Visualizing Palaeontology
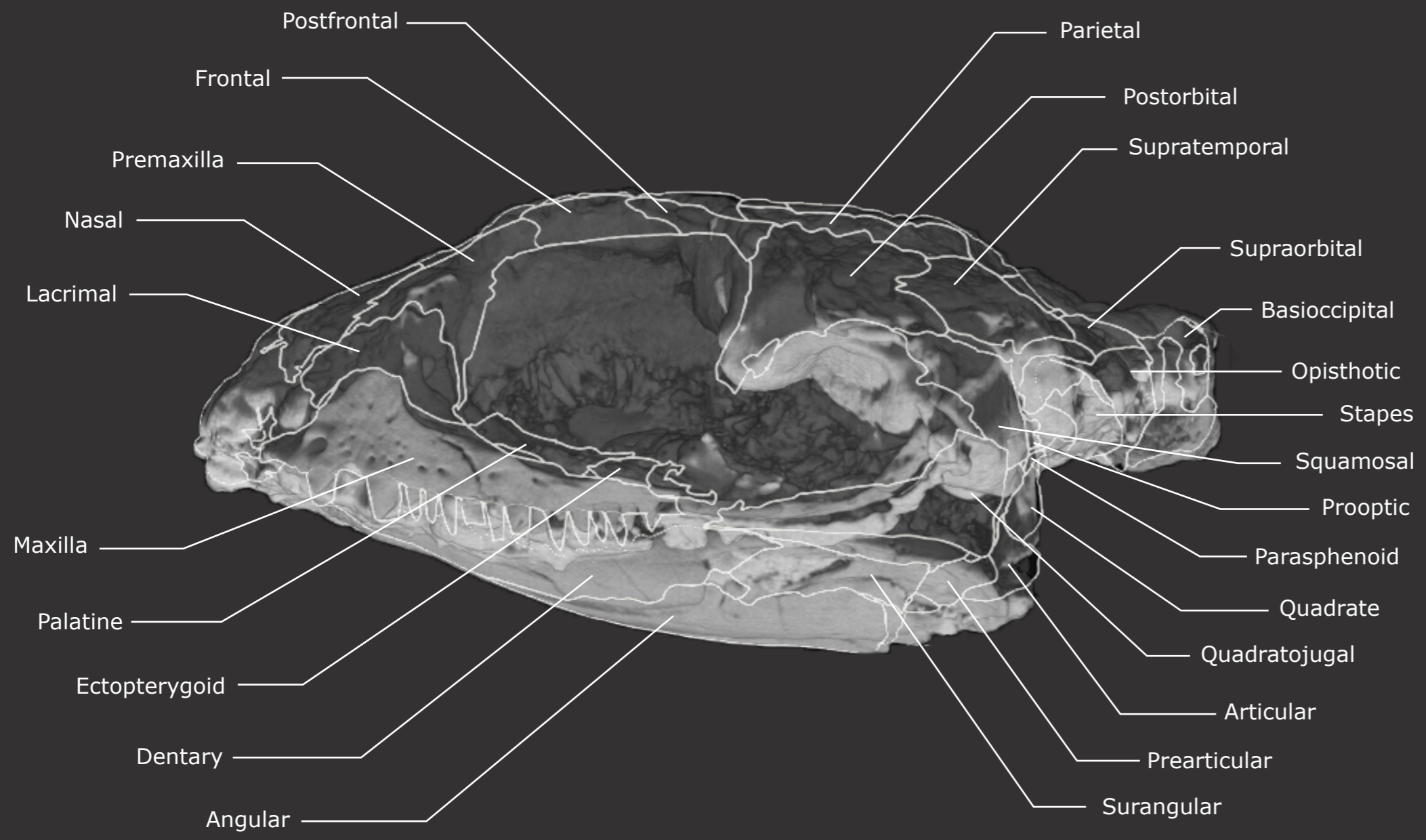
3D reconstruction of a vertebrate fossil cranium using CT data and the development of a model-viewing user interface for vertebrate palaeontologists

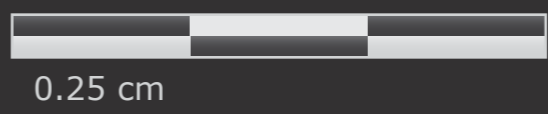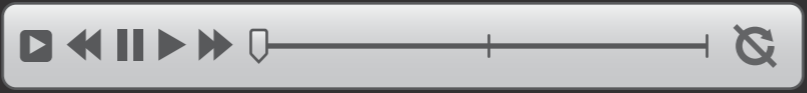# "PaleoScope"

Graphical User Interface

Agnes Chan
996132340
MSC2008H
11 December 2012

Enter search here   Search

When a label is "on", it will appear in the viewport only when the labelled component is visible.

The orientation cube matches the orbit position of the model. The user may rotate the model by click-dragging the model or the cube

Postfrontal
Frontal
Premaxilla
Nasal
Lacrimal
Maxilla
Palatine
Ectopterygoid
Dentary
Angular
Surangular

Parietal
Postorbital
Supratemporal
Supraorbital
Basioccipital
Opisthotic
Stapes
Squamosal
Prooptic
Parasphenoid
Quadrate
Quadratojugal
Articular
Prearticular

When the model is zoomed in/out, the scale icon does not change in size, but the number adjusts accordingly

0.25 cm

Dialogue box

[Component Name]
(Preset)
(Preset)
(Preset)
(Preset)

Components   Info

F. Oklahomensis
Cheek   100%
— Premaxilla   100%
— Maxilla   100%
— Lacrimal   100%
— Prefrontal   100%
— Postfrontal   100%
— Postorbital   100%
— Jugal   100%
— Squamosal   100%
— Quadrojugal   100%
— Quadrate   100%
Skull table   100%
— Nasal   100%
— Frontal   100%
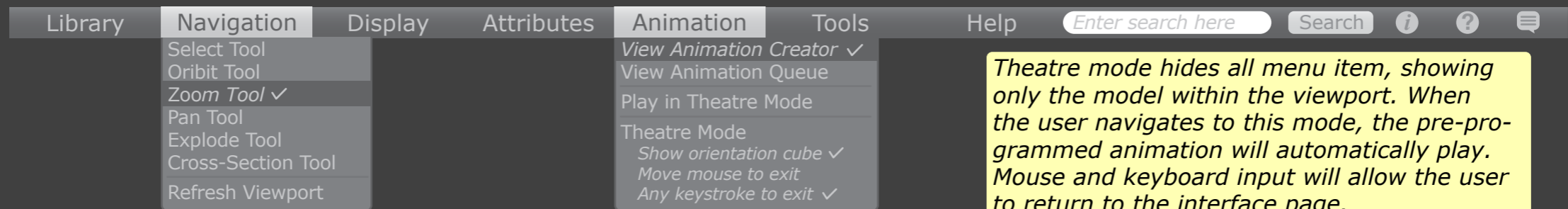— Parietal   100%
— Palate
Occiput   100%
Lower Jaw   100%

Animation Creator   Animation Queue

New animation

Animation type
Timing   5 sec

Option...
Edit option   ...

Save to queue

Top Drop-Down Menu

| Library | Navigation | Display | Attributes | Animation | Tools | Help | Enter search here | Search | *i* | ? | 💬 |

Library
- Open library
- User login
- User library
- Upload model to library

Attributes

Colour presets
- Single colour ✓
- Group colour
- Individual colour
- Customize...

Opacity presets
- All opaque ✓
- All 50%
- External 50%
- Customize...

Labels presets
- Show visible labels ✓
- Hide all labels
- Label these groups ▸
- Customize...

Explode presents
- Explode all ✓
- No explode all
- Explode these groups ▸
- Customize...

Label these groups submenu:
- Cheek
- Skull table
- Palate
- Occiput
- Lower Jaw

Explode these groups submenu:
- Cheek
- Skull table
- Palate
- Occiput
- Lower Jaw
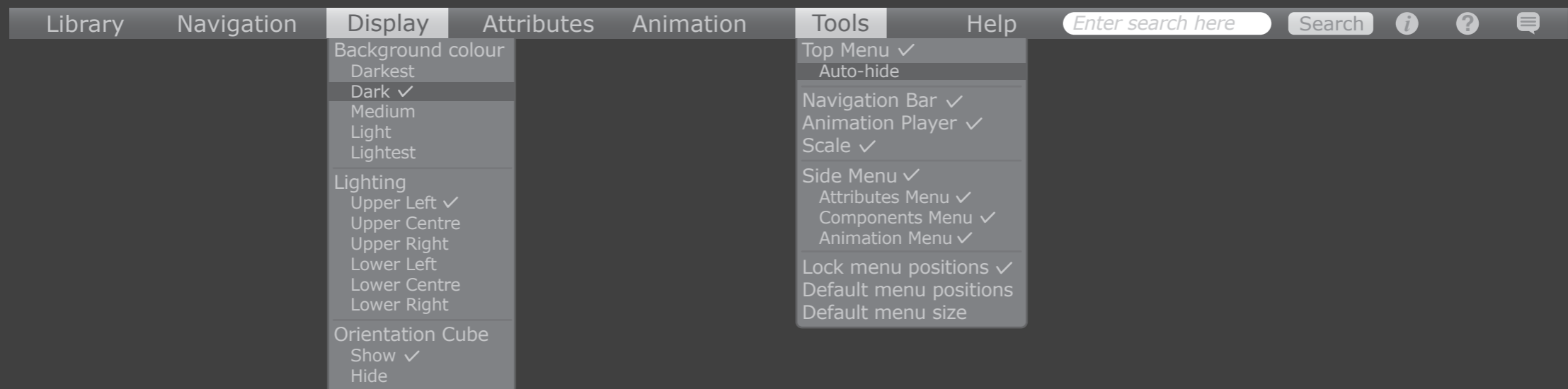
Help
- About this interface
- Open User Manual
- Contact developer

Clicking on any of the Help menu options will navigate away from the interface application page to the appropriate support page. A warning will appear, and the user must confirm to proceed.

| Library | Navigation | Display | Attributes | Animation | Tools | Help | Enter search here | Search | *i* | ? | 💬 |

Navigation
- Select Tool
- Oribit Tool
- *Zoom Tool* ✓
- Pan Tool
- Explode Tool
- Cross-Section Tool
- Refresh Viewport

Animation
- *View Animation Creator* ✓
- View Animation Queue
- Play in Theatre Mode
- Theatre Mode
  - Show orientation cube ✓
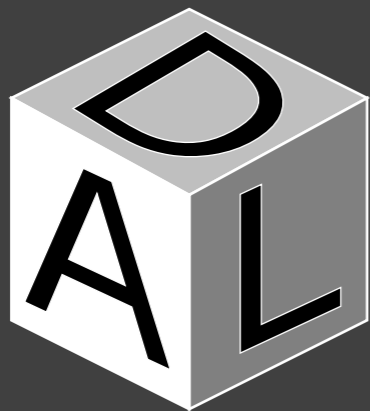 - *Move mouse to exit*
  - *Any keystroke to exit* ✓

Theatre mode hides all menu item, showing only the model within the viewport. When the user navigates to this mode, the pre-programmed animation will automatically play. Mouse and keyboard input will allow the user to return to the interface page.
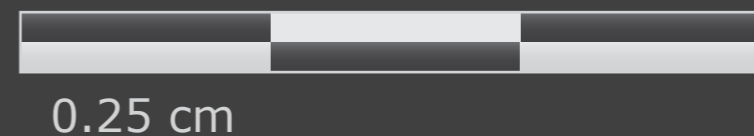

| Library | Navigation | Display | Attributes | Animation | Tools | Help | Enter search here | Search | *i* | ? | 💬 |

Display
- Background colour
  - Darkest
  - Dark ✓
  - Medium
  - Light
  - Lightest
- Lighting
  - Upper Left ✓
  - Upper Centre
  - Upper Right
  - Lower Left
  - Lower Centre
  - Lower Right
- Orientation Cube
  - Show ✓
  - Hide

Tools
- Top Menu ✓
  - Auto-hide
- Navigation Bar ✓
- Animation Player ✓
- Scale ✓
- Side Menu ✓
  - Attributes Menu ✓
  - Components Menu ✓
  - Animation Menu ✓
- Lock menu positions ✓
- Default menu positions
- Default menu size

Viewport Elements
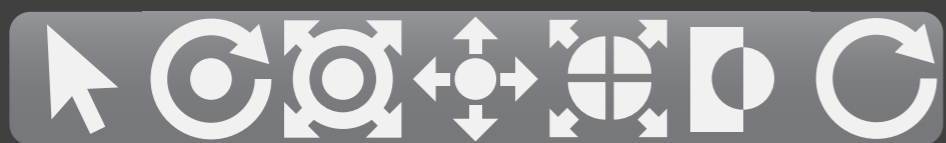
Orientation cube

Scale

0.25 cm
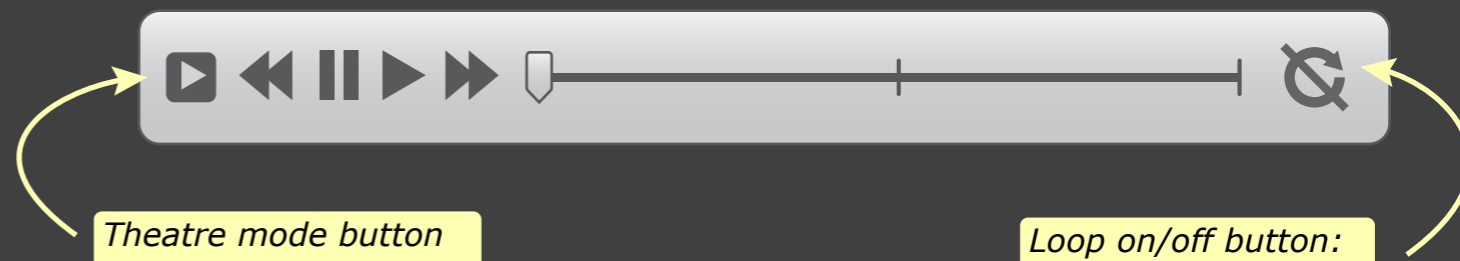
Navigation control

Unselected appearance

Selected appearance

Animation player

Theatre mode button

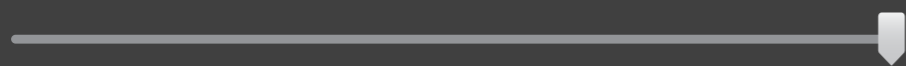Loop on/off button: determines whether the animation stops at the end or loops continuously until paused by the user

Menu Elements

Attributes icons

Menu options submenu

Expand groups
Expand components
Expand all
Collapse all

Show tags ✓
Hide tags

Increase text size
Decrease text size
Default text size

Unselected

Selected

Attributes slider

Menu collapse tab

Menu size adjust tab

Drop-down submenu

(Preset)

(Preset)
Single colour
Group colour
Individual colour
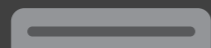
Closed

Opened

Menu scroll bar
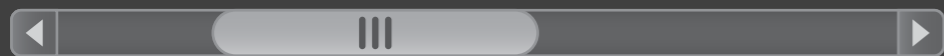
Buttons unselected
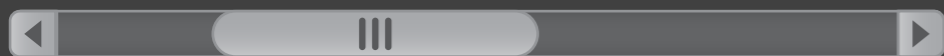
Buttons selected

Menu button
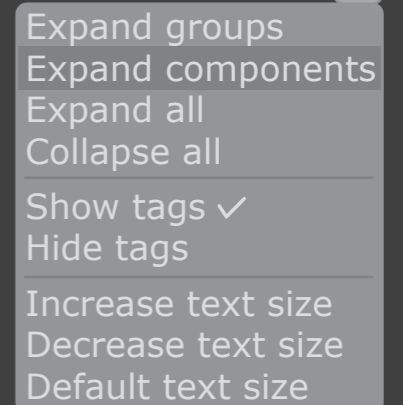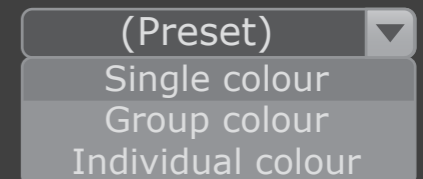
Button

Button

Unselected

Selected

Attributes - Summary Menu

Colour presets

[Component Name] ▼

(Preset) ▼
Single colour
Group colour
Individual colour
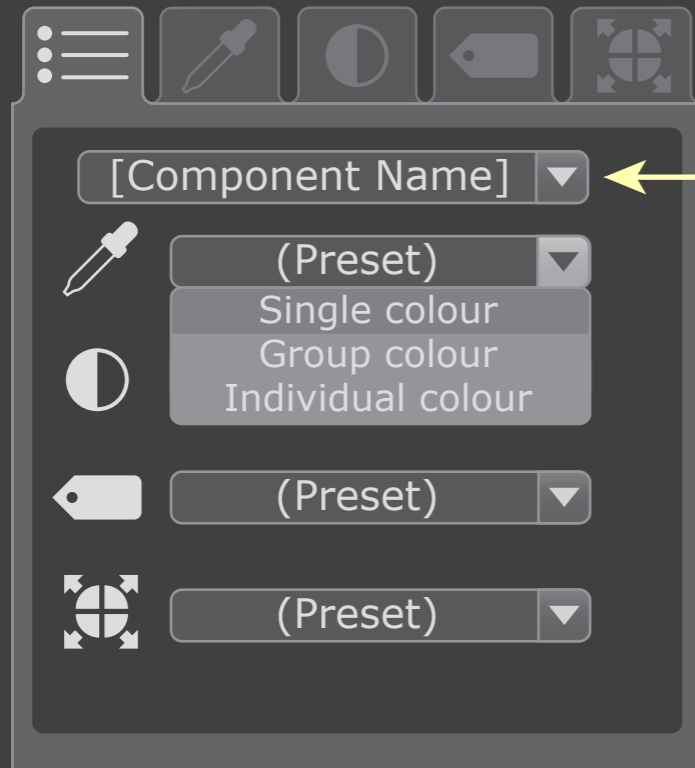
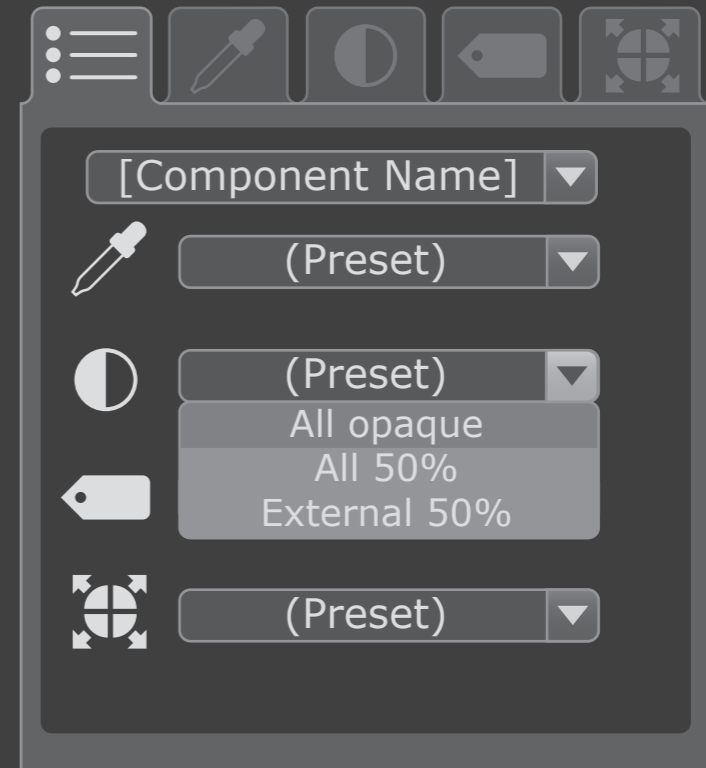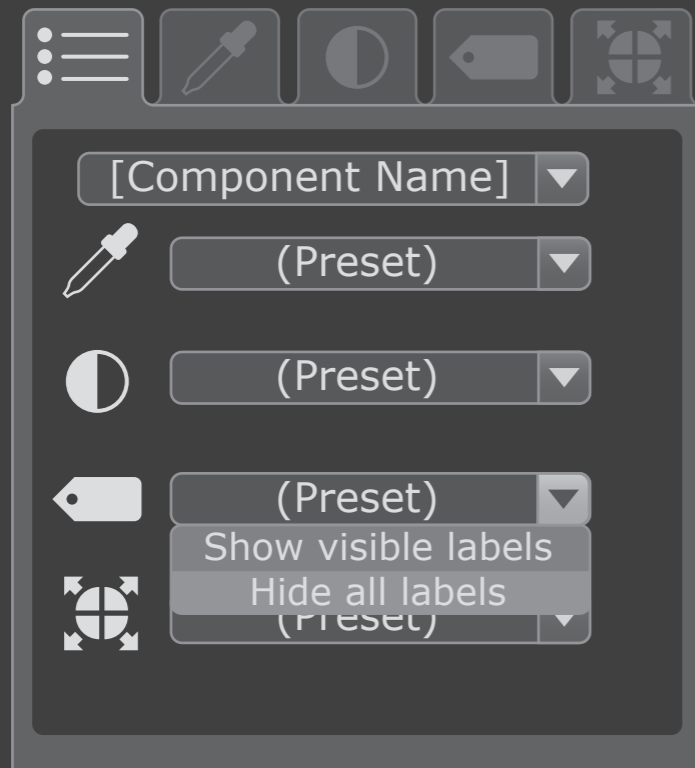(Preset) ▼

(Preset) ▼

The user may change the model component which they are editing at any time.

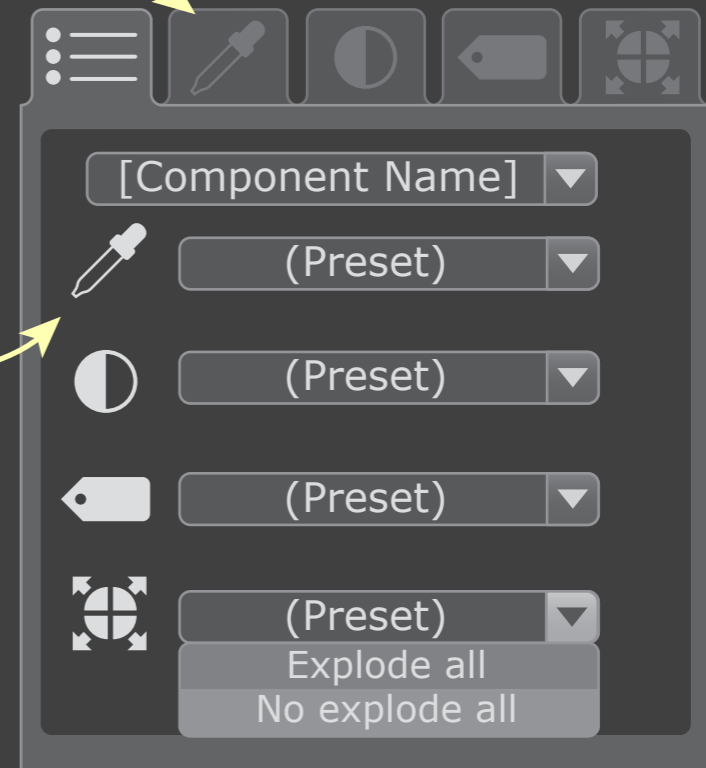*The component that is actively being edited will be highlighted in the Components menu.*

Opacity presets

[Component Name] ▼

(Preset) ▼

(Preset) ▼
All opaque
All 50%
External 50%

(Preset) ▼

Labels presets

[Component Name] ▼

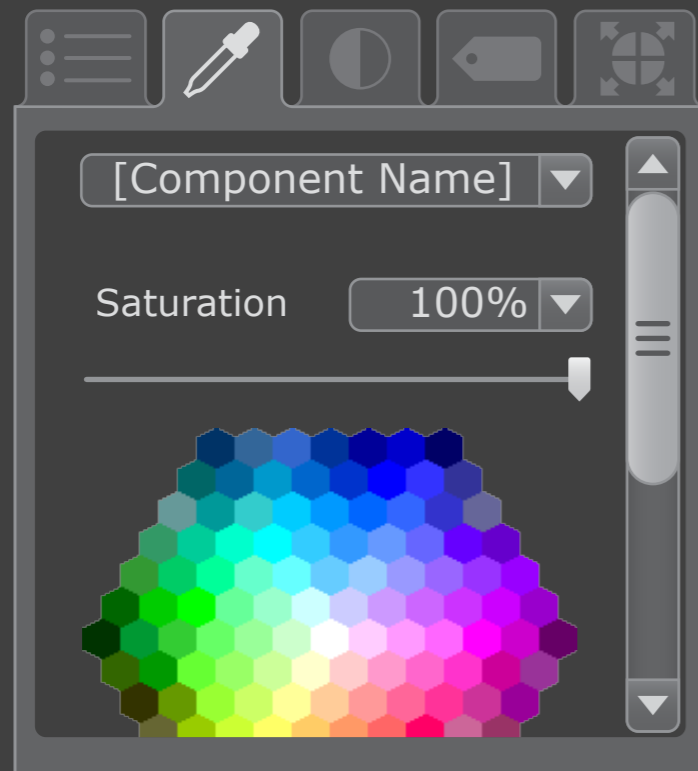(Preset) ▼

(Preset) ▼

(Preset) ▼
Show visible labels
Hide all labels
(Preset)

Double-clicking on either set of icons will open up the customization menu for the selected Attribute menu.

Explode presets
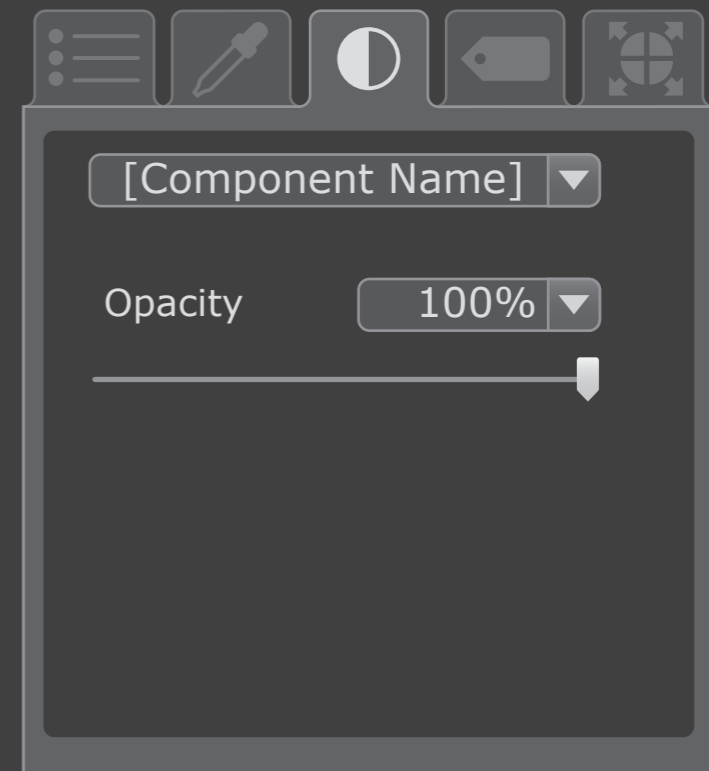
[Component Name] ▼

(Preset) ▼

(Preset) ▼

(Preset) ▼

(Preset) ▼
Explode all
No explode all

Attributes -Colour, Opacity, Labels, Explode Menus

[Component Name] ▼

Saturation   100% ▼

Colour menu

[Component Name] ▼

Opacity   100% ▼

Opacity menu

[Component name] ▼

Labels   Show visible ▼

Text size   10 pt ▼

Labels menu

[Component Name] ▼

Explode   Yes ▼
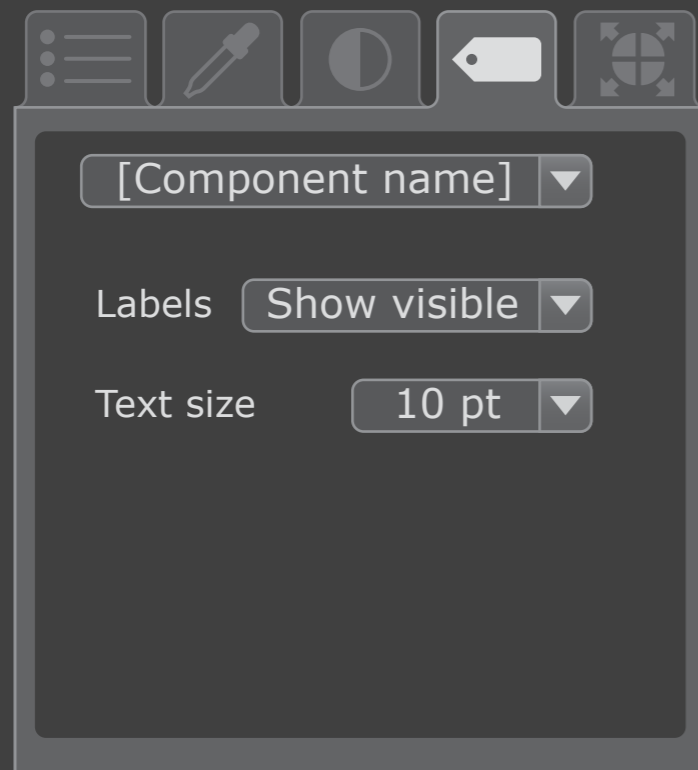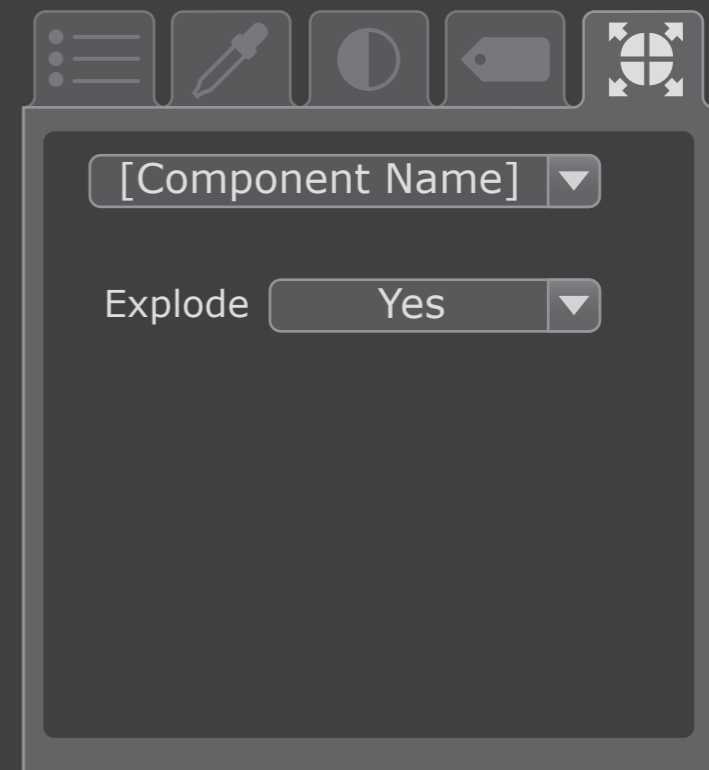
Explode menu

Components Menu

Left panel (Menu options closed)

| Components | Info |

F. Oklahomensis
- Cheek — ☐ 100%
  - Premaxilla — 100%
  - Maxilla — 100%
  - Lacrimal — 100%
  - Prefrontal — 100%
  - Postfrontal — 100%
  - Postorbital — 100%
  - Jugal — 100%
  - Squamosal — 100%
  - Quadrojugal — 100%
  - Quadrate — 100%
- Skull table
  - Nasal — ☐ 90%
  - Frontal — ☐ 100%
  - Parietal — ☐ 100%
- Palate
- Occiput — ☐ 100%
- Lower Jaw — ☐ 100%

Menu options closed

Center note

Tags indicate the attributes that are associated with a component.

Faded tags at lower hierarchical components indicate that all components of a group have the same attributes.

No tags at higher hierarchical group indicates that the components it contains have different attributes.

Right panel (Menu options expanded)

| Components | Info |

F. Oklahomensis
- Cheek
  - Premax...
  - Maxilla
  - Lacrim...
  - Prefron...
  - Postfro...
  - Postorb...
  - Jugal
  - Squam...
  - Quadrojugal — 100%
  - Quadrate — ☐ 100%
- Skull table
  - Nasal — ☐ 90%
  - Frontal — ☐ 100%
  - Parietal — ☐ 100%
- Palate
- Occiput — ☐ 100%
- Lower Jaw — ☐ 100%

Menu options:
- Expand groups
- Expand components
- Expand all
- Collapse all
- Show tags ✓
- Hide tags
- Increase text size
- Decrease text size
- Default text size

Menu options expanded

Info Menu

Menu options closed

Specimen
Feeserpeton oklahomensis
(OMNH 73541, holotype)

Taxonomy
Family: Lanthanosuchoidae
Order: Parareptilia
Class: Reptila
Phylum: Chordata
Kingdom: Animalia

Model
Submitted by: Agnes Chan, University of Toronto
CT Scan: 623 slices, 0.04528mm, University of Texas
Model: [format], University of Toronto

Publications
Macdougall M. J., and Reisz, R. (2012). A new parareptile (Parareptilia, Lanthanosuchoidae) from the Early Permian of Oklahoma. Journal of Palaeontology, 32:5, 1018-1026.

Options for this menu are for the user to jump to the indicated section of the information panel.

When possible, publications will be externally linked to downloadable online versions

Menu options expanded

Specimen
Feeserpet...
(OMNH 73...)

Specimen
Taxonomy
Model
Publications

Taxono...
Family: Lanthanosuchoidae
Order: Parareptilia
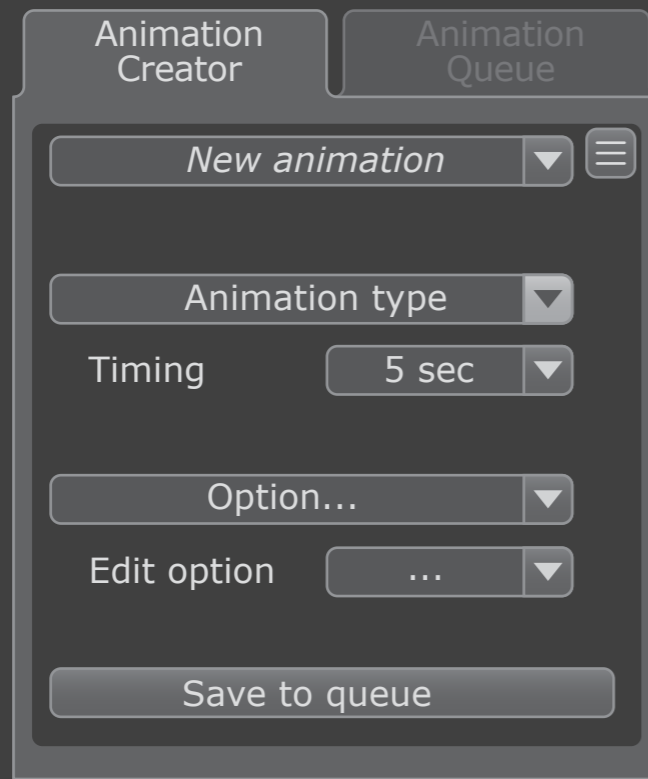Class: Reptila
Phylum: Chordata
Kingdom: Animalia

Model
Submitted by: Agnes Chan, University of Toronto
CT Scan: 623 slices, 0.04528mm, University of Texas
Model: [format], University of Toronto

Publications
Macdougall M. J., and Reisz, R. (2012). A new parareptile (Parareptilia, Lanthanosuchoidae) from the Early Permian of Oklahoma. Journal of Palaeontology, 32:5, 1018-1026.

Components   Info

Components   Info

Animation Menu

Animation Creator | Animation Queue

New animation ▼ ≡

Animation type ▼

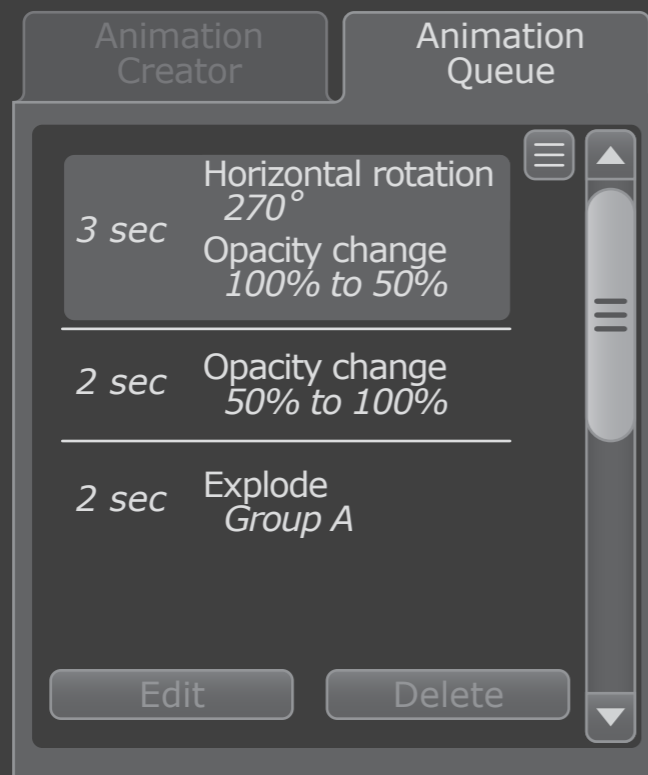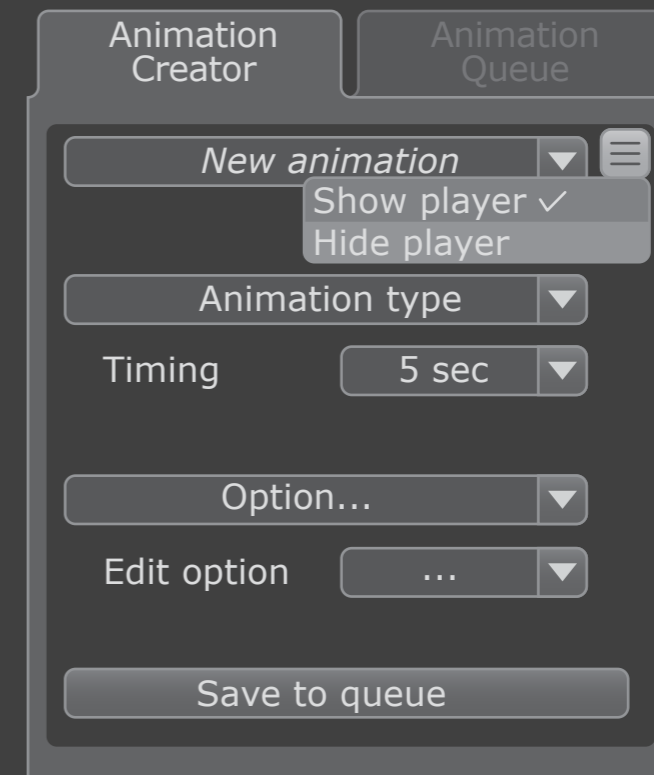Timing 5 sec ▼
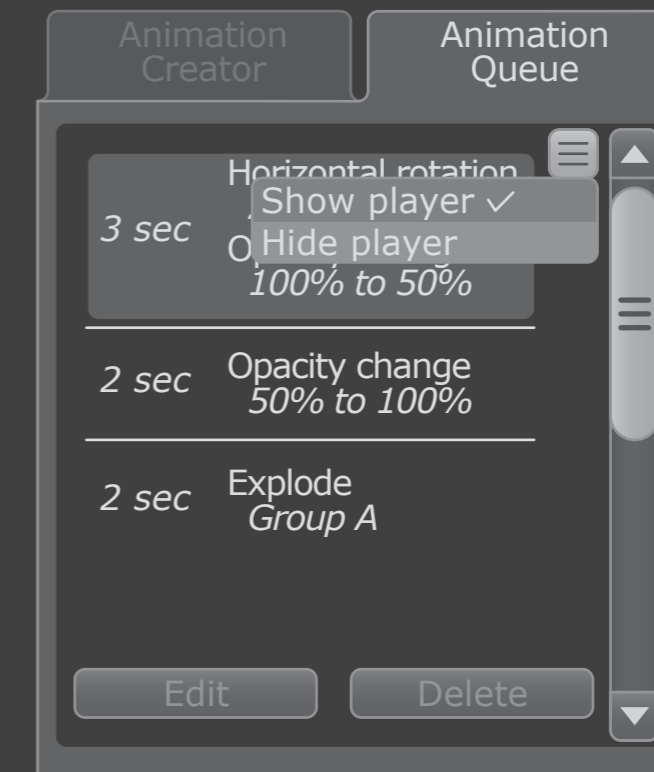
Option... ▼

Edit option ... ▼

Save to queue

The user sets up individual animation using the Animation Creator menu. The customized animation is saved to the animation queue.

At the Animation Queue menu, the user can determine the order of the individual animations. Animations may play sequentially or at the same time as another animation, with exceptions (for example, the model cannot simultaneously orbit in two directions on the same plane).

Using the Animation Queue menu, the user may also delete individual animations, or edit them. Clicking on the edit button will navigate back to the Animation Creator menu, where the top drop-down menu will indicate that an animation is being edited rather than having a new one created.

Animation Creator | Animation Queue

New animation ▼ ≡
Show player ✓
Hide player

Animation type ▼

Timing 5 sec ▼

Option... ▼

Edit option ... ▼

Save to queue

Animation Creator | **Animation Queue**

≡ ▲

3 sec — Horizontal rotation *270°* Opacity change *100% to 50%*

2 sec — Opacity change *50% to 100%*

2 sec — Explode *Group A*

▼

Edit   Delete

Menu options closed

Animation Creator | **Animation Queue**

≡ ▲

3 sec — Horizontal rotation
Show player ✓
Hide player
100% to 50%

2 sec — Opacity change *50% to 100%*

2 sec — Explode *Group A*

▼

Edit   Delete

Menu options expanded

Enter search here

Search

Sort Options

Last viewed

Featured

Date added

Most views

User uploaded

*Feeserpeton
oklahomensis*
(OMNH 73541)

Coming soon

Coming soon
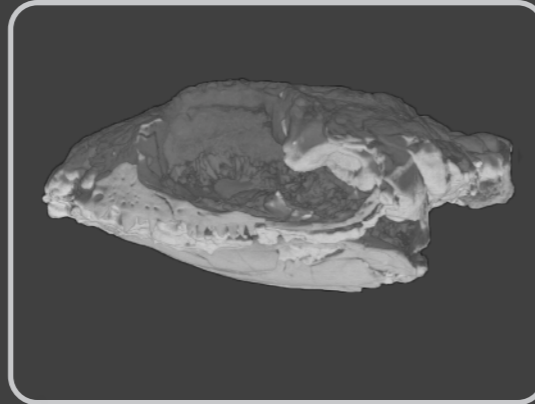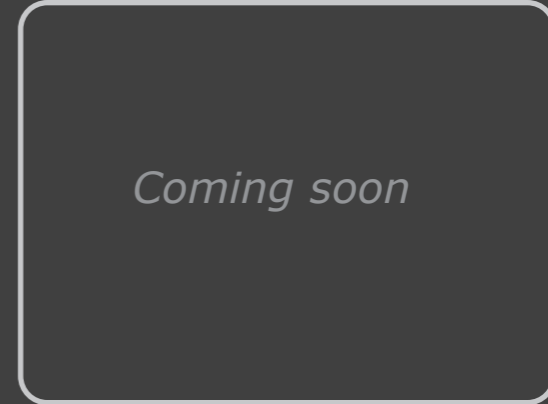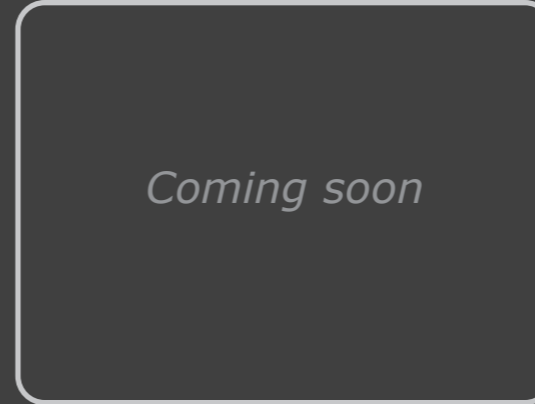
The Library is linked, separate page to the the interface. Here, the user can select models currently uploaded to the site. Mutiple sort options will be available.

The search engine will recognize tagged terms associated with the model, including taxonomic names, specimen identification numbers, and authors of linked publications.

A login option will be available to allow advanced users to upload and store their own models. When logged in, the user will have access to their personal library along with the public one. The user may opt to allow their models to be publicly available, or only accessible via their personal account.

Username

Password

Login

About Paleoscope

A Master's Research Project
submitted in conformity with the requirements for the degree of
Masters of Science in Biomedical Communications (MScBMC)

Offered through the
Institute of Medical Science, Factulty of Medicine
University of Toronto Mississauga

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and credits will be added at
the completion of the project.*

Institute of Medical Science
UNIVERSITY OF TORONTO