RIPPLES FROM A HAZY SOURCE

UNIVERSE CUPCAKE RECIPE

Ingredients:

- Dark chocolate Frosting (69% of total cupcake)*
  - Water: 25.7%
  - Cocoa Powder: 2.3%
  - Flour: 17.9%
  - Baking Soda: 0.5%
  - Salt: 0.2%
  - Baking Powder: 0.1%
  - Butter: 12.4%
  - Sugar: 27.3%
  - Eggs: 12.5%
  - Vanilla Extract: 0.3%
  - Instant Coffee: 0.8%
- Dark Chocolate Frosting (26.4%)*
  - Unsalted butter, softened: 27.5%
  - Vanilla Extract: 0.7%
  - Salt: 0.3%
  - Cocoa Powder: 2.6%
  - Powdered Sugar: 55.1%
  - Heavy Whipping Cream: 13.8%
- Sprinkles (4.6%)*
  - Sprinkles: 100%

*Measurements to preference

Directions

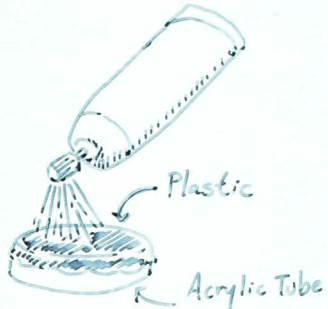
- For cake batter:
  1.) Find a cupcake tin that is large enough to hold the total contents of your cake once it has risen. Prevent the batter from sticking to it.
  2.) Heat oven.
  3.) Combine cocoa powder and water at around 373.2k. Over time the cocoa will be evenly dispersed through the water.
  4.) The dry ingredients will be observably white when mixed together. The other ingredients when combine will hold a more spiral and and peaked shape.
  5.) When combined together they will create a dark, thick batter (not too thick).
  6.) Pour into the cupcake tin and put in oven. At an internal temperature of 372k the cake will be completely uniform in texture.
  7.) Remove from oven and allow to cool enough to not melt frosting
- For Frosting
  1.) Cream together butter, vanilla and salt. Add the other ingredients. It should look dark and uniform.
- Combine appropriate amounts of cake (69%), frosting (26.4%) and sprinkle (4.6%)

BOLOMETER ANALOG

Materials:

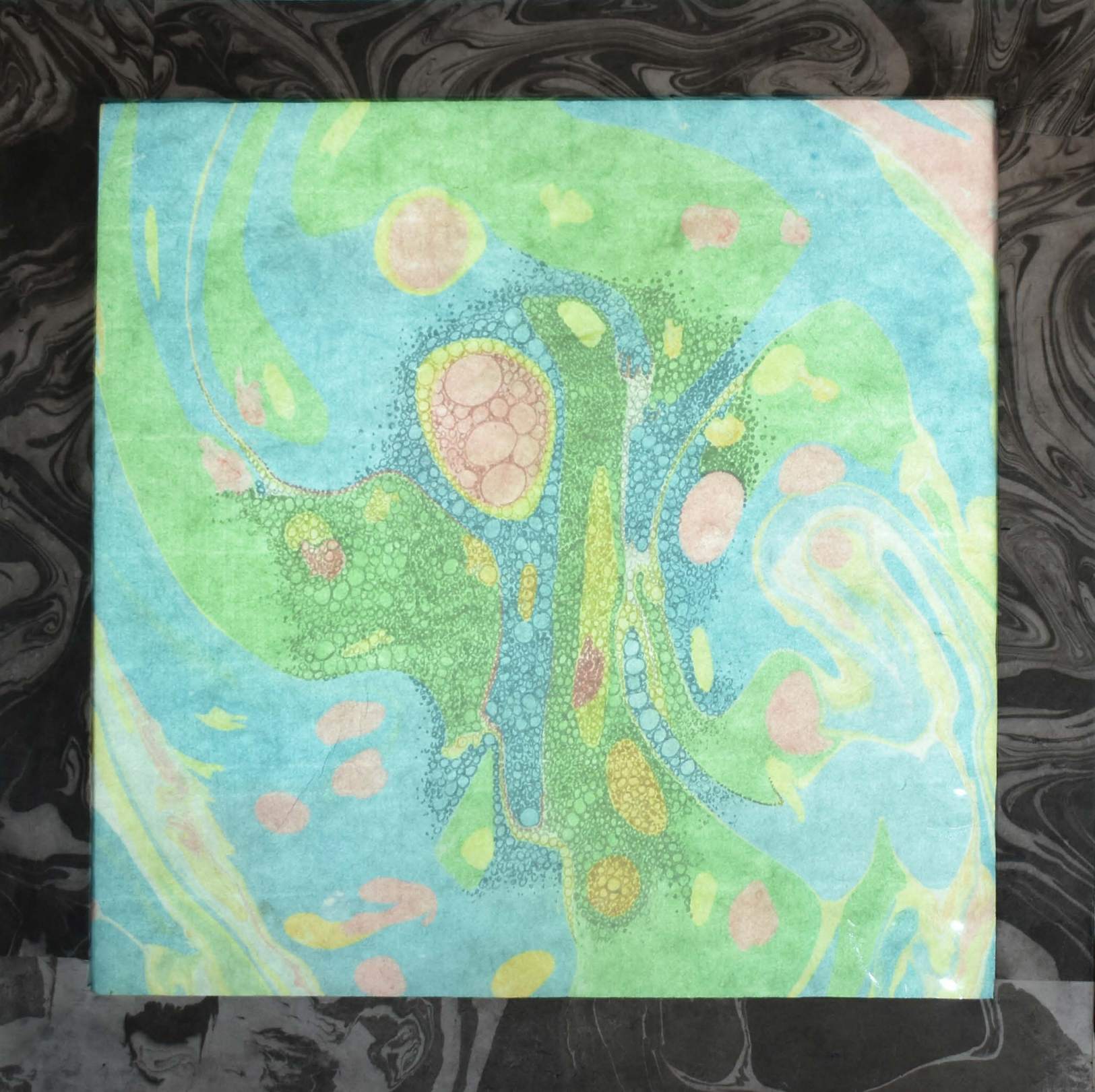
- Geranium Lens
- Thin Plastic Shopping Bag
- Thermochronic Liquid Crystal
- Section of Acrylic Tube the Diameter of the Lens
- Black Spray Paint

Directions:



Stretch And Adhere Plastic Bag Over One Opening of The Thin Acrylic Tube. Spray A Thin Layer Of Paint Over The Plastic Film. Once The Black Paint Layer Is Dry, Lightly Coat The Film In The Liquid Crystal.

Attach Germanium Lens To The Other Side Of The Tube. Find A Patch Of Ground Outside On A Clear Day And Draw Out A Map Of The Sky Immediately Above The Space You Are Sitting. Hold Up The Lens So The Liquid Crystal Painted Side Is Facing You. Slowly Move It Across The Patch Of Sky You Drew. As You Move It, Color In The Map With The Corresponding Colors On The Lens.



n-BODY GRAVITATIONAL LENS ANALOG

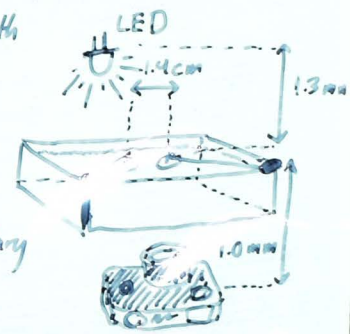
Materials:

- Clear Acrylic Water Basin
- Drawing Pins (Tacks)
- Carbon Fiber Rods
- M3-Screws
- Plastic Washers
- Fuji X-Pro 2 (or Camera of Equivalent Strength) With XF60mm F2.4R Macro Lens (or Equivalent) And Large f-Stop ≥ 16

Directions:

To Produce A Gravitational n-body Lensing Analog. Fill A Clear Acrylic Pool With Water. Attach Two Carbon Fiber Rods To Either End of One Side of The Basin (Diameter $\varnothing = 0.5$mm) With M3-Screws And Two Plastic Washers. Attach n Solid Discs (Drawing Pins) To Support Rods With Super Glue So The Flats Of The Pins Are Held Above The Unperturbed Water Level. Mount The Basin In Such A Way That You Can View Through It With A Camera. To Calculate The Slope of The Liquid Surface Perturbation $z = f(x,y)$, Use The Linearized Young-Laplace Equation

$$\boxed{\nabla^4 f = a^{-2} f.}$$



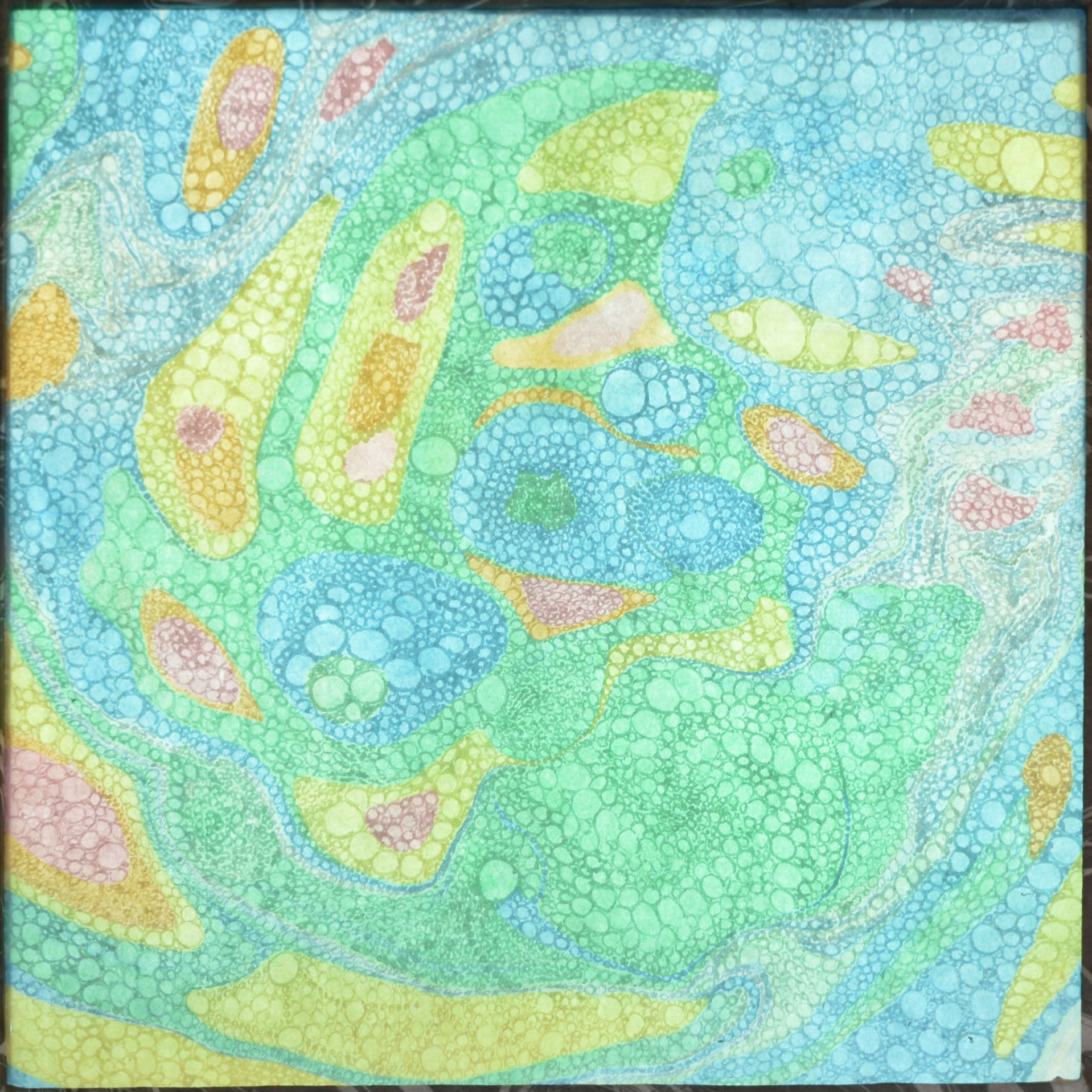
Where a Is The Capillary Length Of The Water, and Solve For The Proper Boundary Conditions. Light Will Be Deflected At The Interface of f By An Angle

$$\boxed{\vec{\alpha} = (n-1)\nabla_{2D} f.}$$

Where ∇_{2D} Is The Gradient Operator ~~Of The Liquid~~ Acting On The xy-Plane. Use a Distant Conventional Whitish LED Light As A Light Source. Set Up The Camera under The Water Basin To Record The Lensing of Light.

To Look At A Single Mass Gravitational Lens ($n=1$), For The Case Of A Single Tack Of Radius R, Set $f(r)|_{r=R} = h$, And The Angular Einstein Ring Radius θ_E (1.0mm, 1.3mm) May Be Computed For The Approximate Profile $f = h\exp(-(r-R)/a)$. In Experiments $\theta_E \sim 1°$.

Credit: "An Optical n-body Gravitational Lens Analogy" (Selmke, Markus)



THOUGHT EXPERIMENT

Go Outside And Sit Silently On The Ground For Several Minutes, Until You Hear Or See Something You Can't Immediately Explain. Without Moving, Write Down Everything You Can Observe Around You That Might Have Caused It.

Continue To Sit Where You Are And Go Through Your List, Attempting To The Fullest Extent Of Your Ability To Prove It.

If You Reach The End Of That List Without A Provable Conclusion, Write Down All The Things That Could Have Conceivably Caused It, Regardless Of Whether You Can Observe It In Your Immediate Vicinity.
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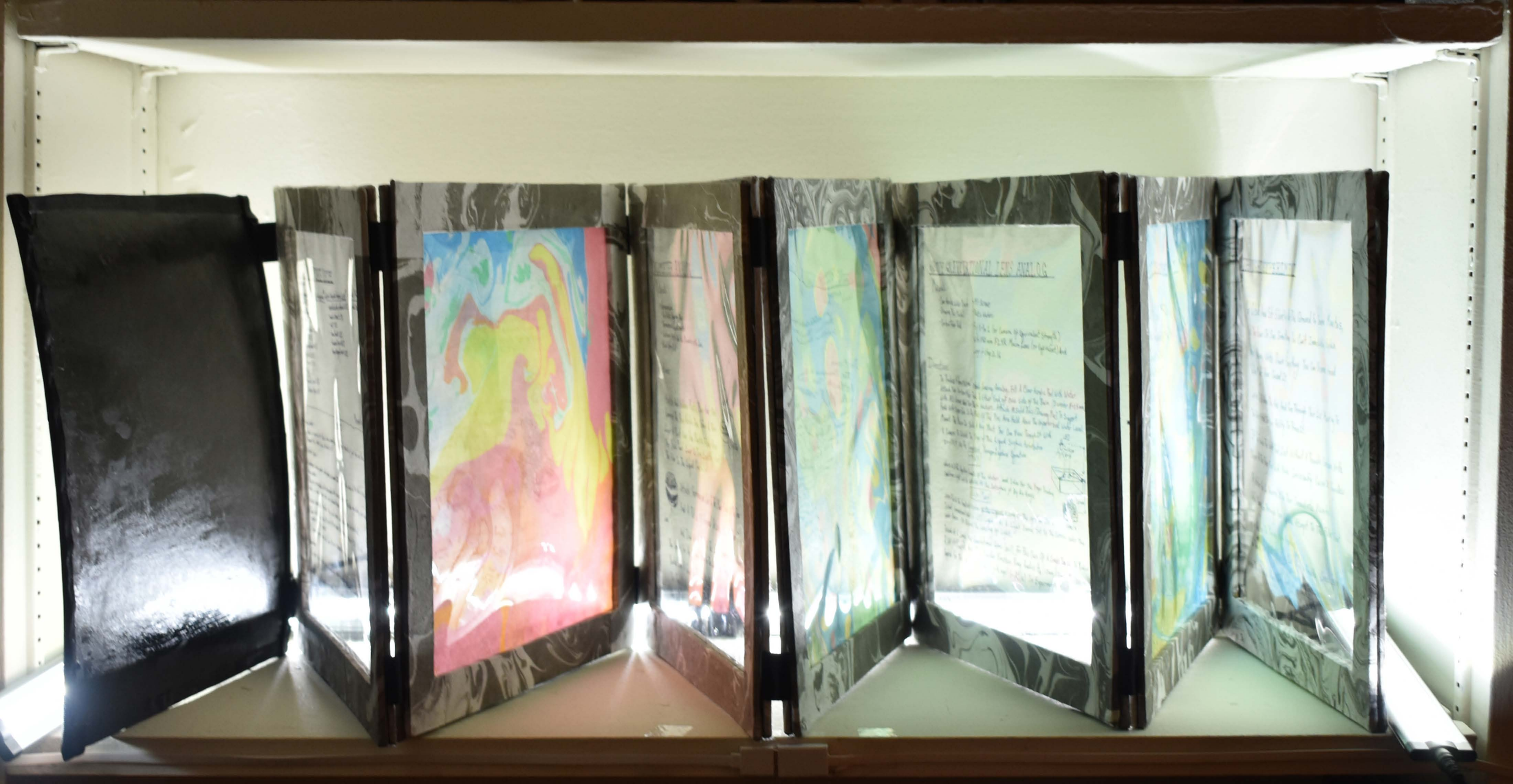

RIPPLES

FROM A

HAZY

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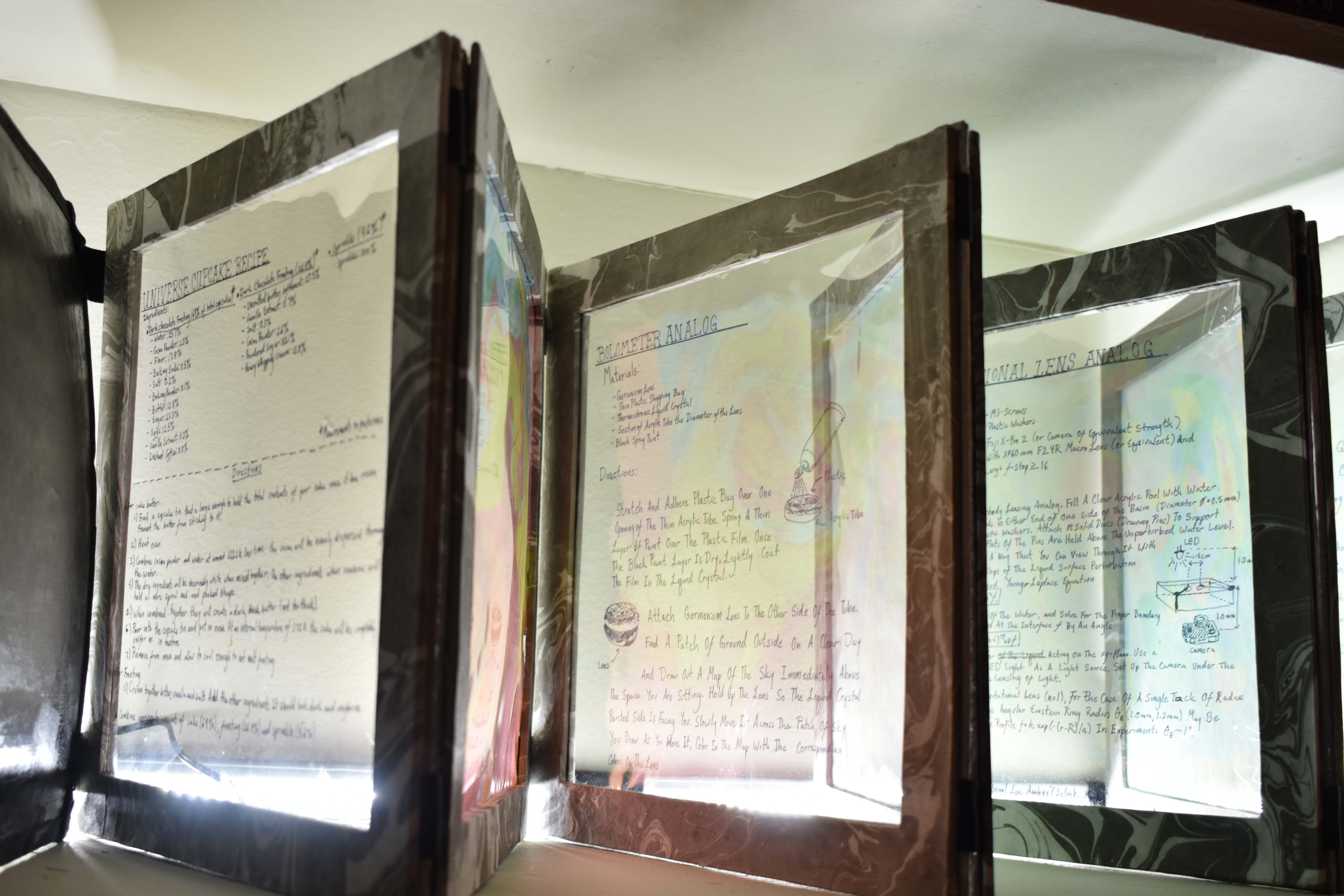
• Sprinkles (4.6%)*

- Sprinkles: 100%

*Measurements to preference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Ingredients:
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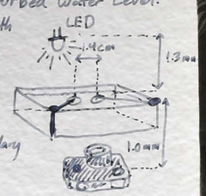

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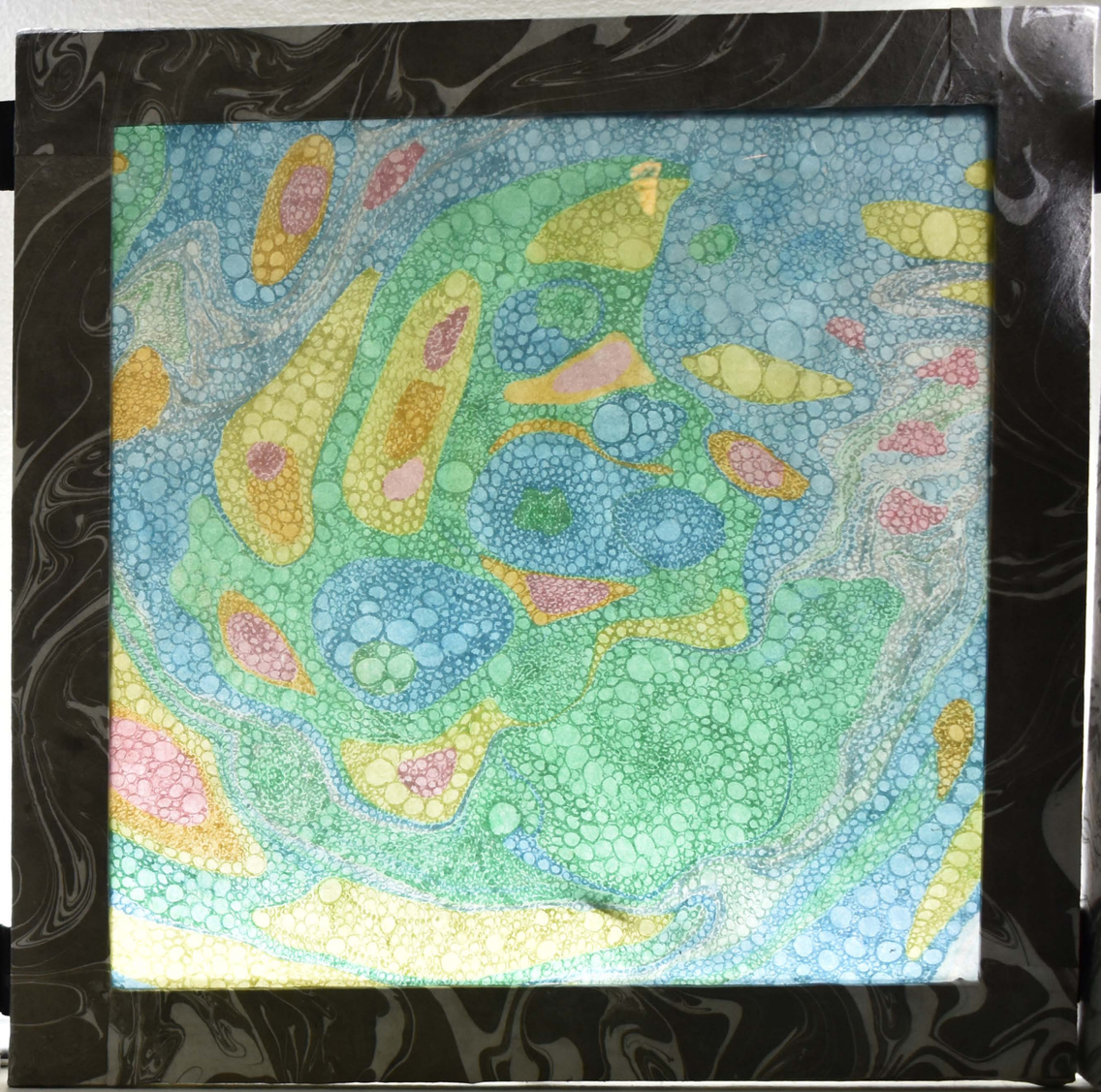

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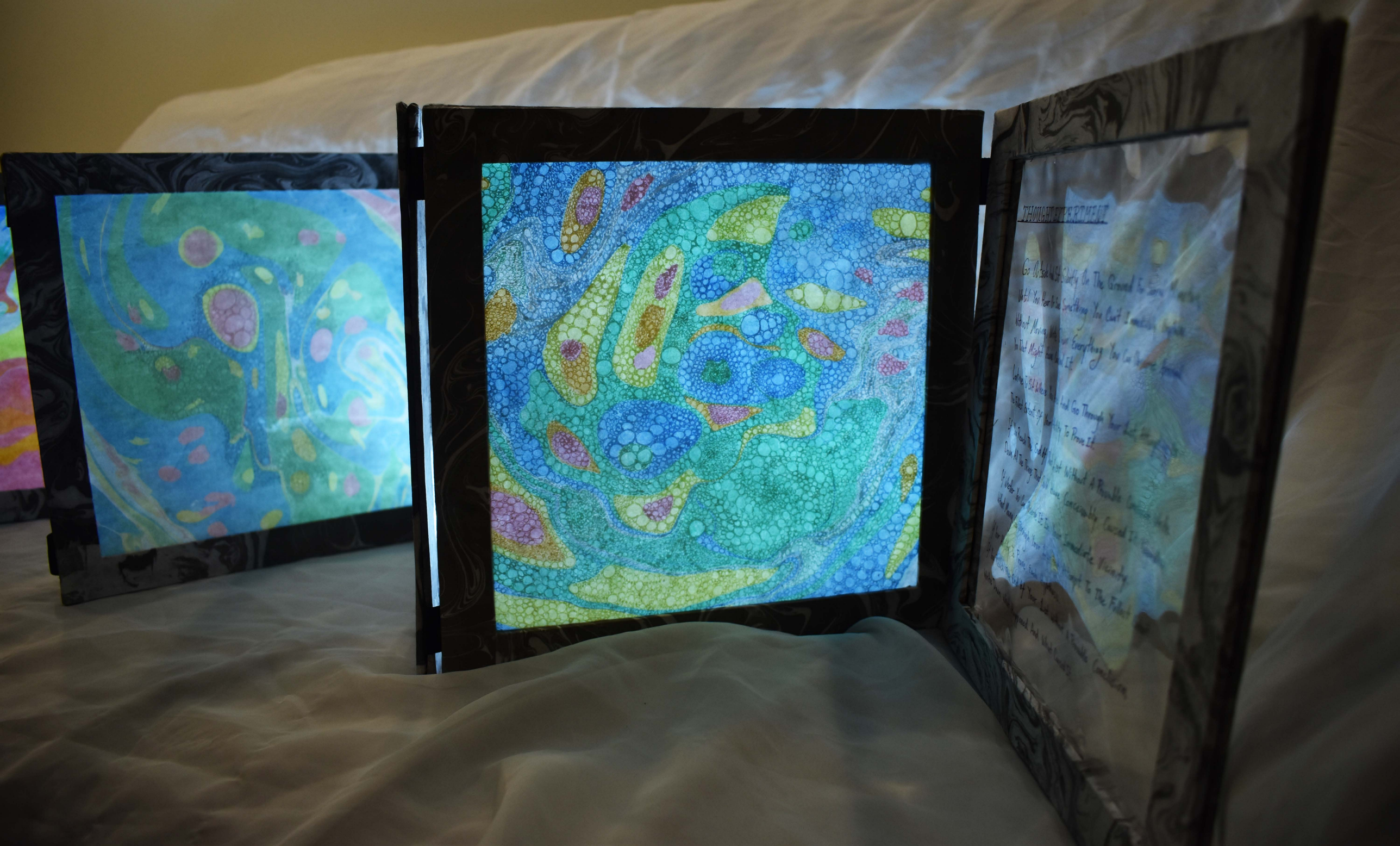
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