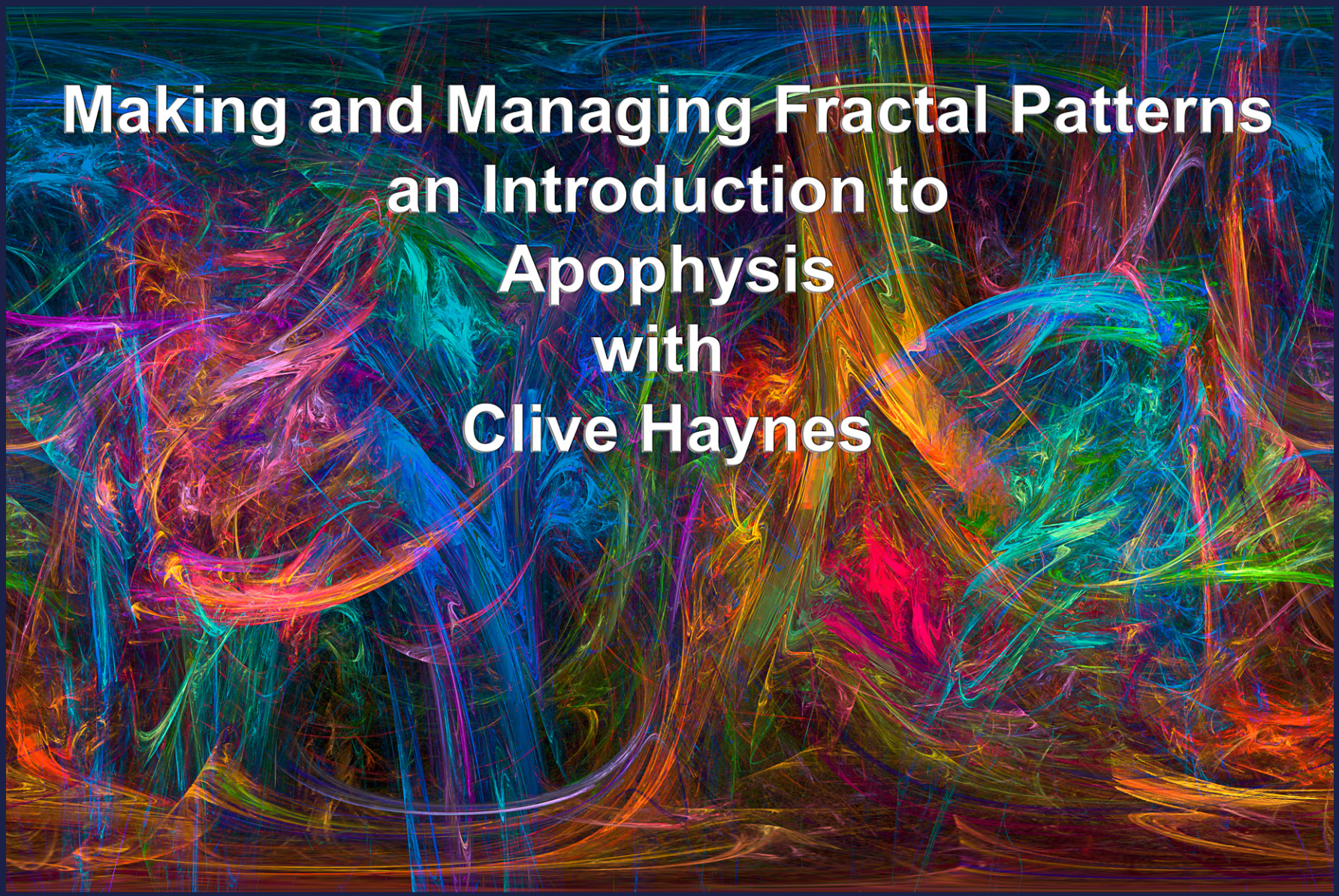

Making and Managing Fractal Patterns
an Introduction to
Apophysis
with
Clive Haynes

Apophysis Fractal Generator
An Introduction

Clive Haynes

Fractal 'Flames'

The type of fractals generated are known as 'Flame Fractals' and for the curious, I append a note about their structure, gleaned from the internet, at the end of this piece. Please don't ask me to explain it!

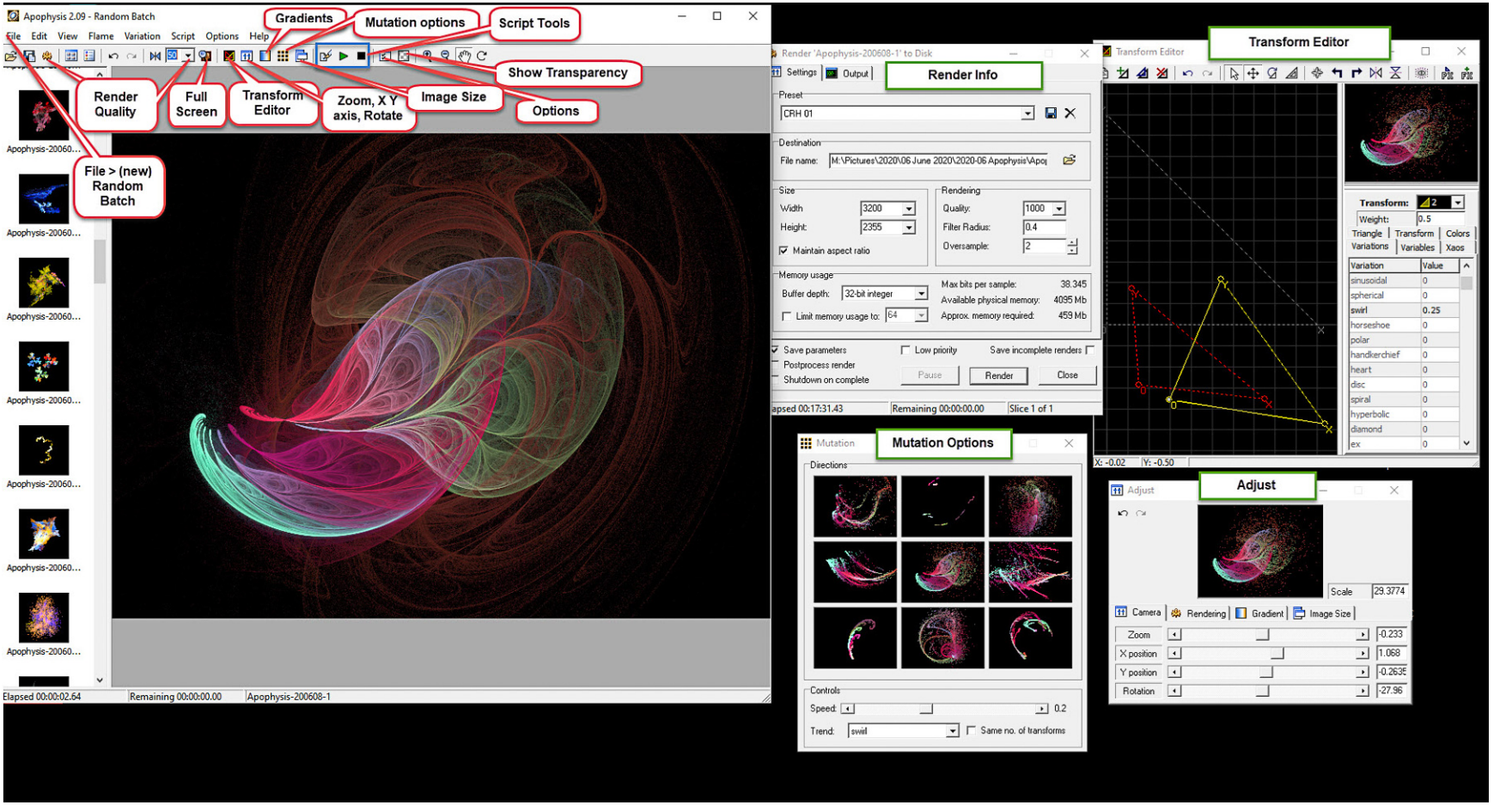
Where to download Apophysis: go to https://sourceforge.net/projects/apophysis/
Sorry Mac users but it's only available for Windows.

To see examples of fractal images I've generated using Apophysis, I've made an Issuu e-book and here's the URL. https://issuu.com/fotopix/docs/ordering_kaos

Getting Started

There's not a defined 'follow this method workflow' for generating interesting fractals. It's really a matter of considerable experimentation and the accumulation of a knowledge-base about general principles: what the numerous presets tend to do and what various options allow. Infinite combinations of variables ensure there's also a huge serendipity factor. I've included a few screen-grabs to help you. The screen-grabs are detailed and you may need to enlarge them for better viewing.

Once Apophysis has loaded, it will provide a Random Batch of fractal patterns. Some will be appealing whilst many others will be less favourable. To generate another set, go to **File > Random Batch** (shortcut Ctrl+B).

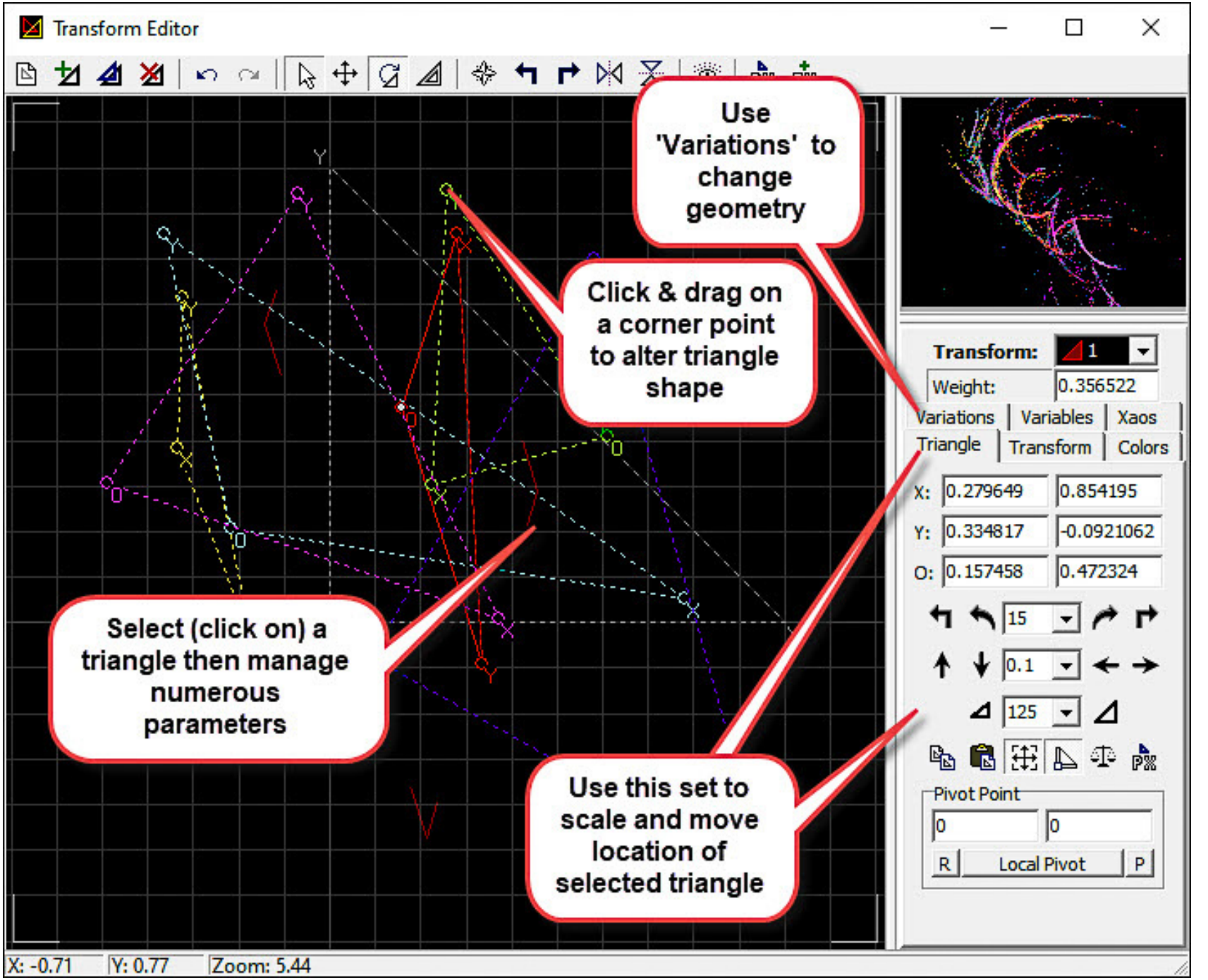


Screen-grab 1

Choose a fractal pattern from the batch and it will appear in the main window (Screen-grab 1). Depending upon the complexity of the fractal and the processing power of your computer, there will be a ‘wait time’ every time you change a parameter. Very much depends upon what you choose to do, from loading a fresh pattern to managing the shape of the fractal.
To get the general feel about the amount of control you have over the appearance of the fractal, have a play around with the following:

Variation
From the top menu, choose **Variation > Built In**. From the long list presented, experiment with a few. The results will often be quite radical. If you’re feeling lucky, there’s a ‘Random’ (pot-luck) option too. Oh, yes and importantly, there’s an ‘Undo’ button, represented by the usual arrow curling backwards (undo) and arrow curling forwards (re-do). NB You will find these for many of the options and dialogue boxes.
Once you have chosen a pattern, experiment with another variation from the dropdown list.

Mutations
Click on the ‘Mutations’ option (a group of nine small squares, below right of ‘Help’ on the menu – see screen-grab 1). This will reveal a set of nine ‘mutations’ arranged about the current version in the centre square. Clicking upon an image in another square will place that one in the centre and your screen display will change to show it. The ‘Trend’ button at the base of the Mutations panel, offers a further set of variables. Simply experiment. Remember each time you make a choice, the on-screen display will take a short time to ‘render’.



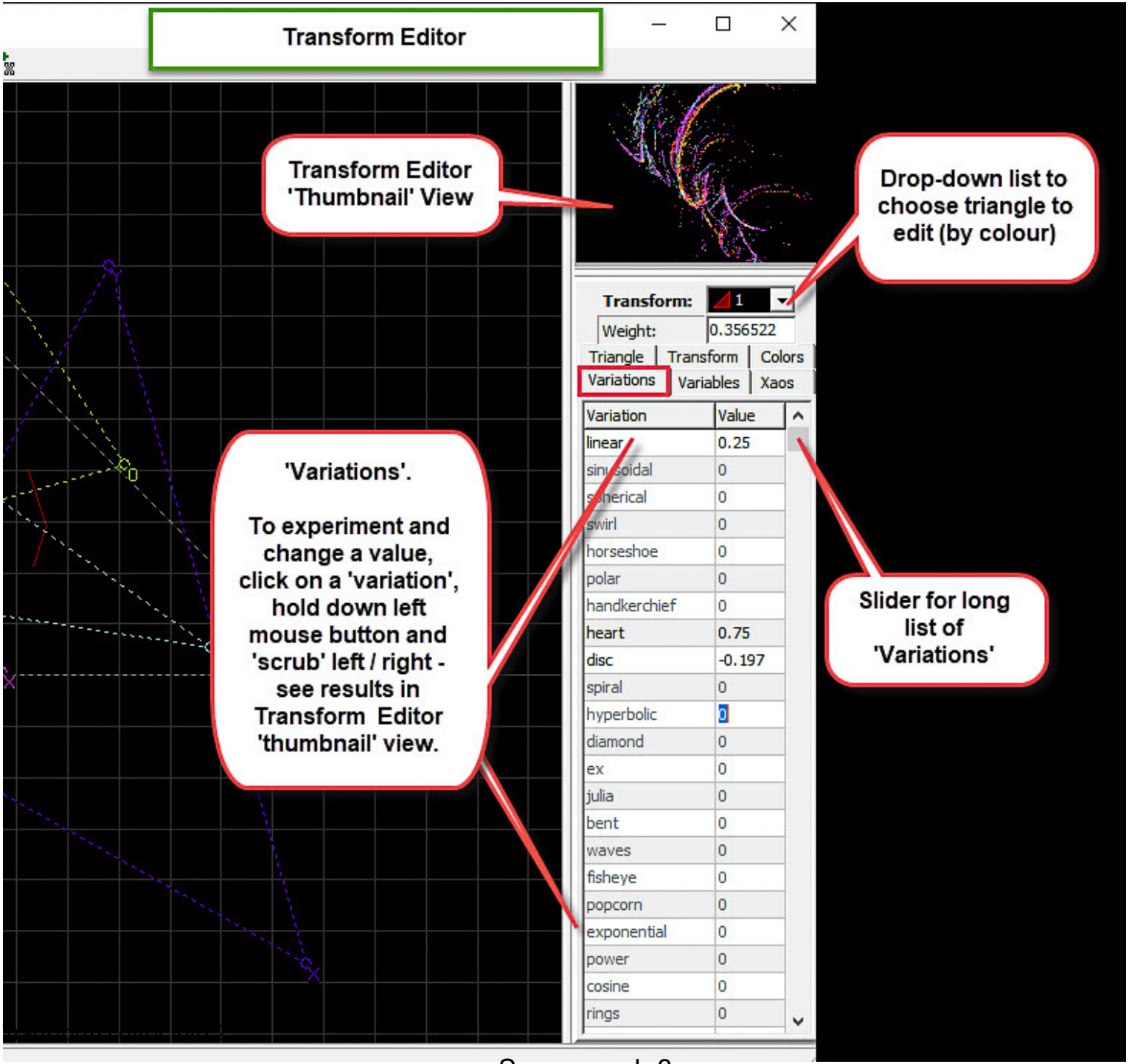
Screen-grab 2

Transform Editor

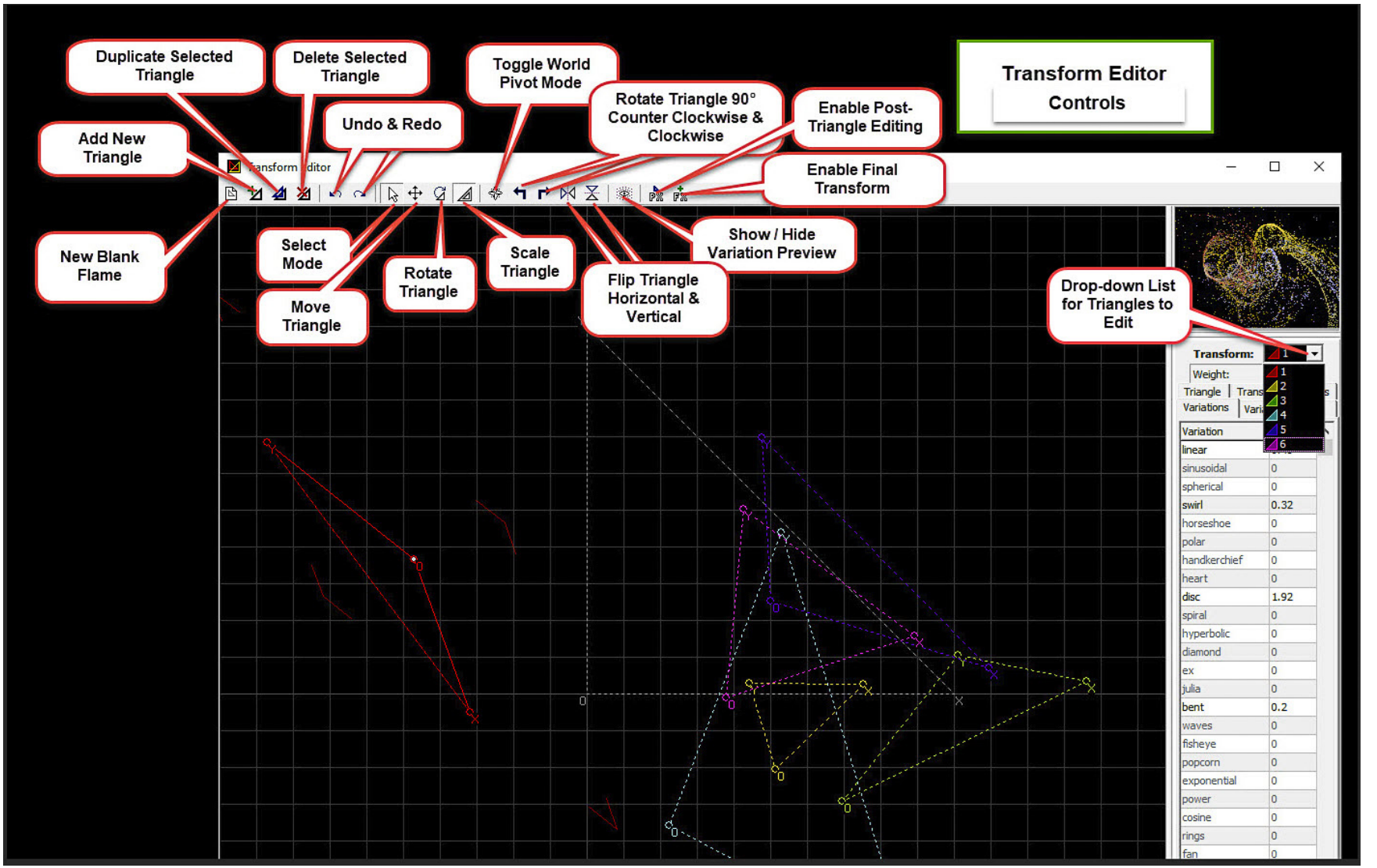
The next control to experiment with is the Transform Editor (located below ‘Options on Menu). (See Screen-grabs 2, 3 and 4). This is both subtle and very powerful. Fractal ‘Flames’ are created by setting parameters for ‘Triangles’. The Transform Editor allows us to see the ‘triangles’ and manage them. The shape, position and attribute of each ‘triangle’ can be altered. You’ll notice the ‘triangles’ have different colours, more about which in a moment. The corner of each ‘triangle’ is identified as ‘X’ for horizontal management (width), ‘Y’ for vertical management (height) and ‘0’ for position around a circumference set by a ‘pivot point’ (you’ll see when you click on it). Click / drag inside the area of ‘triangle’ to rotate the ‘triangle’.
There’s a lot of control here.

To shift the location of the ‘triangle’, this is what you do. (Screen-grab 2). Just below the Transform ‘thumbnail’ display, there’s a drop-down arrow. Clicking this reveals the set of ‘triangles’ identified by colour. From this list, select the ‘triangle’ you wish to manage. The ‘Triangle’ tab in the editor opens an array of options such as move, rotate, scale, etc. Again, experiment to see what happens. It’s also possible change the ‘variation’ for each triangle. (Screen-grabs 3 and 4).

Click on ‘Variations’ tab and select one from the long list. To change the numeric value of the ‘Variation’, left click on the name of the Variation; continue to hold the left mouse button down and ‘scrub’ left and right. The numbers will change, so keep an eye on the ‘Transform’ thumb-nail display to monitor what happens.



Screen-grab 3



Screen-grab 4

Adjust options
(See Screen-grab 1, where ‘Adjust’ icon at the top, is labelled Zoom, X Y axis, Rotate and is situated below left of ‘Help’ on Menu.)

Clicking on the ‘Adjust’ icon opens these general adjustments:

‘**Camera**’: Controls, Zoom, (Global) X & Y positions and rotation

‘**Rendering**’: Sets the following:
Gamma (think of this as mid-range contrast value)
Brightness
Vibrancy

Background (colour) – this is usually black or white but other colour choices can be made. (Note: when you have finished making the fractal and choose to ‘render’ it as a PNG file with ‘Transparency’ selected, the background colour will not show in the rendered/exported image. (See ‘Render’ information below).

‘**Gradient**’: This offers a wide range of colour combinations, though the effectiveness will depend upon the underlying characteristics of the fractal. The drop-down arrow on the Gradient Preset will reveal many, many gradients to select from.

Image Size: Choose the pixel dimensions you need.

Option: Saving a Fractal as a Preset (.Flame file)

Once you have a useful looking fractal, it's possible to save it as a Preset and use it as a starting point for further development. To save as a Preset, go to (Menu bar) **File > Save Parameters**. Choose or create a folder for your preset(s). It's best to create a folder outside of the Apophysis program structure, as should you need to reinstall the program, the folder will be lost.

NB. As a general principle of good practice, saving your own presets and / or images in a folder 'outside' the structure of any program is always recommended.

To load a 'Flame' from a saved Preset: go to **File > Open** and from the folder where you saved your presets (and this may well be the one that's present when you 'open'), choose the .flame file you need.

Render

Once you're content with the design you need to 'render' the fractal. This enables it to be saved and used in an image-editing program such as Photoshop, Lightroom, etc.

To render, click on the small cogwheel icon beneath Edit on the menu (Screen-Grab 1). Set width & height in pixels. Generally speaking, I use the following:
Quality: 4000
Filter Radius: 0.4
Oversample: 4

The larger the numeric value for Quality and Oversampling, the better the quality will be and as a result, rendering will take longer. An 'oversample' of 4 is usually reckoned to be perfectly adequate by the way.

Choose a destination to save the file (remember, not inside the program) and give it a name. Here you can choose to save your creation either as JPEG or PNG.

Here's a note about JPEG / PNG. However if you always want to save as a JPEG and many people do, then skip the explanation and go to **Rendering** below.

JPEG or PNG?
A note about 'Transparency'.

JPEGs don't allow for 'transparency' and your fractal pattern will be saved as displayed with its background colour.

PNGs do allow 'transparency' and you may wish to consider this option.
I often prefer 'transparency' as it offers advantages when editing layers in Photoshop. However, a fractal saved as a PNG with 'transparency' and opened in Lightroom will usually have a rather thin and veiled appearance. When opening a fractal PNG with 'transparency' in Photoshop, it will also appear rather faint and insubstantial. To restore 'visibilty', add a layer beneath the image and fill this with black, white or any colour of your choice. If choosing black, the image will then become much more substantial and will appear as you viewed it in Apophysis. Choosing 'Transparency' also often makes it easier to combine the fractal pattern with another image via a suitable Blend Mode in Photoshop.

In Apophysis, to ensure PNG Transparency, go to Options > General > PNG Transparency > Enabled. You can of course, 'Disable' Transparency and the PNG will appear similar to the JPEG. However for some purposes PNGs do offer improved attributes over JPEGs.

Rendering
Click 'Render' and the fractal will be saved. An estimated rendering time will be shown. The predicted time is dependent upon fractal complexity and computer processing power. Times can vary between just a few minutes to over 1 hour. The essential business of 'oversampling' for a complicated and well resolved fractal involves lots of complex work for the computer processor to complete.

Once the fractal has been rendered and exported to, say, Photoshop or Lightroom, simply treat it and edit it as any for other image.

Lots more to discover.....

There are many adjustments and controls beyond the scope of this introduction. However, there should be sufficient information for you to get started.

Other Fractal Making Programs
Another fractal-making program you may wish to consider is JWildfire and it's 'Mac friendly'!

You'll find some similarity with Apophysis but the interface is rather more modern-looking. It has many additional features, too. To run JWildfire, if it's not already installed on your computer, you'll need to download and install 'Java'.

Additionally, there are other fractal-making programs available to experiment with, however getting to grips with Apophysis will provide a firm grasp of the basics.

Mac users may also wish to try Fractal Architect X (Apple Apps Store and there are others too)

And ... just in case you really wanted to know this, here's ithe promised additional information

Fractal Flames
(Gleaned from the Internet)

Fractal flames is a member of the iterated function system class of fractals created by Scott Draves in 1992. Draves' open-source code was later ported into Adobe After Effects graphics software and translated into the Apophysis fractal flame editor.

Fractal flames differ from ordinary iterated function systems in three ways:
- Nonlinear functions are iterated in addition to affine transforms.
- Log-density display instead of linear or binary (a form of tone mapping)
- Color by structure (i.e. by the recursive path taken) instead of monochrome or by density.

Continued ...

The tone mapping and colouring are designed to display as much of the detail of the fractal as possible, which generally results in a more aesthetically pleasing image.

The algorithm consists of two steps: creating a histogram and then rendering the histogram.

For fractals rendered with Density Estimation, the noise is smoothed out without destroying the sharp edges.

The flame algorithm is like a Monte Carlo simulation, with the flame quality directly proportional to the number of iterations of the simulation. The noise that results from this stochastic sampling can be reduced by blurring the image, to get a smoother result in less time. One does not however want to lose resolution in the parts of the image that receive many samples and so have little noise.

This problem can be solved with adaptive density estimation to increase image quality while keeping render times to a minimum. FLAM3 uses a simplification of the methods presented in Adaptive Filtering for Progressive Monte Carlo Image Rendering, a paper presented at WSCG 2000 by Frank Suykens and Yves D. Willems. The idea is to vary the width of the filter inversely proportional to the number of samples available.

As a result, areas with few samples and high noise become blurred and smoothed, but areas with many samples and low noise are left unaffected.
Rendering an image

To increase the quality of the image, one can use super-sampling to decrease the noise. This involves creating a histogram larger than the image so each pixel has multiple data points to pull from.

For example, creating a histogram with 300×300 cells in order to draw a 100 x 100 px image. Each pixel would use a 3 x 3 group of histogram buckets to calculate its value.