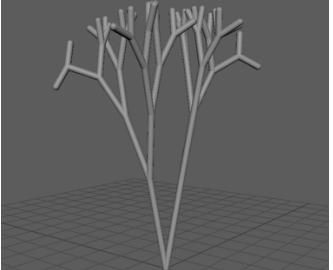
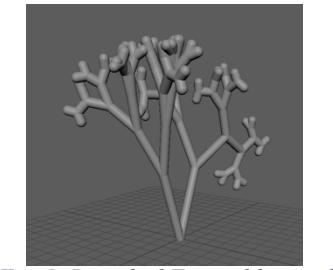
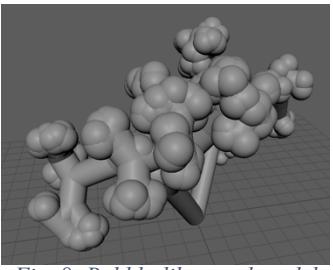


## Modelling

From the beginning I wanted to create an underwater scene with procedurally generated corals driving the environment. In the interest of time, I have decided to focus on the types of corals that can be generalized and created with only tweaking several parameters by the same generator function. In the end majority of my scene consists of variation of the following:

Type	Reference	Model example	Final result example
Staghorn Coral	 <i>Fig. 1: Staghorn Coral (Outforia 2023)</i>	 <i>Fig. 2: Staghorn-like coral model (personal collection)</i>	 <i>Fig. 3: Staghorn-like coral model final render (personal collection)</i>
Branched Finger Coral	 <i>Fig. 4: Branched Finger Coral (Citrus Reef 2023)</i>	 <i>Fig. 5: Branched Finger-like coral model (personal collection)</i>	 <i>Fig. 6: Branched Finger-like coral model final render (personal collection)</i>
Bubble Coral	 <i>Fig. 7: Bubble Coral (Outforia 2023)</i>	 <i>Fig. 8: Bubble-like coral model (personal collection)</i>	 <i>Fig. 9: Bubble-like coral model final render (personal collection)</i>

## Look dev

I was going for a mysterious atmosphere of deep underwater and was inspired by the color palette of Ursula's lair from Disney's The Little Mermaid as this environment had similar mood to what I was trying to achieve. However, I wanted to play with the textures more – introducing reflections and refractions to evoke the feeling of brittleness, coldness and unease.



Fig. 10: Ursula's Lair 1 (The Little Mermaid 1989)

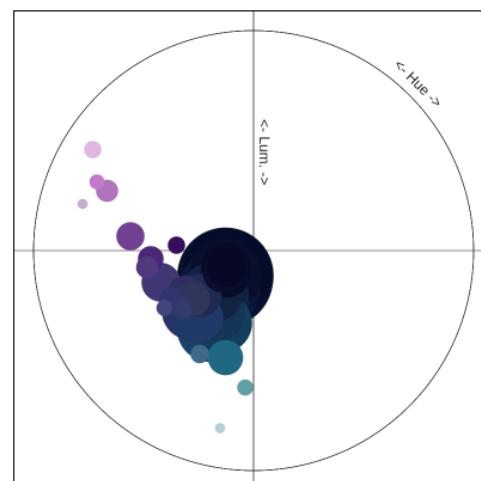
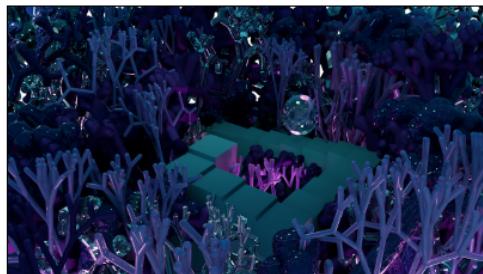


Fig. 11: Ursula's Lair 2 (The Little Mermaid 1989)

When deciding the distribution of the colors and textures I tried to follow the 60-30-10 rule to balance the composition and draw the eyes of the viewer to the ball and the staircase.

	Color	Texture
~ 60	Dark blue	Reflective/Glossy
~ 30	Shades of purple	Matte
~ 10	Turquoise	Reflective + Transparent

You can see the breakdown of the colors more clearly in the diagram below.



[8:15:45]	: 188
[8:17:48]	: 187
[9:16:46]	: 166
[5:12:42]	: 159
[10:26:61]	: 131
[9:22:54]	: 119
[13:24:57]	: 119
[25:61:99]	: 111
[9:15:43]	: 106
[15:35:74]	: 102
[22:66:106]	: 92
[13:63:94]	: 71
[38:53:104]	: 69
[17:32:65]	: 63
[35:55:103]	: 62
[17:54:87]	: 58
[17:35:69]	: 52
[8:9:39]	: 47
[32:58:104]	: 46
[6:13:43]	: 42

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**1- Image to analyze**  
Select an image:  or load a local image :  staircase.de...er.0150.png

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**2- Parameters**

Image sampling step :	<input type="text" value="100"/>	<input type="button" value="+"/>	<input type="button" value="-"/>	Main colors to exclude :	<input type="text" value="0"/>	<input type="button" value="+"/>	<input type="button" value="-"/>	Luminosity min:	<input type="text" value="0"/>	<input type="button" value="+"/>	<input type="button" value="-"/>	Circle contour:	<input type="checkbox"/>
Threshold of color difference :	<input type="text" value="30"/>	<input type="button" value="+"/>	<input type="button" value="-"/>	Symbol size :	<input type="text" value="1"/>	<input type="button" value="+"/>	<input type="button" value="-"/>	Luminosity max:	<input type="text" value="255"/>	<input type="button" value="+"/>	<input type="button" value="-"/>	Axis labels:	<input checked="" type="checkbox"/>

Fig. 12: Color Breakdown of frame 150 of my animation (geotests.net 2024)

## Staging

There are multiple ways in which I force the view's eye to the staircase and the ball.

1. I make the staircase turquoise color pop among the various purple shades around it. Moreover, the ball (which in my case is a bubble) reflect the staircase a lot also getting some of that same color making it pop in front of the dark purple corals.
2. I made the staircase geometry very simple while the large number of more detailed and random corals surrounding it introduce a lot of details. This way the staircase appears as a small negative space among the noisy environment drawing the eye towards it.
3. The simple matte texture of the staircase creates a big plain spot among the reflections and refractions of the corals contributing to the previous point – lots of details in the corals and plain negative space of the staircase, making it pop.

And with the viewer's eye drawn to the staircase the bubble which is in its close vicinity draws the attention as the only moving thing as well as the brightest and lightest object with plenty of reflections on it.

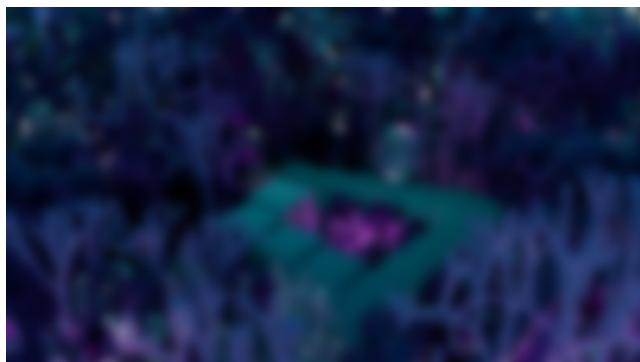


Fig. 13: Frame 150, blurred to show color contrast of the staircase (personal collection)



Fig. 14: Frame 150, sharpened and b/w to show color contrast of the staircase (personal collection)

## Animation

When it comes to animation and capturing the liveliness of the moving bubble, I've used squash and stretch as well as secondary action animation principles. As the bubble squashes and stretches on impact, it continues to oscillate that deformation until it dies down just like a real bubble would. In addition, I have decided to minimize the number of jumps to emulate the resistance of the water and slowness of underwater motion.

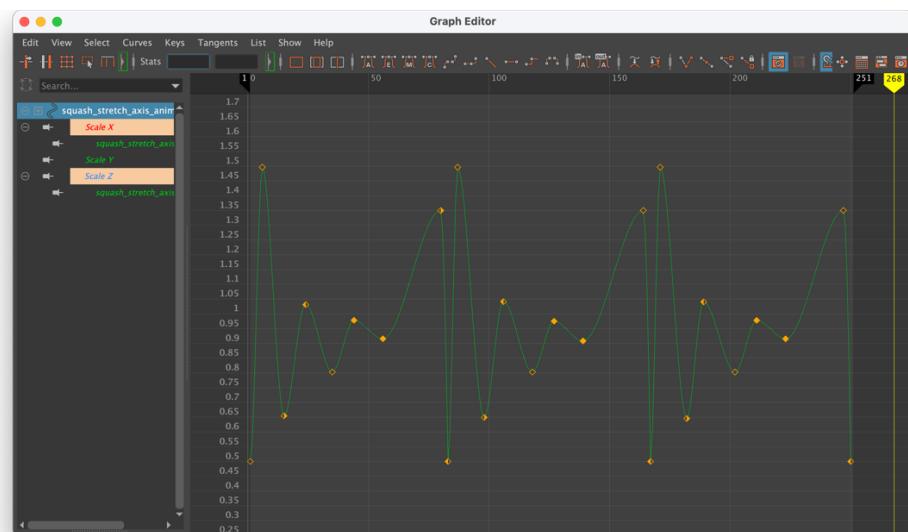


Fig. 15: Squash and stretch with fading motion graph

## References

- Citrus Reef, 2023. *Branched Finger Coral - branched-finger-coral.jpg [photograph]*. <https://www.citrusreef.com/blogs/news/types-of-coral-reef-species>. Available from: <https://cdn.shopify.com/s/files/1/0024/1788/5284/files/branched-finger-coral.jpg> [Last accessed 9 January 2024].
- Jégou L., 2013. Color proportions of an image [online tool]. Université de Toulouse-Le Mirail, Dépt. de Géographie: [https://www.geotests.net/couleurs/frequencies\\_en.html](https://www.geotests.net/couleurs/frequencies_en.html) [Last accessed 9 January 2024].
- Outforia, 2023. *Slaghorn Coral - Types-Corals-Staghorn-0321.webp [photograph]*. Oslo: <https://outforia.com/types-of-coral/>. Available from: <https://outforia.com/wp-content/uploads/2021/03/Types-Corals-Staghorn-0321.webp> [Last accessed 9 January 2024].
- Outforia, 2023. *Bubble Coral - Types-Corals-Bubble-0321.webp [photograph]*. Oslo: <https://outforia.com/types-of-coral/>. Available from: <https://outforia.com/wp-content/uploads/2021/03/Types-Corals-Bubble-0321.webp> [Last accessed 9 January 2024].
- The Little Mermaid*, 1989. [film, DVD]. Directed by Ron Clements, John Musker. USA: Buena Vista Pictures.

## External Materials Used

Underwater HDRI by Namtaar, <https://www.deviantart.com/namtaar/art/Underwater-Hdri-805776729>

Chaos Cosmos VRay material assets:

- Soap Bubble 10cm
- Wall Paint Shadow Matte 300cm
- Pearl Black 2cm
- Gem Ruby
- Gem Diamond
- Ice 05 100cm

*Word Count - 467 (without references, appendix and header)*