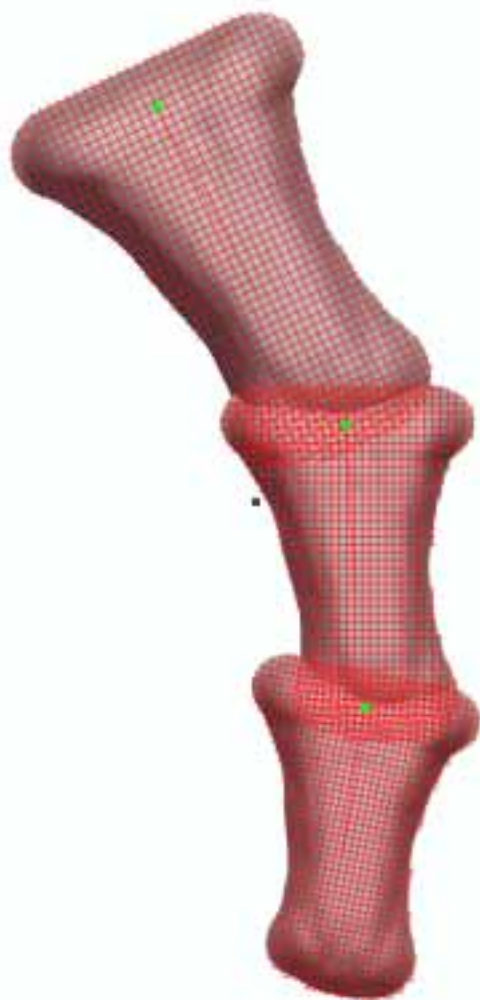
Elevation

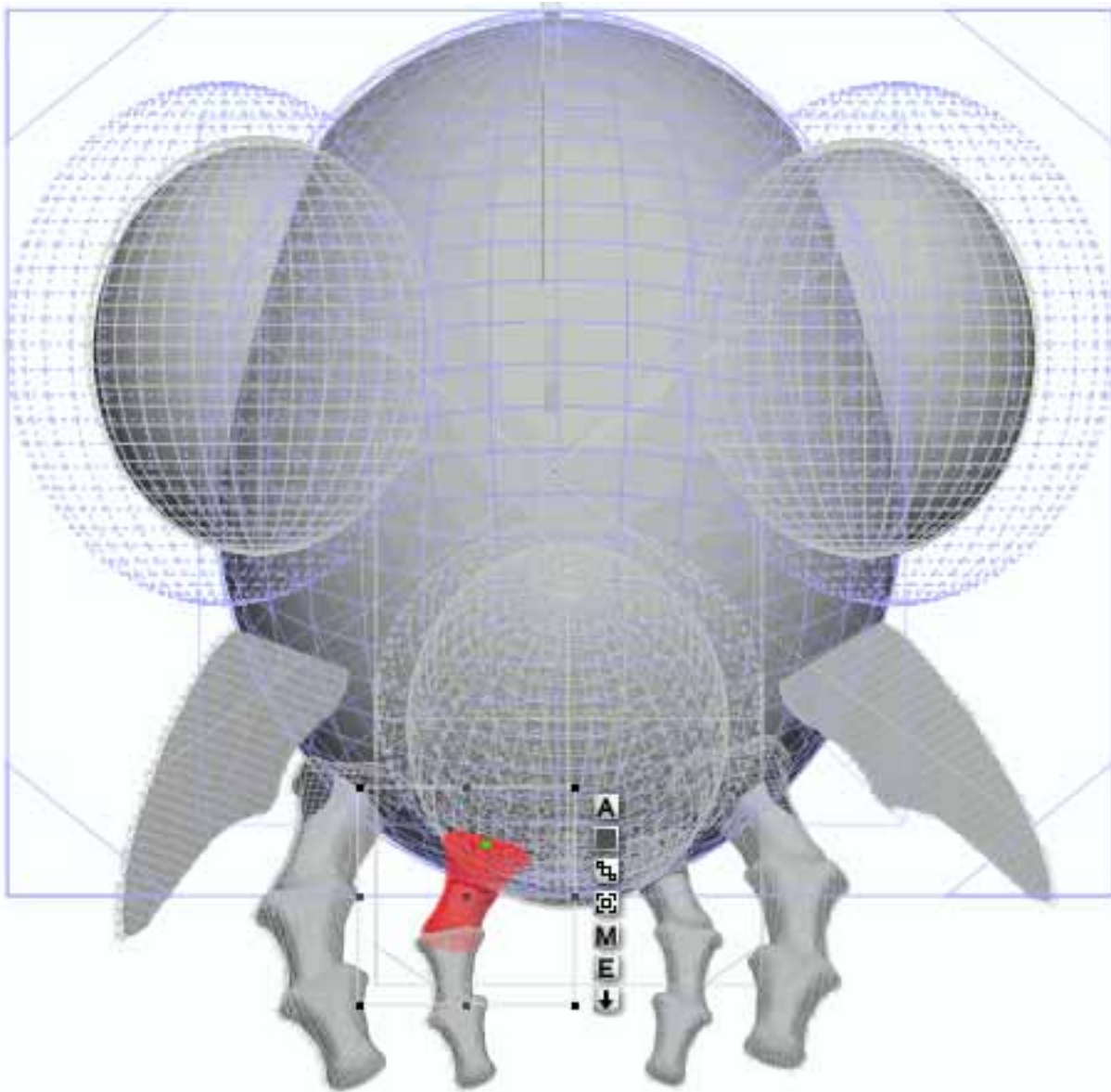
Export

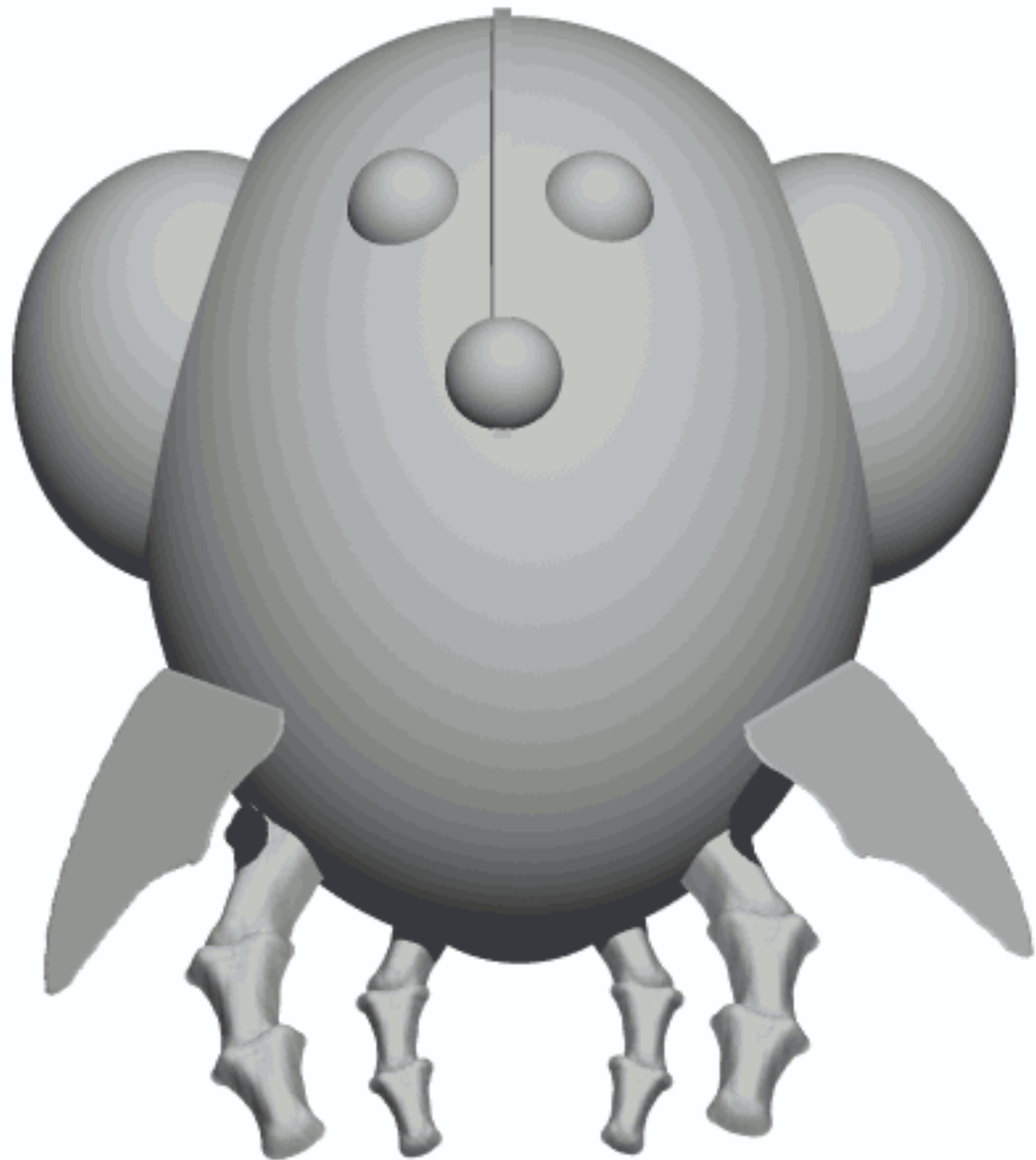
● Zoom Area

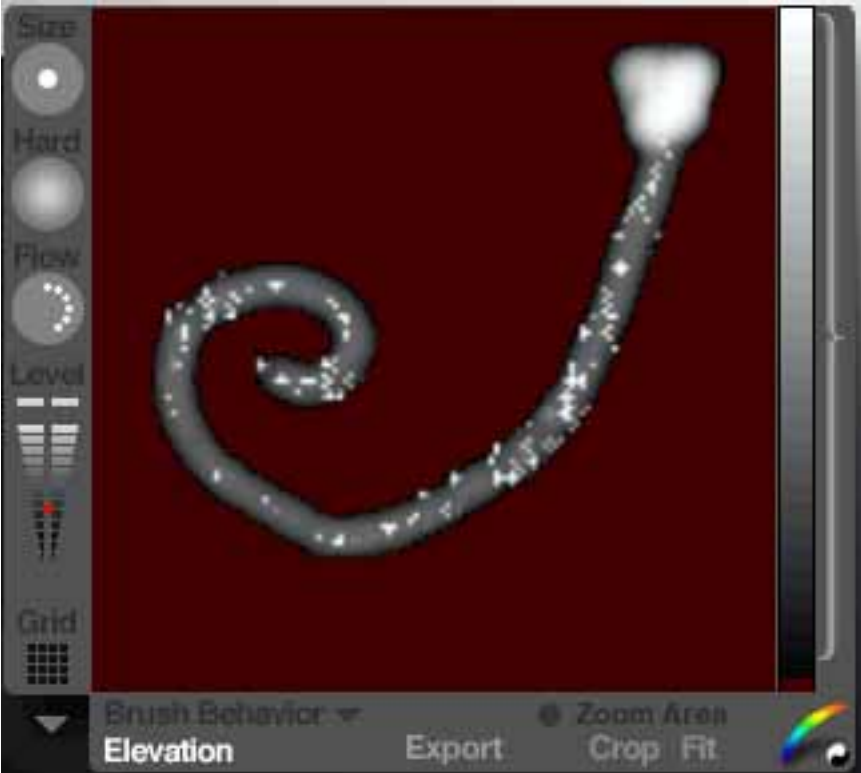
Crop Fit

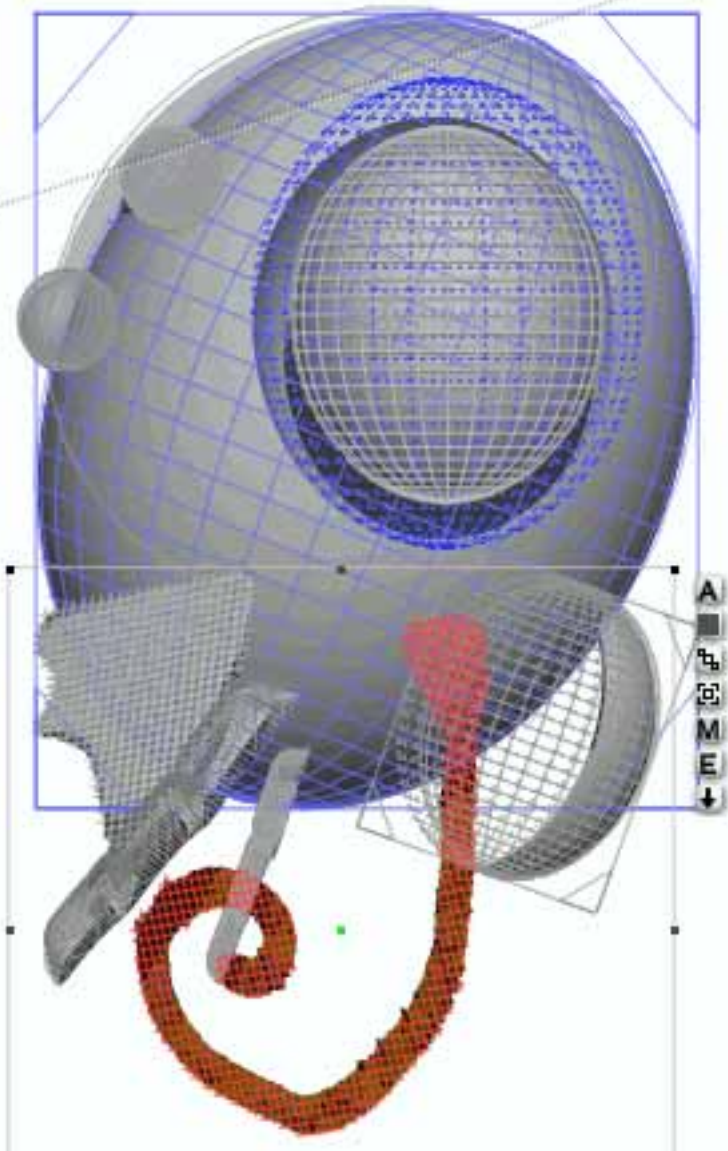


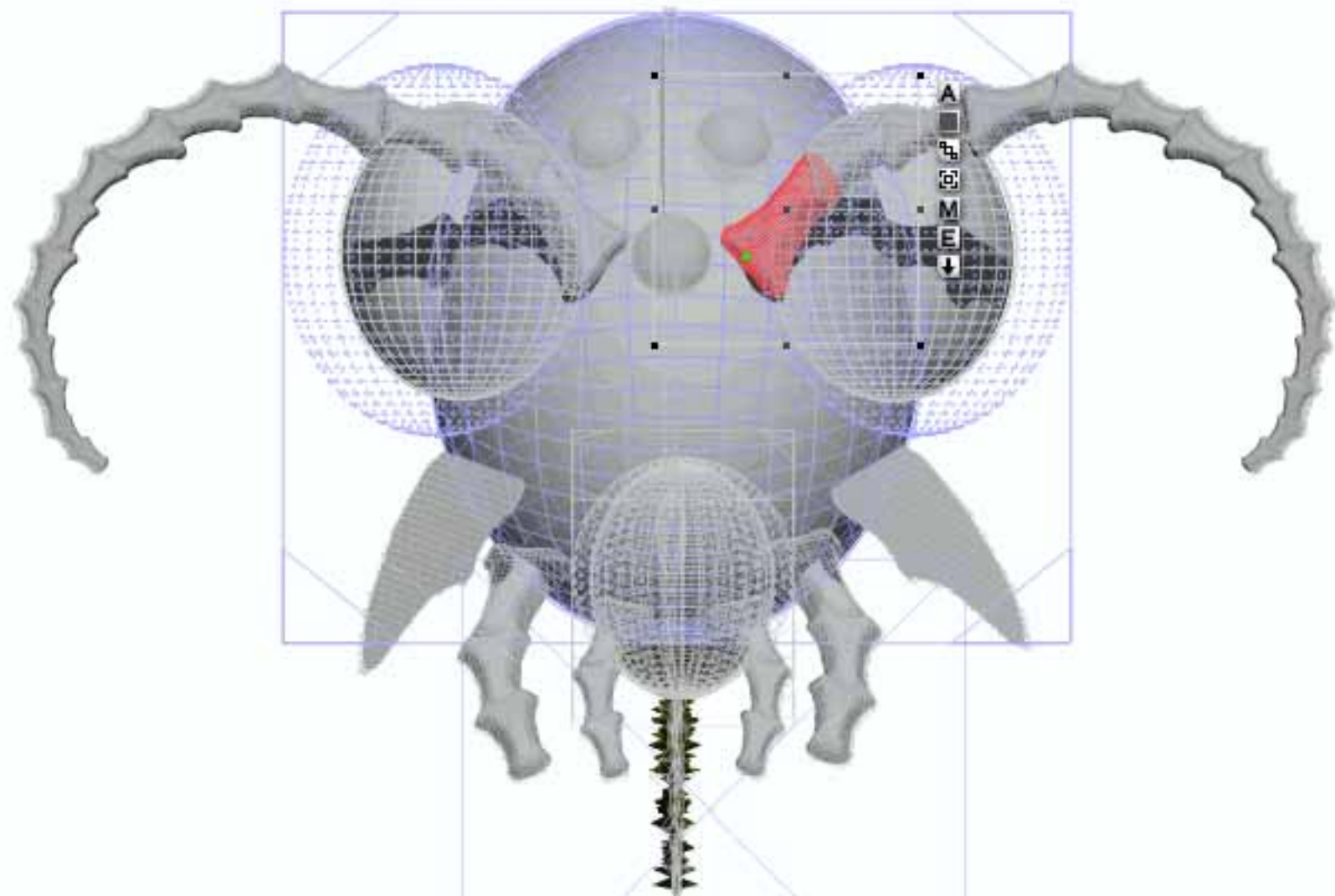


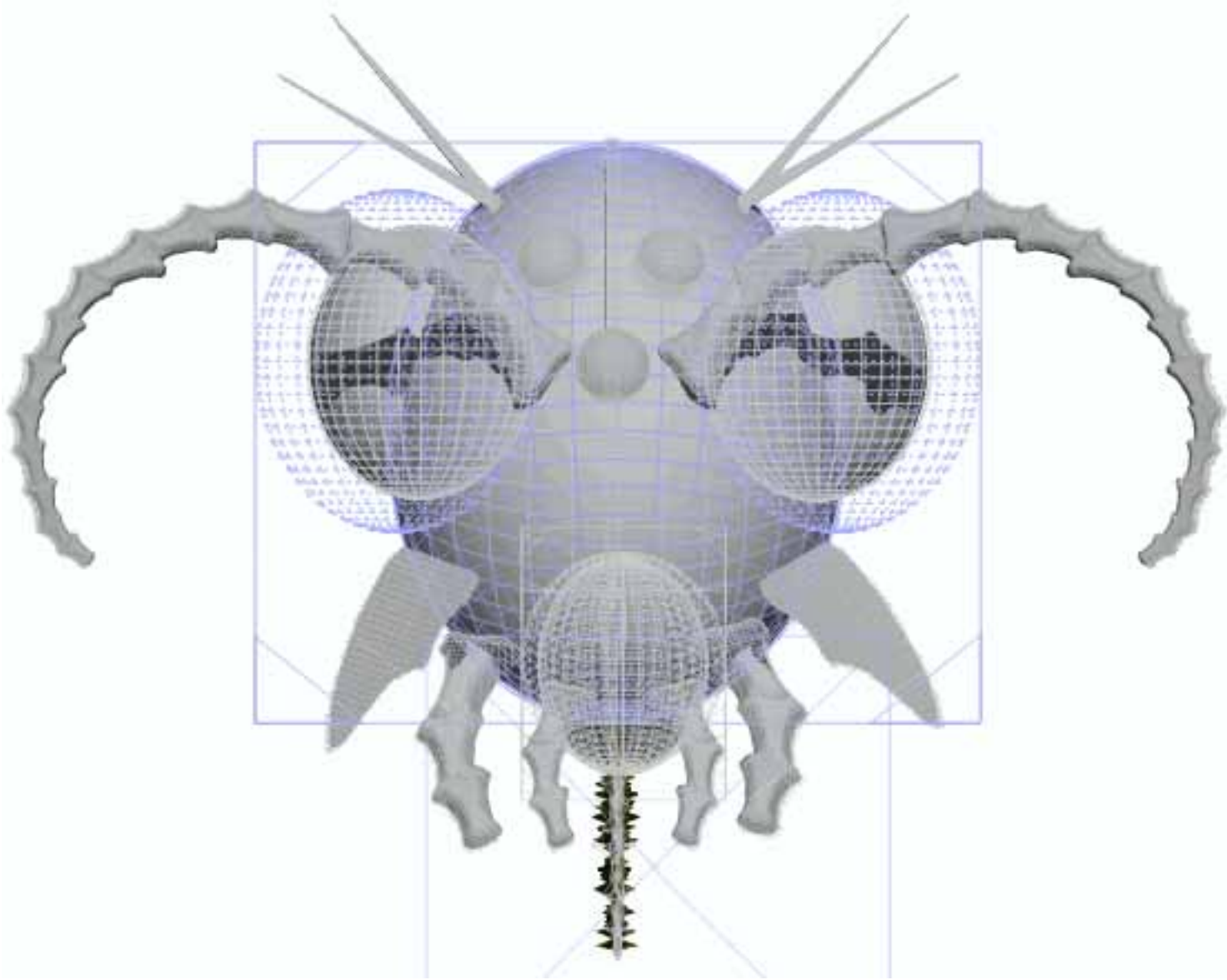












Size



Hard



Flow



Level



Grid



Brush Behavior ▾

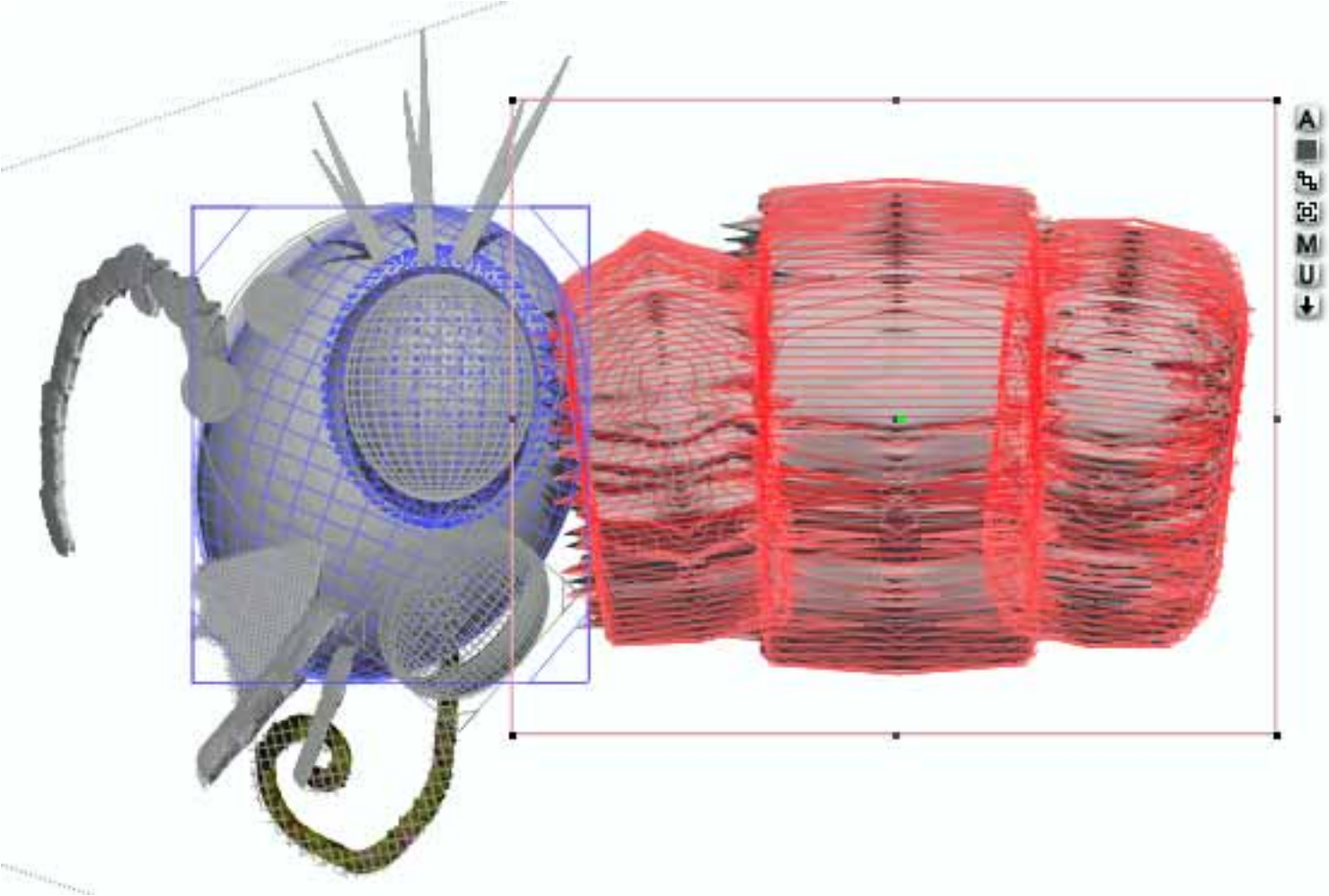
Elevation

Export

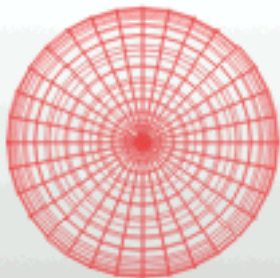
Zoom Area

Crop Fit





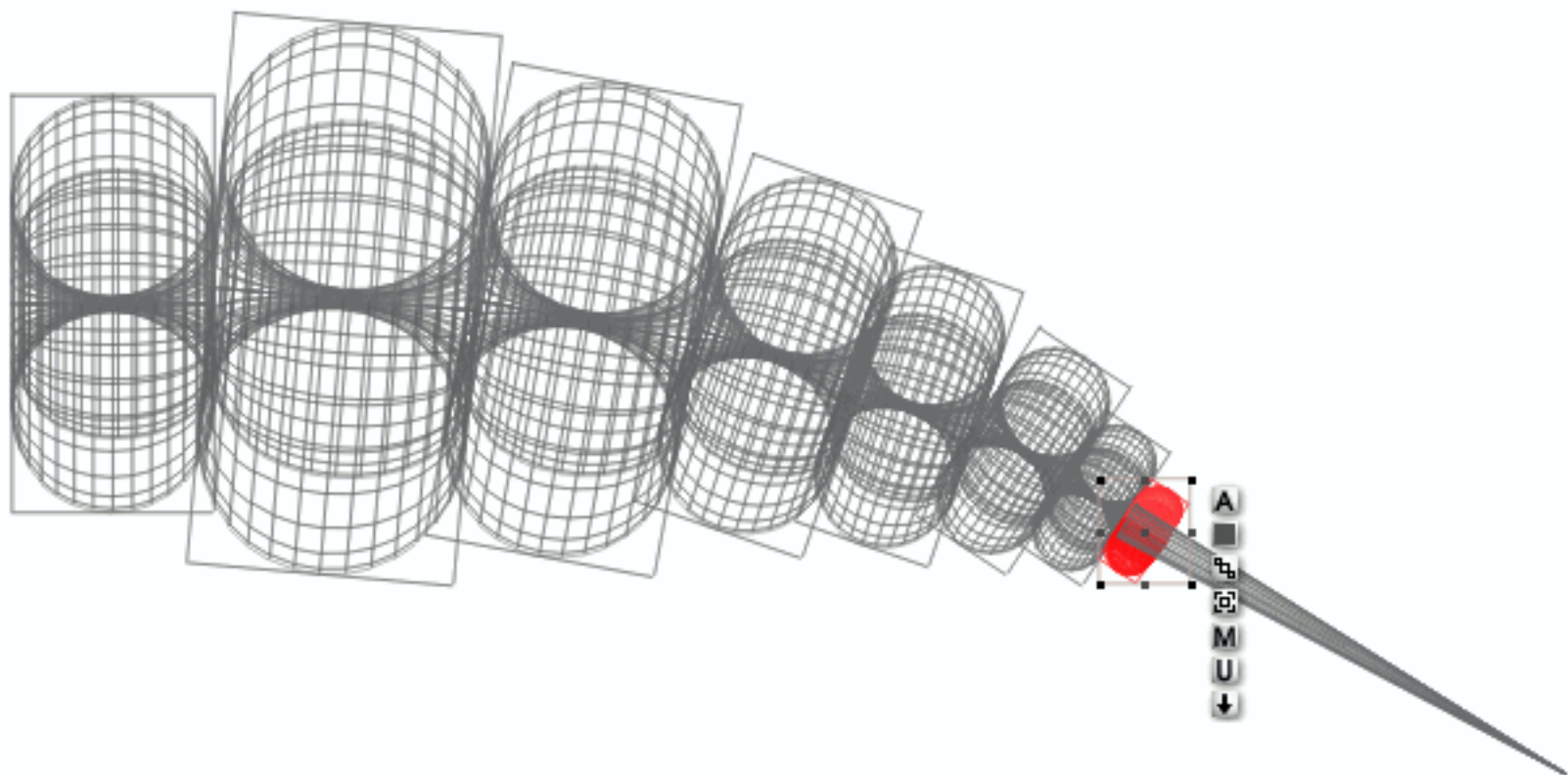
Edit Torus

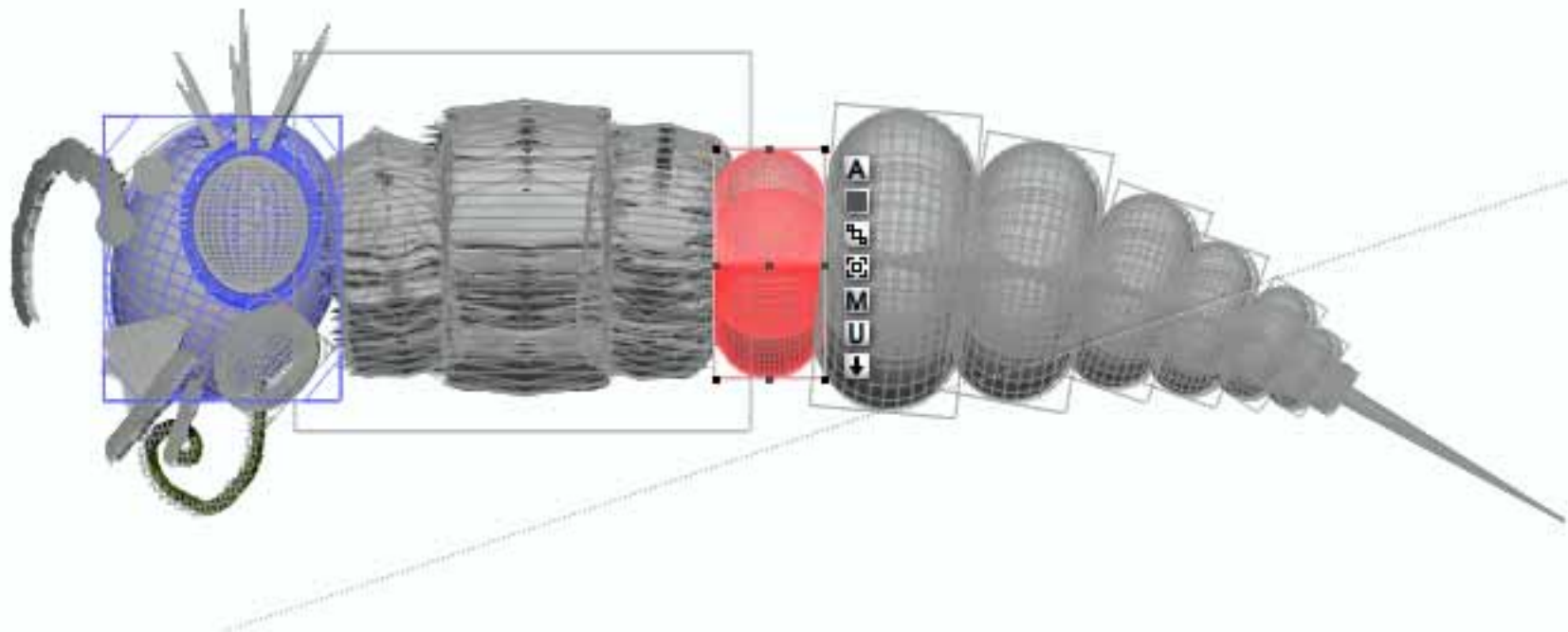


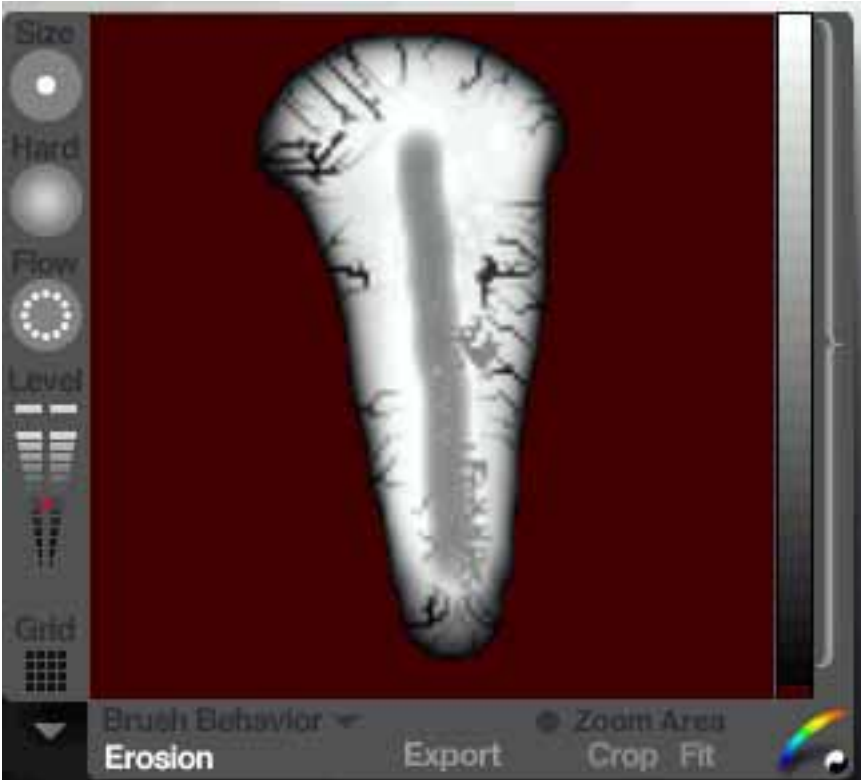
530

Radius

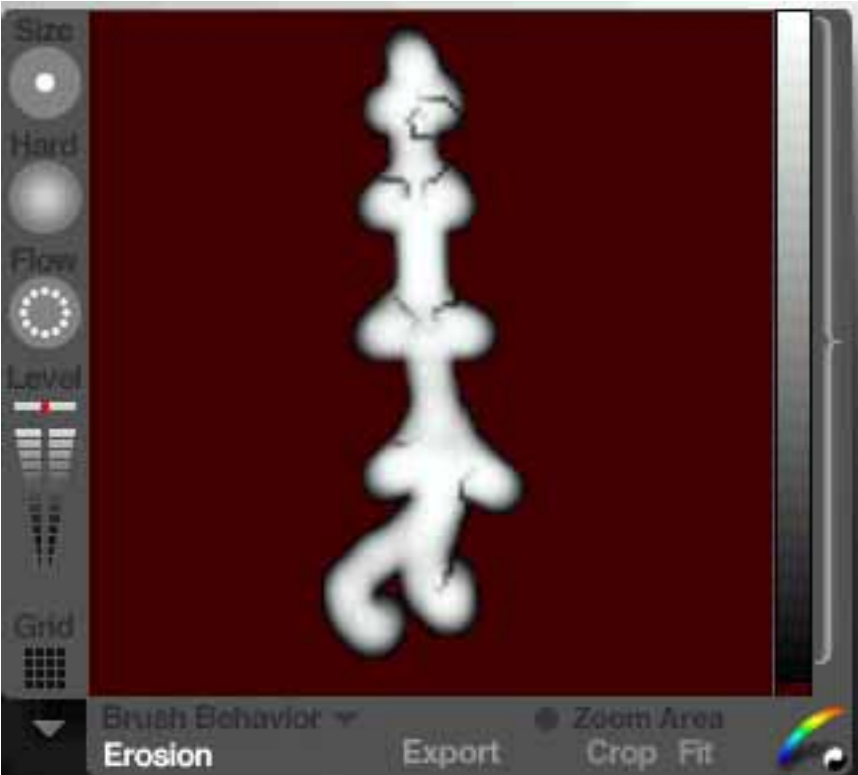


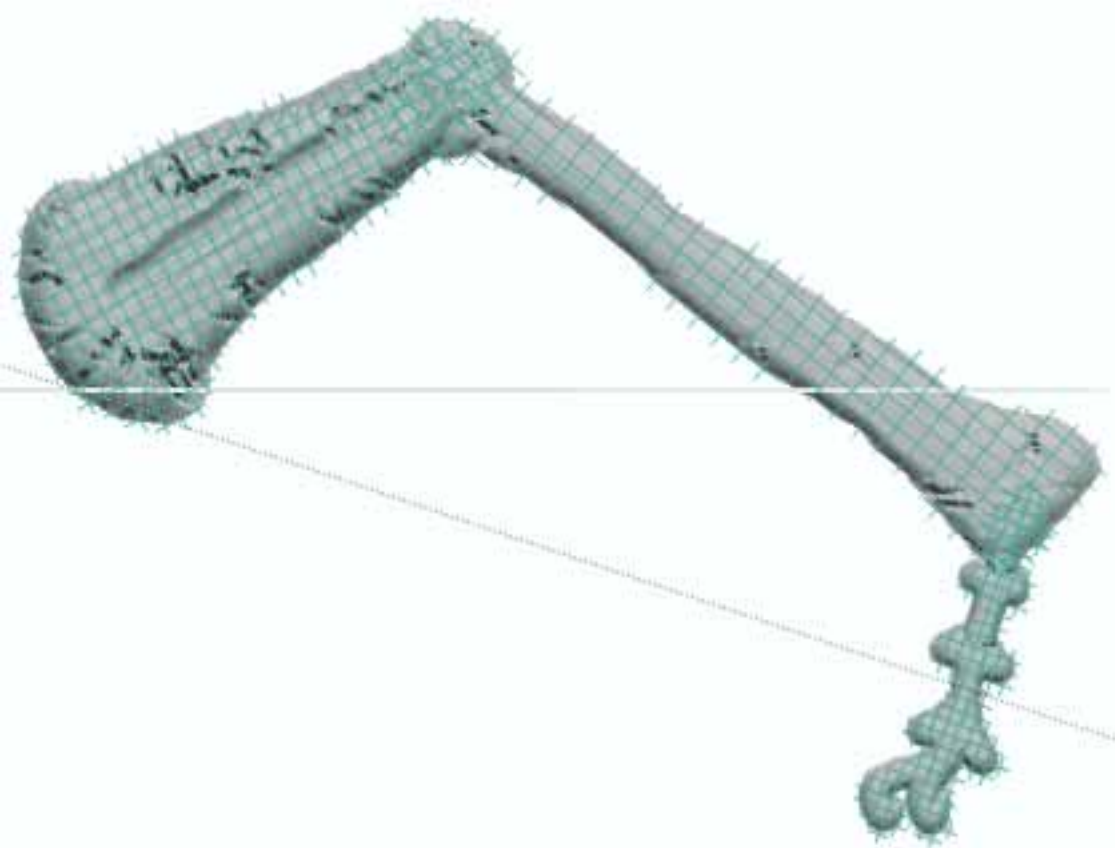


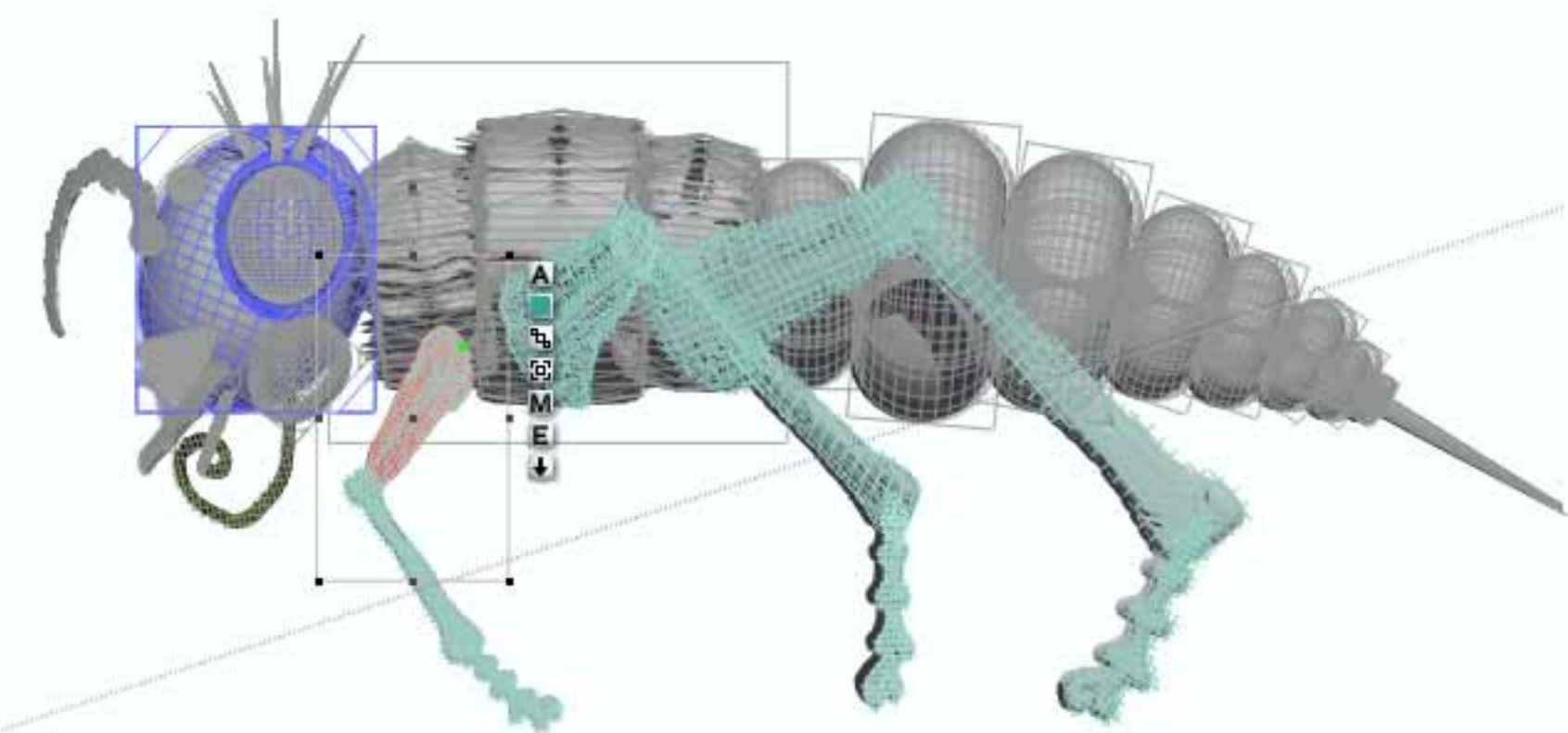


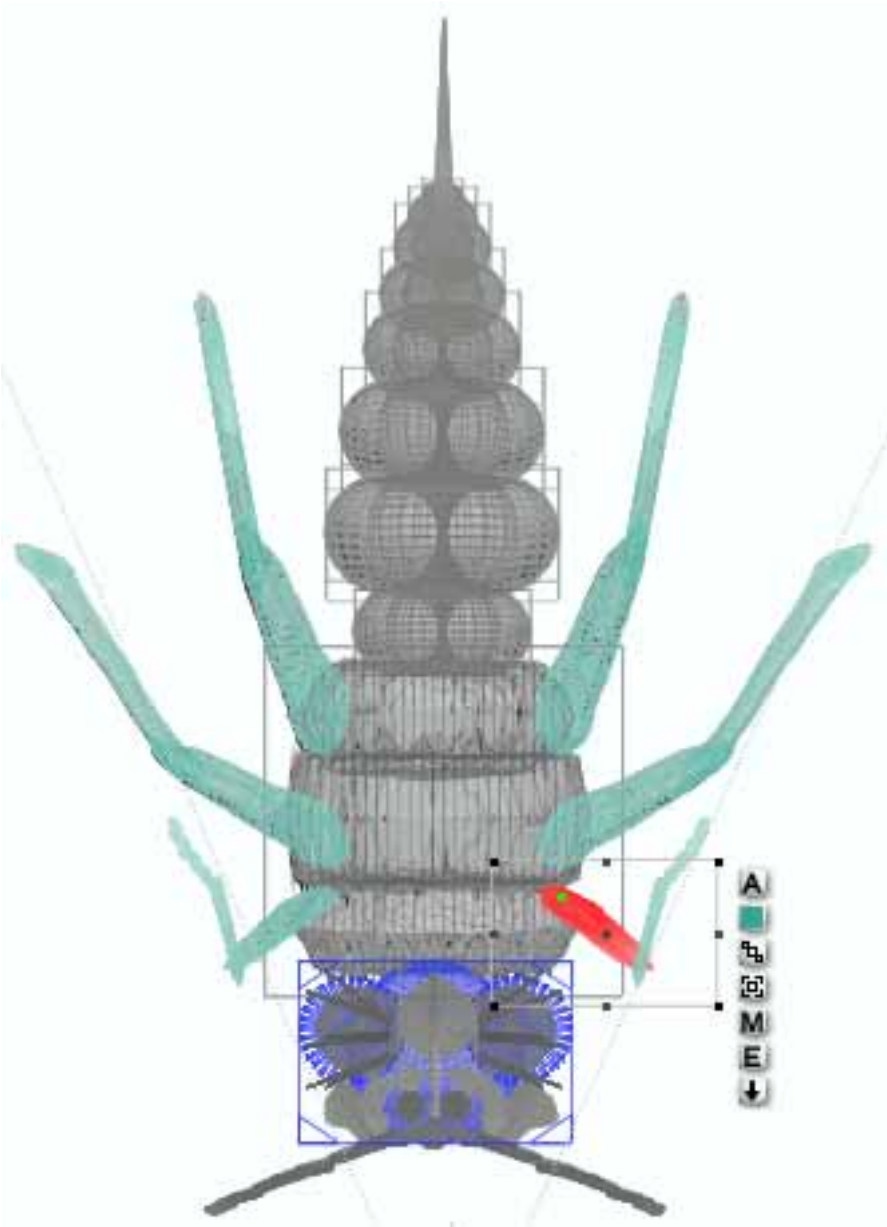


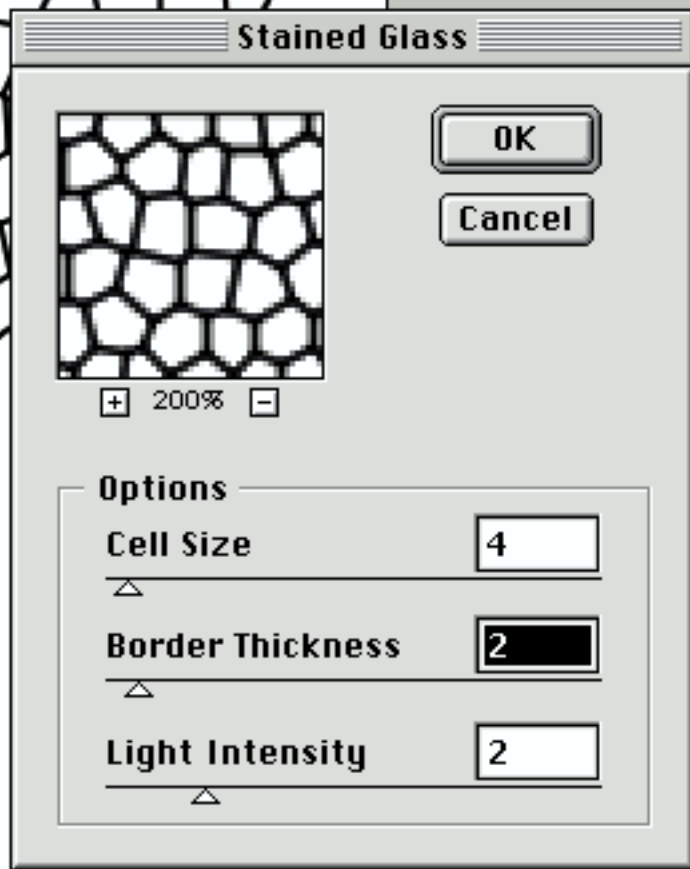
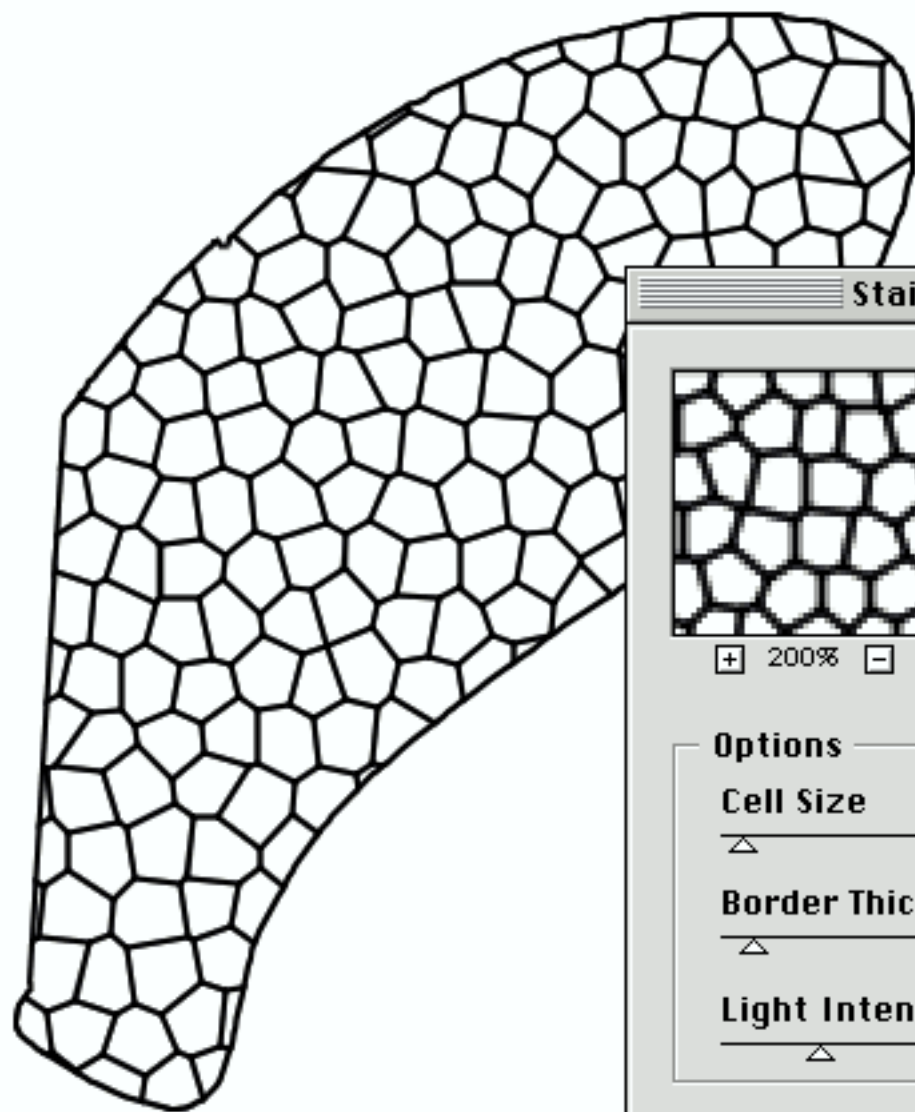












Elevation

Filtering

Pictures

Load



Copy

Paste

Load



Copy

Paste



Blend

Apply

Size



Hard



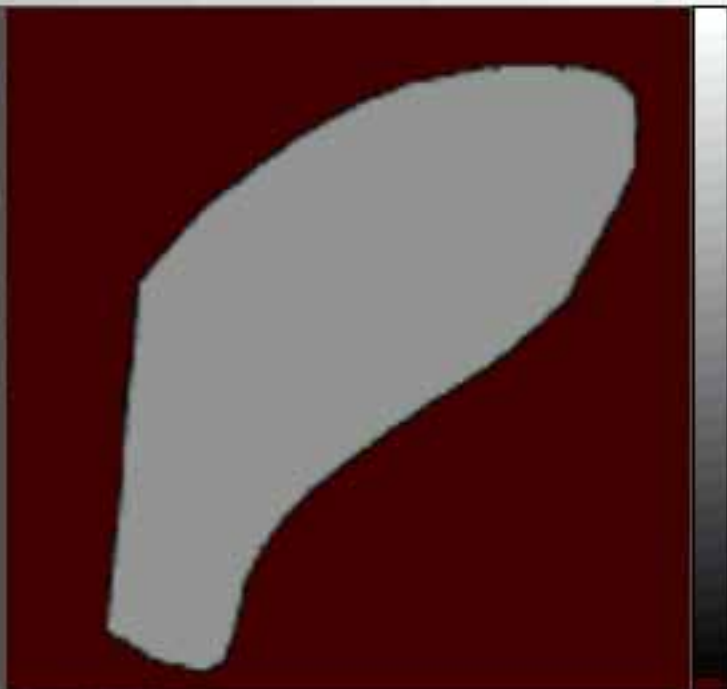
Flow



Level



Grid



Brush Behavior

Erosion

Export

Zoom Area

Crop Filt



