Problem

With the Column-Well data set, Column 2 Well 2 7-6-13(8).jpg raised `NoBeadExceptions` which seem to occur because the threshold for recognizing a circle is too low at certain times.

Experiment

The changes for this experiment involves the adaptive reduction of the threshold parameter during bead detection from 128 to 16 pixels with decrements of 32 pixels.

- `__self.threshold` was added with value `[16, 32, 64, 96, 128]`
- Bead detection algorithm decrements `thresh` parameter starting at 128 down to 16 until a bead is found

Unexpected consequences may include detection of false positive beads.

General Results

The image was successfully analyzed.

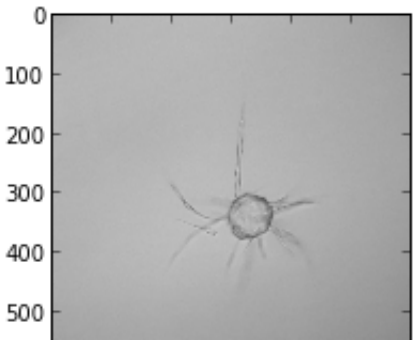
In [1]:
```
from SimpleCV import Image
import sproutogram

import matplotlib.pyplot as plt
import matplotlib.image as mimg

%matplotlib inline
```

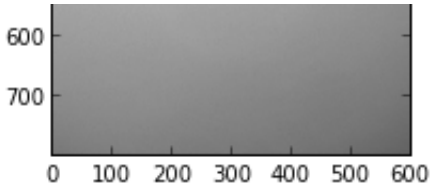
Original Image

We load a sample image with some branches to demonstrate an example from the database

In [2]:
```
img = Image('data/samples3/Column 2 Well 2 7-6-13(8).jpg').resize(w=800
plt.imshow(img.getNumpy())
```

Out[2]: `<matplotlib.image.AxesImage at 0x7f55e523fbd0>`





Bead Extraction

The first step is bead extraction. The bead is found eventually. In the original method, the bead could not be found.

In [3]:
```
bead_ex = sproutogram.BeadExtractor(img)
beads = bead_ex.extract()

print(beads)
```

```
[sproutogram.features.Bead at (289,267)]
```

Sprout Extraction

The second step is sprouts extraction where the canny parameters change. Almost all sprouts are found unlike before.

In [4]:
```
sprout_ex = sproutogram.SproutExtractor(img, beads, canny_min=60, canny
sprouts = sprout_ex.extract()

for sprout in sprouts:
    print(sprout)
```

```
[sproutogram.geometry.RadialSegment at (209,312),
sproutogram.geometry.RadialSegment at (182,315),
sproutogram.geometry.RadialSegment at (209,312)]
[sproutogram.geometry.RadialSegment at (317,358),
sproutogram.geometry.RadialSegment at (369,307),
sproutogram.geometry.RadialSegment at (317,358),
sproutogram.geometry.RadialSegment at (362,368),
sproutogram.geometry.RadialSegment at (318,411),
sproutogram.geometry.RadialSegment at (381,316),
sproutogram.geometry.RadialSegment at (320,373),
sproutogram.geometry.RadialSegment at (382,383),
sproutogram.geometry.RadialSegment at (363,341),
sproutogram.geometry.RadialSegment at (344,357)]
```

The skeleton produced for analysis is shown below.

In [5]:
```
sprouts_img = sprouts[-1].image
plt.imshow(sprouts_img.getNumpy())
```

Out[5]: <matplotlib.image.AxesImage at 0x7f55e50e6650>