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Reality In Motion: An Audio Documentary Exploring the Fluid Essence of Life

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By

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Abstract

Reality in Motion: an Audio Documentary Exploring the Fluid Essence of Life

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Reality in Motion is a science communication project that aims to create an audio documentary based around the theme of movement in various aspects of life, both human and non. The project is a 30-minute podcast that explores the topic of life and movement through the lens of smaller stories. Guided by a main narrator, with the intervention of experts, *Reality in Motion* seeks to provoke thought and inspire curiosity about the intricate dynamics that shape our world.

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Chapter 1: Introduction

In recent years, podcasting has emerged as powerful medium in the field of science communication. This evolution was primarily driven by technological advancements and an increase in accessibility of audio content. The internet and portable devices have had deep impacts in the manner in which people consume information, which has lead to an increase in popularity for podcasts (St. Aubin, 2023). Their appeal partly stems from their adaptability to various contexts, which offers flexibility to an increasingly busy audience. Through being a powerful source of information dissemination (Dhiman, 2023), having the ability to create closer relationships with its audience (Fox et al., 2021), and by utilizing engaging storytelling, they have become effective tools for science communicators.

What made this field of particular interest to me is its ability to share scientific knowledge in an accessible and captivating way. Scientists can often struggle to engage the public effectively, and with the decline of legacy media outlets that used to facilitate the sharing of information between academia and the general public, this gap keeps increasing in size. Podcasts offer a unique opportunity to present complex scientific concepts in a compelling and more digestible manner. This project aims to contribute to this evolving field by creating an audio documentary that explores the theme of life and movement.

The objective of this project was to create a 30-minute podcast in the genre of science communication. The podcast, titled *Reality in Motion* explores several interconnected stories united by the theme of movement. These stories range from plants colonizing islands across oceans to the migration of humans around the world and beyond. The narrative is guided by a main narrator and features interventions from experts, aiming to provoke thought and inspire curiosity on the forces that shape the world we live in. Although it may initially appear straightforward, producing content of this caliber demands considerable effort and dedication behind the scenes. Crafting a quality podcast entails

more than just researching topics and conducting interviews; it requires a nuanced understanding of the medium from inception to execution.

In the following pages, you will find a literature review that explores the significance of the internet's impact on our society, the rise of podcasts, and the challenges faced by popular science communication. The next section describes the methods used to create the podcast. This is followed by a description of the results of these methods. Finally, the document concludes with a discussion about the process of making the podcast.

Chapter2: Literature Review

This literature review explores how the recent revolution of the state of podcasting has gradually affected various sectors of audio journalism, including science communication. In addition, it will serve to contribute to a deeper understanding of the topics in question and their relevance.

The New World

In modern days one would be hard pressed to find someone that doesn't have daily interactions with the internet and modern technologies (e.g. computers and smartphones). So much so that only about 7% of Americans have reported they do not use the internet, according to a 2021 survey (Perrin & Atske, 2021), with most of them being over 65 years old. Over the past few decades, many key aspects of life have moved online, including government and work-related activities, but above all news and entertainment. In particular, thanks to app platforms such as the Apple Appstore and the Google Playstore, many programs dedicated to delivery of immediate news have encountered great successes. Their ease of use, accessibility, and mostly free experience have created an environment in which they have become one of the main go-to options to obtain information. For some people it is just a way to stay up to date, for others it is an easy way to access "infotainment," which combines educational or informative content with entertainment elements, and for some others it is simply entertainment, which focuses primarily on providing enjoyment and amusement (Dhiman, 2019).

The integration of this new technology into our daily lives reflects ideas brought up by McLuhan (1964) about the transformative powers of a new medium on a society. He argues that the integration of a new medium of communication can shape entire industries, lifestyles, and modes of thinking, and that it is not the content itself but the characteristics

of the medium that matter most. Carey (1989) expands on these ideas, using the example of the telegraph to illustrate how these kinds of technological innovations can produce sensible changes in communication and culture. The telegraph, much like the internet today, fundamentally reshaped long-distance communication and brought profound societal changes to aspects of life such as businesses and personal communication. Both technologies disrupted existing networks and traditional information-sharing methods, forcing industries to adapt rapidly to new paradigms. While newspapers managed to evolve in response to the telegraph's emergence, the internet's impact has been even more pervasive, challenging not only established media but also commerce, education, and social interactions on a global scale (Standance, 1999; Miller, 2020).

It seems like legacy media outlets initially underestimated the budget dynamics of the internet era (Shafer, 2021). They failed to grasp that digital platforms like Alphabet and Meta, and particularly their algorithms, would redefine the advertising landscape. As competition from other online-based news services increased, partly due to new lower access levels, traditional sources began facing declining readership and revenue, prompting them to cut costs to stay viable. This would create a vicious cycle that would see readers become less and less interested in the kind of offerings that these services would provide (Shafer, 2021). However this change in the media landscape has not affected all media equally. While newspapers saw a reduction in consumption over the past decade, other forms of media consumption, such as podcasts, experienced something different (Götting, 2023).

The Podcast Revolution

The 21st century brought a few key technologies other than the internet that managed to bring podcasts to the public eye and in some ways to define it. With developments such as the RSS feed, portable mp3 players like the iPod, and the

introduction of seamless ways to easily access podcasts from personal devices (iTunes, Spotify, etc.), it is now easier than ever for the average person to find and listen to their programs (Rime et al., 2022). Listening to podcasts was not the only thing that was simplified. Falling equipment prices and rising levels of accessibility mean anyone with an idea and the ability to buy some cheap gear can produce their vision and deliver it to thousands of people with relatively little difficulty. Podcasting is perhaps one of the greatest examples of paradigm shift the internet brought, as it has seen incredible growth in the past decade alone, going from 12% to 42% of Americans claiming to have listened to a podcast recently (St. Aubin, 2023).

A few key factors put podcasting and audio storytelling in general in an interesting position. Radio, which by all means is not only a spiritual ancestor of the podcast but more of a "sibling" of sorts (Rime et al., 2022), first became widely popular in the early 20th century, being for many the primary source of information, entertainment, and even propaganda. However, it then suffered a period of decline after the advent of popular television, with the latter seemingly becoming the new main source of entertainment for the masses (Dhiman, 2023). Nonetheless, something peculiar happened at the turn of the century. The internet was able to recreate an environment for audio storytelling in which it was not simply enduring but was, in fact, thriving once more.

Compared to other media such as television or print, audio can be consumed in a considerably wider amount of circumstances. From one's daily commute and exercising, to cleaning the house or to relieve boredom, there is almost no limit to when or how one can turn on a podcast that will discuss their specific interests. Missed something that was said? No problem! You can simply rewind, fast forward, and even change the speed at which the podcast is playing. It is no surprise then that the number of people who listen to podcasts on a daily basis has also drastically increased over the past decade, with almost half of Americans over age 12 claiming to have listened to a podcast in the month prior to a 2023

survey (St. Aubin, 2023). This growing trend has been noted by several companies, who, for example, have begun to achieve their corporate responsibility goals through this medium (Barrio-Fralle et al., 2023).

As far as the most popular podcasts in the United States, we can find shows such as “This American Life” and “Radio Lab,” which focus on stories of everyday people. “Serial,” a spinoff show of “This American Life,” is particularly credited as a major step in the development of the modern podcast landscape (Berry, 2015; Rime et al., 2022). These types of shows have a unique ability to engage their audience in a manner that traditional journalism often finds challenging. Their engaging narratives and innovative storytelling techniques contribute to their widespread appeal and influence on contemporary media consumption trends. Shows like "Serial" became popular because they brought the idea of "seriality" in podcasting similar to the episodic nature of TV and radio shows, by employing cliffhangers to maintain listeners from one episode to the next. These shows raised the bar in terms of production quality and presented podcasting as a viable platform for professional creators and storytellers (Rime et al., 2022). One of the key aspects of these shows is also the narration. Compared to the more stoic or distanced approach of many news outlets, shows with multiple hosts, such as Radiolab, exhibit a lot of personality. In an article discussing the success of the show Radiolab, Ira Glass writes that “the banter has an aesthetic of its own. Most journalism in our country lacks the sense of joyous discovery one gets in Radiolab” (Glass, 2011).

Additionally, the rise of podcasts mirrors the broader trend of media consumption that has seen a shift away from traditional television to streaming platforms such as Netflix and Disney +, and even YouTube in certain demographics (Auxier & Anderson, 2021). This transition is driven by the versatility and mobility that streaming platforms offer, similar to the advantages of radio but with the added benefits of on-demand access and personalization. Streaming platforms, much like podcasts, allow users to consume content

at any time and from anywhere, making them highly adaptable to modern lifestyles. This shift is part of the larger digital transformation in the media landscape that was discussed in the previous section.

Now, the consumption of content is increasingly driven by algorithms and personalized recommendations. Netflix, for example, uses sophisticated algorithms to recommend content to users, thereby enhancing user engagement and satisfaction. The personalized nature of these platforms ensures that users are more likely to find content that resonates with their preferences, much like the tailored content found in podcasting (Tussey, 2023). The shift to podcasting reflects these broader trends in media consumption, emphasizing convenience, personalization, and the ability to engage with content on one's own terms (Dhiman, 2023).

This digital transformation is not limited to entertainment and news but also extends into the realm of education, particularly in science communication. Podcasts have emerged as a powerful tool for science communicators, providing a platform to disseminate complex scientific ideas in approachable and engaging ways. The ability to reach a broad audience through storytelling and narrative techniques has made podcasts an effective medium for educating non-experts about scientific topics (Kiernan et al., 2023; Sotério & Queiroz, 2023). This combination of podcasting and science communication offers a unique way to improve public understanding and appreciation of science, which is especially important in an era filled with misinformation.

The Side of Science Communication

Science communication finds itself in a unique position. Scientists and science enthusiasts have incredible new ways of spreading knowledge and their passions. There have been great jumps in science and other science-based technologies that have been able to touch billions of lives in the past century alone, from medicine and industrial practices,

to entertainment and agriculture. It would then follow that our modern society would value science and its understanding to a higher degree than any in human history, but that is not necessarily true (National Academies, n.d.; Leshner et al., 2017). There seems to be a disconnect between lay people and science, which can be often due to several factors such as a lack of communication training for scientists, the decline of legacy media outlets, and the rise of the internet and social media.

The decline of public's trust in science and scientists has been a growing concern for many years. This effect is fuelled by several factors, including a perception of elitism within the scientific community. The insular nature of scientific communities, shaped by years of specialized work and the significant economic resources that are often required to pursue a career in science, exacerbates this perception (Kennedy & Tyson, 2023; Leiserowitz et al., 2013). Additionally, the rise of misinformation, particularly on social media platforms, has played a significant role in eroding trust. Misinformation often spreads faster and more widely than factual information, creating confusion and doubt about scientific consensus on critical issues like climate change, vaccination, and other public health matters (Fisher, 2022).

Effective science communication requires bridging the gap between technical expertise and public understanding. Typically, scientists are trained to communicate with their peers in a highly detailed and technical language, which although allows for effective discourse between each other, it does not translate as well with the public. This has the capacity of hindering engagement with non-expert audiences (Scheufele, 2013). In addition, the slow decline of legacy media has had the effect of reducing the amount of professional science journalists who once played a vital role in making scientific information accessible to the public. As a result, this burden has shifted towards the scientists themselves, many of whom are not necessarily qualified for this responsibility. Despite these challenges, some have answered to the call, and through the use of new

technologies have been able engage lay audiences directly. For instance, Dr. Neil deGrasse Tyson, an astrophysicist, has utilised television appearances, social media, and of course podcasts, to bring science to thousands of homes and inspire many people (Hubbard, 2015). This approach reshaping how scientific information is sought and understood, but with the added effect of blurring the lines between scientists, journalists, and the public.

According to MacKenzie (2019), for most science podcasts there is more work done than there is revenue to make up for it, which pushes the narrative that many of these podcasts are produced by actual scientists on their own time, and (with some exceptions) without a major organization to back them. While there can be many reasons for someone to get into science communication, it appears that the desire to educate others on the varied findings and excitements that science can bring is a major one. Furthermore, increasing the public's appreciation of science, how it can influence people's opinions, and helping them make informed decisions in the complex world, are also important factors (Dietz, 2013; Fox et al., 2021; Leshner et al., 2017).

The participatory nature of new media environments such as videos and podcasts, presents unique opportunities for engaging the public (Yang et al., 2022). Social media platforms such as YouTube and TikTok provide great examples of how these individuals can interact directly with their audiences, sharing science and information, but also confronting stereotypes and creating a more inclusive portrayal of STEM professionals (Huber & Luis, 2023; Yang et al., 2022). Performing science communication on these digital platforms also brings many advantages to the makers of this content. It can bring new perspectives and ideas to creators, as well as provide metrics on reach and engagement, allowing them to get a clearer idea of what their audience thinks. This is particularly important if the goal of these science communicators is to build trust in science (Fox et al., 2021). In addition, this sort of two-way communication allows for the creators to have a better understanding of what their audience feels is worth discussing (Dietz,

2013). In the post COVID-19 pandemic era, science communication on these platforms has become stronger, possibly due to a whiplash effect in response to the multitude of events in the past decade (Neira et al., 2023).

There are further effects that the consumption of science media can have on its audience. As noted by Chen et al. (2023), it plays a pivotal role in not only educating but also in shaping the very identities and career aspirations of individuals, particularly students. These results seem to emphasize a complex relationship that can occur between technology, consumed media, and the development of individuals' identities. There certainly is an ethical aspect that comes into play in this field. The information and concepts can often be overcomplicated to someone that lacks the years of study necessary to understand the details. Therefore, when producing science communication content, it is key to decide what is worth including and what is not (Leshner et al., 2017). Effective science communication should strive to strike a balance between conveying necessary details and preserving brevity, ensuring that information is accessible without sacrificing accuracy or depth. If the wrong information is withheld, this may result in incomplete understanding at best and misinformation at worst. This is particularly relevant when considering the impact and power that some creators have, both within and outside the realm of science communication.

In addition, Huff (2022) writes about the damaging effects on mental health that increased news consumption can lead to. In science communication this effect can be seen, for example, by the news regarding extinct species or how much worse climate change has become (Einhorn, 2023; Plumer, 2023). Furthermore, the fact that much news information is increasingly being consumed through social media is a concern, as it can create a distorted perception of reality.

The Great Equalizer

Podcasts offer a unique platform for making complex scientific concepts more accessible and engaging to the public. By presenting science in a compelling and digestible manner, podcasts can help bridge the gap between the public and scientists. Their convenience allows for people to consume content at their own convenience, and thanks to the two-way communication inherent in online platforms, it encourages audience interaction and inclusivity. The interactive nature of social media platforms adds another layer. These platforms not only facilitate direct interaction between content creators and their audiences but also contribute to the democratization of information dissemination. While there are plenty of people who are using such platforms to benefit, the lack of gatekeeping means that ill-intentioned individuals have access to the same instruments (Gilmore, 2022). The internet has created an environment where different people with different backgrounds have the same type of apparent authority, making it easy for truths to be distorted and miscommunications to occur. This becomes a particular problem when individuals with a large audience wield disproportionate influence on discussions of scientific significance, disseminating misinformation, whether in good or bad faith, because enough of their followers perceive them as experts (Fox et al., 2021).

In *The Chaos Machine*, Max Fisher (2022) highlights the alarming impact of social media platforms, provoking violent events to unfold. In Fisher's book, Brianna Wu, a commentator on women's issues in gaming, explains that "social media platforms are designed for: 'We're right. They're wrong. Let's put this person down really fast and really hard.' And it just amplifies every division we have" (Fisher, 2022, Ch. 4.3 para. 16). The internet's information bubbles, seemingly credible yet often misleading, exacerbates societal polarization and misinformation. This phenomenon, as Fisher demonstrates with examples like the Rohingya crisis and the Capitol insurrection, underscores the dangerous consequences of unchecked algorithms steering users towards harmful content and

conspiracy theories, such as those propagated by figures like Alex Jones on his podcast (Fisher, 2022).

These challenges extend to science communicators who operate within the same digital ecosystem. The financial incentives tied to advertising and sponsorship revenue encourage content creators to prioritize views, watch time, and subscriber numbers, sometimes at the expense of accuracy and nuance. While boosting user engagement is crucial for effective science communication, the intense competition in the global content landscape can lead to shortcuts and compromises (Yang et al., 2022). Not every scientific topic is inherently sensational or constantly breaking news, yet amidst fierce competition, there's a risk that creators may prioritize attracting clicks over delivering rigorous and truthful content. This pressure often pushes creators towards sensationalism or "clickbait," which aligns more with algorithmic preferences than with genuine scientific communication.

In science communication, these challenges are particularly pronounced with controversial topics like global warming or the coronavirus pandemic, contributing to the spread of misinformation among the public with conflicting interests. In a world where everyone is equal, debunking this kind of misleading information can become a real challenge (Leshner et al., 2017). Despite these obstacles, such events can also lead to positive outcomes. In the case of the pandemic, the public has seemingly begun to recognize once again a greater necessity for professionals capable of effectively managing information, thereby reinforcing the perceived importance of explanatory and service journalism (Neira et al., 2023).

Having said this, there is still much work to do, and it becomes a duty for anyone participating in science communication, but also journalism at large, to have the public’s best interest in mind. Creating any kind of media, including a podcast, necessitates a comprehensive understanding of the reality we inhabit and the potential consequences of

misinterpreting its influence. Science podcast creators must conduct accurate research, upholding the principles of sound journalism, and creating an environment where listeners are able to make informed decisions on their lives.

The choice of a podcast-centric approach for this project stems from the characteristics of podcasts and science communication in modern times. Together, they create a powerful dynamic that makes for a more effective engagement environment.

Chapter 3: Methodology

For this project, the main objective is producing a podcast centered around the theme of movement. There are a number of steps and procedures to be followed to accomplish this goal. As with many other kinds of similar media, the work that goes into producing a podcast can be separated into the following three sections: pre-production, production, and post-production. The purpose of this section is to break them down and to explain how each will be executed.

Pre-Production

In pre-production the main objective is to have everything ready for recording of all the audio (production). The bulk of this section is made by gathering all relevant resources, planning ideas, and conceptualizing story structure for the podcast (Kern, 2008). Focusing the story should be one of the main starting points. Creating a focus sentence is a common way of narrowing down the scope of the project and what would fit in that narrative. In Jessica Abel's book *Out On The Wire*, Jad Abumrad, creator and former co-host of RadioLab, said that a focus sentence "gives you a path. And if you have that path, then you are more likely to get someplace worth going" (Abel, 2015, p. 53). To make a metaphor with the scientific method, the focus statement is essentially a hypothesis that one can use to as a guide to create an experiment, or in this case a story.

I began this project with a fascination with the idea of movement, and so that is what I based my early research upon. An initial major source of inspiration came from Mancuso (2018), bringing to my attention the very alive and moving world of plants. From there, I started grouping enough data and interesting information, eventually coming up with a focus statement to help me guide myself to the next steps. The focus statement for this story is the following:

Movement is an intrinsic part of our existence. It manifests in various forms across different scales and domains, contributing to the dynamic nature of the world we inhabit. But it is not always found where we imagine or how we imagine it. From the silent travels of plants, to the bold endeavors of human exploration. In this project, I want to delve into how movement defines lived experiences, and how it ultimately shapes life.

The collection of further information is the next part, as research can help gaining a deeper understanding of the topic itself, and how people's opinions might differ on a given subject. The idea is to identify potential sources to interview, and eventually to create an outline of the main story that is trying to be told, possibly with a few draft script lines, "leaving as little to chance as possible" (Kern, 2008, P. 76). The last steps are to finalize the interviewees and book them. Once all of that is taken care of, it is finally time to record.

The process of finding and recruiting people to be interviewed is one of the most complex steps of the process, as there is only so much a person can do and at one point it is up to the other people to get back to you. During the course of this project, I reached out to a total of twenty potential interviewees. Out of those contacted, six individuals accepted the invitation to participate. Four expressed interest but were unable to commit due to scheduling conflicts or other constraints. Three people initially showed interest but then ceased communication, effectively ghosting the project. Seven others did not respond to the invitation at all. I started the project with the intention of interviewing between 4 to 9 people. To illustrate the process, I will provide a practical example of how I successfully recruited Dr. Olga Kolbrún Vilmundardóttir for an interview. She is the first guest to speak on the podcast.

I began by reading numerous research papers on the Icelandic island of Surtsey, a topic of interest for this project. One notable paper by Magnússon et al. (2014) provided a

fascinating account of the plant colonization process on the island. Among the authors, Dr. Borgþór Magnússon, a plant ecologist, stood out as a promising interviewee. Further exploration of his work revealed that he had published extensively on this subject. A quick search on the Icelandic Institute of Natural History's website confirmed his affiliation, but the emails I found were outdated and undeliverable. I decided to call the Institute, where the secretary informed me that Dr. Magnússon had retired. However, she kindly provided a point of contact for him. Fortunately, Dr. Magnússon responded and, although he was unable to participate, he referred me to other researchers continuing the work on Surtsey. After several email exchanges with Dr. Vilmundardóttir, we scheduled an online appointment and had a productive half-hour conversation. This success contrasted with other instances where contacts did not respond, stopped communicating, or missed scheduled interviews. Despite these setbacks, I persevered and ultimately conducted interviews with six individuals, achieving my objective.

The role of these interviews is twofold. Having an expert weigh in on the topic not only adds authority to any claim I may make, but may also provide invaluable insights and ensure accuracy, enhancing the overall credibility and depth of the project's content. The kind of questions I asked depended on a few different factors, including what is unclear to me, what I believe would be interesting to hear their opinion on, and what they find fascinating.

By the end of pre-production I had decided what topics the podcast would be touching. The main story of the podcast revolves around the theme of life and movement. It begins with the tale of Surtsey, a volcanic island formed in the 1960s off the coast of Iceland, which was rapidly colonized by plant species like sea rocket. This narrative explores the remarkable journeys of plant seeds across oceans and the significant role birds played in transporting them to the island. The story then shifts to coconuts and palm trees, highlighting their importance in human history as versatile resources for early seafarers.

The podcast also delves into humanity's enduring quest for exploration, from ancient Polynesian navigators to modern space missions, emphasizing the continuous drive to discover and inhabit new frontiers. Through these interconnected stories, the podcast illustrates how movement is a fundamental aspect of life, shaping our past, present, and future.

Production

The production section is when the work that was done during pre-production begins to finally deliver. Once the equipment is ready it is now time to begin the interviews and to record them. The main narration recordings were performed through the use of a ZoomH5 Handy Recorder in a quiet environment to obtain the best possible audio. The format used was .wav, and at a sampling rate of 44.1 kHz and bit depth of 16 bits, which are all industry standards that allow for quality audio without sacrificing file size. As previously mentioned, I interviewed six individuals for this project. Due to factors like distance and availability, all interviews were conducted via Riverside, a digital video call service. Riverside records high-quality remote interviews directly from the interviewee's device, enhancing audio quality even when basic equipment such as earbuds or the device's native microphone is used. This method effectively prevents audio compression, ensuring the highest possible quality for the recordings.

Interview Protocol

During the interview process, it was important to ease the guests by asking them about themselves or starting with simple questions that they would feel confident answering. Maintaining eye contact, a friendly attitude, and doing my best to make the interviewee feel comfortable were key to capturing natural, high-quality recordings (Kern, 2008). The interviews were semi-structured to allow the necessary flexibility for discussing

the subjects in question. Once recorded, the major points of the interviews were transcribed using transcription software and manual transcription. The rest of the content was segmented into different topics to facilitate the post-production and script-writing process.

An important aspect to consider in this kind of project was how to interview the scientists themselves. Most of the people I ended up interviewing were professionals that were trained to talk to other professionals. This meant that they were more likely to use specific terms, or take certain knowledge for granted. Therefore, as the interviewer and intermediary between the scientists and the audience, it was my duty to facilitate communication.

There are a few techniques that can be used to achieve this. It is crucial to do your homework on any given guest. Understanding their background and the topic that is to be discussed will help you know better what questions to ask. However, during the interview it might be beneficial to "play it dumb", meaning that even if you already know something, sometimes asking it anyways can lead to great tape. It can also help the interviewee get in the mindset that they are not talking to another scientist but to someone who doesn't know anything about the topic. This approach can help reduce the use of very technical language or complicated explanations, making the conversation more accessible to the general audience.

Post-Production

Post-Production is where the magic happens. So far most of the work has been mostly theoretical, but at this final stage we take all that has been worked on and transform it into its final form. A big part of post-production is the writing process, taking all the research, interviews, and ideas and turning them into a cohesive story. In the same way a sculptor would have had to come up with an idea of what to sculpt, research what kind of stone they would need, and procure the necessary materials, post-production is when you

begin to shape the actual stone. There is not any specific way to begin the writing process, and it really is up to one's creativity and imagination. In Abel (2015), Ira Glass notes that going in chronological order is typically a good way to get started, as it creates momentum in a story. However, by changing up the order of events, for example by putting the climax of the story at the beginning, the audience can be captivated by the mystery. Ultimately, however, it really is up to personal taste.

If we were creating a statue, editing would be the action of hammering the stone. In this project, Logic Pro has been my editing software of choice. Once again, editing is a very subjective process. For me, editing and writing happen almost at the same time. As I write, I also reproduce a mock version of what I have written on Logic Pro, so that I can have a clear idea of what it actually sounds like. Using my notes from pre-production and production, I then begin to construct the actual story. Each topic was selected to fit within the overarching theme of life and movement, maintaining a coherent and logical flow. To transition between segments, I ensured that each one not only followed the theme but also had connection points to what came before and what would come next. For example, coconuts were included as a segment because they connected well with both Surtsey and Polynesians. Throughout this process, I added any relevant audio from the interviews, as well as sounds that supplement the story. Incorporating the interviews depends on what I want to convey and the best way to say it. Sometimes, I take aspects of conversations I had with the experts to guide me through a specific block. Other times, I write what I want and implement a good quote or sentence from an expert if it comes to mind.

To enhance immersion that would otherwise not be possible, music and sound design were implemented. For example, if the story is taking place in a sea, there can be the sound of waves and wind. If there is an action being described, like building a boat, we could hear the hammering of the wood. All these elements are not just additions to the narration, but are actually nonverbal aspects of the narration itself. Music has a similar

effect, being able to convey the emotions of a moment. These are very powerful tools, if used incorrectly can ruin the mood or even alter the meaning itself of the words that are being spoken, but when used wisely can in fact create a further dimension of storytelling.

Once everything was put together, however, there was one last very important step, the edit, not to be confused with editing. So far most of the work had been done by me, the person that produced the piece; however, barely anybody has heard it, so how can one know if it is hitting where it should? The idea of the edit is that a third party listens to the piece and lets you know what they think works and what does not. This can be even simple things, such as "I liked/disliked this," as well as more complex notes on the structure of the piece itself. This process helps to refine the work, so as to deliver the best possible version. For this process, I sought people who understand audio productions, as well as lay people. A diverse feedback helped me understand what needed to be clearer, what did not land, what should be added, and what should be tweaked. Professional opinions can inform me on more technical aspects, such as story elements and use of music; however, lay people can actually let me know if they enjoyed it, since at the end of the day they are the target audience for this type of production.

Chapter 4: Results

To achieve the goal of creating an effective piece of science communication, 6 professionals in relevant fields were interviewed. The interviews served to add authority and ensure accuracy, enhancing the podcast's credibility and depth. For the interview process, the questions were individually tailored to each person with the purpose of addressing any unclear topics, interesting perspectives, and the interviewees' fascinations. The focus of this section is to look into each interview and in what manner they contributed to the project. The interviewees will be discussed in their order of appearance on the podcast. Some of the quotes that were selected have been edited for the purpose of conciseness.

Dr. Olga Kolbrún Vilmundardóttir

Dr. Olga Kolbrún Vilmundardóttir is a researcher from the Icelandic Institute of Natural History. As previously mentioned, I was able to interview her thanks to a recommendation from Dr. Borgþór Magnússon. Following his retirement, she became one of the researchers that is continuing the work on Surtsey. From the very early stages of the project, it was clear that Surtsey would be a formidable starting point. Thus, being able to interview someone who had been there and was familiar with the ongoing research was very important. She would provide firsthand insights and valuable context.

Despite the time difference we were able to schedule an interview for a time that would work for both of us. The interview was held over Riverside and lasted a little over 35 minutes. As with many of the people I interviewed for this project, it was her first time being interviewed. She began speaking in very concise terms, as if addressing other scientists. However, as time went on, she began to relax a little. It is at this point that she shared some of my favorite quotes throughout the whole interview, some of which made it

to the final podcast. The following quote recounts her thoughts on her first visit to Surtsey. Very few people will ever be able to visit the island, let alone visit it multiple times, making her experience quite special.

> It is an exciting and special experience to go to Surtsey. I was thinking, ah it's a small island, probably won't take that much effort to cross it ahaha … but when I landed there I realized "wow it's an island with a quite diverse landscape surface cover!" It had much more diversity to it than I anticipated.

Her contributions go beyond good quotes. While talking I was able to learn about aspects of the island's ecology that I could not have obtained through my research alone. One of the things she particularly cared about is that I would be able to accurately paint a picture of the complexities of Surtsey's ecosystem. In an attempt to honor her wishes, I accidentally stumbled upon what would become one of the main themes of the podcast: interconnectedness. Despite the podcast focusing primarily on movement through the lens of life, the theme of interconnectedness surfaced consistently across various topics, even when I was not necessarily looking for it.

Dr. Alvaro Montenegro

Dr. Alvaro Montenegro is an associate professor for the geography department of Ohio State University. I had previously read a few of his research articles in various topics such as plant species and humans crossing oceans. I initially contacted him with the sole intention of discussing the Polynesian expansion, but as we were talking, plants naturally made it into the discussion. When talking to him I was particularly interested by what he had to say about the bottle gourd. Originally, I was planning for the podcast to head

directly from Surtsey to coconuts: however, I found that the story of this plant's spread across the globe was too interesting not to mention.

As a rare exception for this project, he was very responsive with his emails, rarely taking more than a few hours to respond. As such we were able to come up with an interview time and day fairly quickly. We spoke through Riverside for about 35 minutes. As mentioned, most of the questions I had prepared were centered around the Polynesian exploration of the pacific. Although I found the plant aspect of our talk to be unexpectedly relevant, the Polynesian part was also quite relevant. He was able to guide me and clear up certain doubts that had formed during the research phase, such as the true connection between individual islands and how these people were able to navigate through such a large body of water thousands of years ago.

One aspect that I particularly appreciated about him was his down-to-earth talking manners. As an example, here is how he described the process of geneticists collecting global bottle gourd samples and using genetic markers to estimate divergence times and evolutionary relationships through genetic clock analysis.

> Geneticists went around, got samples of bottle gourd from around the world and did that genetic thing that they do. Trying to separate certain groups from others using the genetic clock. And they discovered that the American gourds were more closely related to the African than the Asian gourds.

His ability to simplify complex scientific processes made the information more accessible and engaging for a general audience.

At the end of our conversation, he recommended some potential sub-topics for me to explore, such as navigation and trade in ancient Europe, as well as possible interviewees

who could provide great conversations and ideas on those topics. Unfortunately, however, these interviews never materialized for various reasons.

Tobias Spanner

Tobias, also known as Toby, Spanner is the director of the International Palm Association, as well as the founder of rarepalmseeds.com, one of the largest suppliers of palm seeds in the world. He is also the author of a handbook on growing palms and several journal articles on the topic. His name was recommended to me by Jeremy Evanchesky, the next guest that will be discussed. Toby Spanner's extensive background on the topic made him a valuable source for the coconuts section of the podcast. Being based in Germany and having a filled schedule delayed his interview until very late in the process. By that time, I had already begun post-production. On the bright side, however, I was able to ask him questions that helped fill certain gaps in my knowledge and the podcast. I wouldn't have known about these gaps until I reached that point in the process.

We spoke through Riverside, and our conversation lasted a little under 30 minutes. During our discussion, Toby shared his insights on various species of coconuts and their unique growing conditions. A particularly interesting point we discussed was the fascinating and sometimes similar ways in which plants propagate themselves. In one instance he claimed, "It's quite staggering, I find, what sort of shapes nature comes up with, and how well some of these things fly or float." Toby's enthusiasm for botanical diversity was evident as he described the ingenious methods plants use to spread their seeds across diverse landscapes and environments.

Jeremy Evanchesky

Jeremy Evanchesky is the membership chair for the Central Florida Palm & Cycad Society. I was put in contact with Jeremy after reaching out to the society. He has been the de facto spokesperson for a few years and has grown many varieties of palms, including coconuts, for over two decades. His expertise and practicality were invaluable in providing accurate accounts of the many uses of coconuts.

Among the topics we discussed were the resilience of coconut palms and their history with navigation. I found him particularly effective in demonstrating the usefulness of coconuts in a navigational context. His logic and practical examples made it easy to understand what he meant. The following quote demonstrates this:

> If me and you were on a ship and we got a lot of coconuts and we know we're gonna be running a certain route, if we get somewhere where there's no coconuts, and we need to set up a place to resupply. The first thing we're gonna do is go in there and get a bunch of coconuts and put them down in the sand, and if they sprout now we got a place to resupply.

There was one obvious challenge with Jeremy: the quality of his audio. Due to logistical constraints, despite being the physically closest guest to me, we still had our conversation through Riverside. The recording lasted about 45 minutes, although we spoke for some time after, expressing our fascination with the world of plants. Unfortunately, I did not catch the extra noise coming from his room during the recording process. By the time the session was completed, it was too late to fix the noise levels in his audio significantly. I was still able to clean it up enough to make it intelligible. Unfortunately though, bad audio will remain so.

Dr. Silvia Geraci

Dr. Silvia Geraci is an Archaeology Ph.D. candidate from the University of Verona. She was very kind and accommodated my schedule despite the time difference and other difficulties. In one email, she explained that when our mutual contact mentioned the project's topic, she was immediately on board, as it is a subject very close to her heart. I didn't know this when we first got in touch, but her doctoral thesis actually focuses on the movement and interconnectedness of ancient Rome and Greece, making her the perfect guest for the podcast.

The questions I had prepared were designed to talk mainly about the connectedness of the ancient world and how people moved from place to place. What I did not expect, but was more than happy to find, was the big parenthesis we took on the topic of globalization and migrations. Between the concepts of cyclical mobility and the effectiveness of modes of transportation, our 34-minute conversation was enlightening and engaging. Out of all her quotes, there is one that really stuck with me, which I ended up including in the final version of the podcast. She said, "I think the human being is born for stability, but strives towards movements."

The biggest difficulty during this interview was probably her mastery of the English language. While I believe she spoke it quite well, there were many moments during the recording where she took pauses between words to think about the correct next step. While this is not inherently bad, it did make it difficult at times to follow her train of thought. Knowing the average English level of Italian speakers, I initially offered to conduct the interview in our native language, as I was prepared to have someone else dub any relevant quotes. However, Silvia chose to have the entire conversation in English, and I believe she did a great job. Additionally, the fact that she did not feel entirely comfortable speaking in English and that it was her first time being interviewed resulted in somewhat slow and timid speech. Through a combination of editing her sentences to shorten the

pauses and strategic interventions in my narration, I was able to make great use of our conversation.

Dr. Amy Williams

Dr. Amy Williams is an astrobiologist from the University of Florida. She has been a member of the NASA Curiosity rover science team since 2009, and much of her research focuses on microbial life, particularly outside Earth. Other than her expertise on the topic, I was familiar with her work from my time as an intern at Central Florida Public Media, formerly WMFE, where she is a recurring guest on the show "Are We There Yet?" Her familiarity with the interview process and science communication, together with her professional expertise, made her a great guest for the podcast.

After coordinating a mutually convenient time, our conversation on Riverside lasted about 27 minutes. Initially centered on the possibilities of extraterrestrial life and human exploration beyond Earth, the interview took an intriguing turn towards the ethics of human space exploration. As we spoke, it came out that the topic had been something not only the both of us, but many other scientists increasingly thought about. When I asked her about her opinion on what the future of humans on Mars, she responded,

> For some people the next step is a sustained presence, or colonization. And that does make me uncomfortable, because humans don't have a really good track record when we try to settle in a new place. We tend to disrupt the existing ecological system.

On a personal level, it was validating to hear that many other professionals not only shared similar thoughts but also shared my level of concern. For this reason, I decided to include this final discussion in the podcast. While human space exploration offers

countless topics for discussion, it's easy to get carried away with excitement. Therefore, addressing something that not many like to talk about felt justified and necessary.

Conclusion

The interviews with these six professionals helped to significantly enhance the podcast. Each of them was able to bring insights and perspectives that enriched that narrative in ways that were unexpected at the time of recording. Dr. Vilmundardóttir sharing her experiences on Surtsey offered valuable ecological knowledge on the island and on the interconnectedness of it all. Dr. Montenegro's explanation of the spread of the bottle gourd and of Polynesian exploration gave a global perspective of the topic. This was further emphasized by Toby Spanner and Jeremy Evanchesky's contributions with their knowledge of coconut palms. Dr. Geraci expanded the discussion introducing a historical dimension and adding depth with her discussion on globalisation and migration in ancient Rome. Finally, Dr. Williams was able to enrich the podcast by adding a layer to the discussion through the topic of space exploration ethics, highlighting some important considerations for humanity's future beyond Earth.

I found all these interviews to have been crucial for the success of the podcast. Talking with these people I was able to understand better what I would be discussing. This allowed me to create an even more informative and engaging production.

Chapter 5: Discussion

I have always found it interesting that when discussing the creation of something, whether it be a story or a scientific theory, one of the most common questions is on how the idea came up in the first place. However, that is possibly one of the hardest questions. One could go on for hours talking about editing techniques, audio quality, writing preferences… but being able to capture a series of internal thoughts, or the moment a decision was made, feels almost impossible. That moment when out of nowhere the multitude of thoughts and concepts coalesce into one solid idea. I would argue that in a way, the idea of it had been there for at least a little while. A whole lifetime of thoughts and experiences, that branch out into more and more, without any real purpose, other than for the sake of the idea itself.

You could say that the idea of *Reality in Motion* began in December 2023 when I settled on what this project would be about, but in truth many of the topics that were discussed in the project can trace their origins far before that moment. The sections of Surtsey and coconuts, for example, had been inspired from reading Mancuso (2018) years prior, and can trace their origins from even earlier when my fascination with plants first began during my childhood. All of this is to say that truthfully I do not know when or how the idea first came to me. Very simply, one day it simply appeared, and I loved it so much that I dedicated the next several months to it.

Very early on, in the early stages of this project, I knew what genre this podcast would be. One the one hand, science has always been a great fascination of mine, which is what inspired my pursuit of a degree in astrobiology for my undergraduate studies. On the other hand, however, in the past few years I have been able to learn to appreciate media more and more. It then felt natural for this to be a science communication project. Podcasts are a medium that I found to be uniquely captivating, and that allowed me to express

myself in ways that I had never been able to. These factors allowed me to maintain excitement and a positive attitude even in the face of the harshest challenges that I faced during the creation of the project.

One of the harshest challenges was certainly the recruitment of guests to interview for the podcast. While some of the people that I contacted were able to respond within reasonable timeframes, I never received a response from many. At times, this made it difficult to know who to contact next, as I did not want to run the risk of interviewing too many people for the same topic. On the other side of this spectrum, there are other people that initially agreed to an interview, but that unfortunately never showed up for it. This made much of the production process somewhat disheartening, as time was passing by and options were becoming limited. Thankfully, I was able to interview enough people to make the podcast work; however, there were plenty of moments in which I was afraid I would not be able to do so.

As previously mentioned, by the time post-production began, I was still missing two guests, and given my previous track record with interviews that failed to materialize, there were no such guarantees. Thankfully, my worries were unfounded, and in the end I was able to talk to a great variety of experts. Overall, I am particularly happy with the way the interviews resulted. With the exception of one, where unfortunately the audio resulted to be noisier than the others, the audio was clear, I was able to get great quotes, and I believe that all the conversations I had with them added great value to the podcast.

While I would not necessarily describe it as a challenge, the writing and editing process were certainly not a walk in the park. Making sure the audio levels were right, timing when the next sound or sentence would start playing… while not necessarily complicated, these were pretty tedious tasks that required a lot of effort and attention to details for hours at a time. Eventually though, I was able to get into my zone, reaching a state of focused productivity where the work flowed more smoothly and efficiently.

Writing, however, I faced other difficulties. While I did have a rough outline to help guide me through it, there were plenty of moments in which even adding a single sentence felt like an impossible problem. Plenty of time I kept asking myself, “How can I connect these two ideas?” or “This sentence is absolutely meaningless!” On certain days, I could spend entire hours working, only to see the runtime increase by a couple minutes. Thankfully, through a combination of “aha!” moments and persistent effort, I was eventually be able to overcome these hurdles.

One of the major challenges in science communication, which was also previously discussed in the literature review, is the difficulty in effectively bridging the gap between technical expertise and public understanding. Many times lacking training in communications, scientists and other experts can struggle to relay complex ideas in an accessible and engaging manner to the general public. This aspect was a central consideration during the development of *Reality in Motion*. My objective was to translate a complicated topic into a package that offered a compelling narrative to listeners of many different backgrounds. To make sure I achieved this, when sharing the podcast for the edit I specifically searched for intellectual variety and diversity in that aspect as well, sharing it with people that had little to no scientific backgrounds, and others who had either pursued degrees in STEM or are currently working in the field. They unanimously found it to be quite informative and entertaining, confirming to me that the podcast was accessible and engaging to many different groups.

Overall, I am happy with what the podcast became. One of the best moments was when I started sending it out to some people for the edit process, and they began to tell me what their thoughts were. The response was overwhelmingly positive. I could not believe it. Not because I thought it was bad or was unhappy with it, but simply, I assumed people would find many problems to work on for the final version. Instead, everyone I shared it with expressed great enjoyment while listening. There were of course some notes here and

there, but they were mostly small modifications, such as volume levels needing some adjustments or a sound effect being somewhat distracting, but everyone seemed to like it. Some specific comments highlight the general sentiment particularly well. During the pre-production stage, one individual initially doubted the topics I planned to discuss, but upon listening, immediately changed their mind. Another person, who typically dislikes podcasts, remarked that "this one checked all my boxes. [...] It's so good. Fastest 29 minutes of my life." Many listeners expressed a strong desire for more after the podcast ended, indicating its success in both informing and entertaining. By presenting complex ideas in an accessible manner, the podcast seems to have effectively engaged its audience and sparked further exploration into the topics discussed. Such positive feedback suggests that they would be likely to return for future episodes and to possibly recommend it to others, essentially achieving one of the main necessities for good science communication online.

This was a nourishing experience for me. Not only did it solidify my intentions to pursue a career in science communication, but it also helped me better understand the medium I want to achieve this through. I plan to upload this podcast through the main platforms where people can listen to it, such as Spreaker, Spotify, and Apple Podcasts. Additionally, I will be pursuing possibilities for this to be published by some companies. Working on this project had its ups and downs, but I am very satisfied with the way it turned out, and I look forward to working on more in the future.

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Appendix

The following pages include the script used for the podcast. To make it clearer for readers, the words spoken by the guests are underlined. While this script is largely accurate, there may be minor differences between the script and the final podcast.

The Podcast Script

It is a cold morning off the south shores of Iceland in November 1963.
A cook on a fishing boat is the first to notice a large column of smoke coming from the horizon. The faint sound of explosions does not bode well. Could it be a fellow fishing boat needing help? Better not leave it to chance.

So the captain orders the ship to go investigate. But Upon arriving at the site, it is clear that it's something completely different.
A violent combination of explosions, ash and lava.
A volcanic eruption is coming from very deep under the ocean. And it has finally made its way above sea level.

The eruption would continue for the next few years. A cycle of magma escaping from within the Earth and solidifying upon contact with the sea water. But From this, a brand new island was born: Surtsey.

Olga: <u>and in 1964 scientists saw that there were some seeds that had washed up on the shores of the island. There biologists realised that we have this huge opportunity to monitor colonisation of life on this new surface</u>

So, Surtsey was turned into a natural reserve, and only a handful of people were allowed to go there.
Dr. OLGA KOLBRÚN VIL-MUNDAR-DÓTTIR is one of the few researchers that is allowed on the island. She has been going to Surtsey since 2021.

Olga: It is an exciting experience and special experience to go to Surtsey. I was thinking, ah it's a small island, probably won't take that much effort to cross it ahaha but when I landed there I realised "wow it's an island with a quite diverse landscape surface cover". It had much more diversity to it than I anticipated.

Indeed, the island's diverse landscape is a testament to the dynamic processes that shaped it. Surtsey is not just a rock in the North Atlantic. It's alive. And it's a place where scientists like Olga can witness the birth and evolution an an ecosystem, from scratch.

Olga: When you come again later, to visit the island, you get like another dimension of experience in the island. You have to start considering "why are these plants now so prominent but they weren't last year?". You know " why is it so much dryer?" "I can see that the island has eroded a couple of meters since last year". It is changing very fast.

It's really amazing how fast life started on the island.
By 1965, just a couple of years after the island appeared, a type of (h)erb called sea rocket had already started growing there.
But it makes you wonder: How did life show up so fast, and what made it happen at all?

Hello earthlings out there, my name is Alessandro Bonaiuto, and you, are listening to the Made on Earth podcast.

In this episode, I want to tell the story of life and movement. I want to take you on our journey to uncover the hidden rhythms of existence. From the silent travels of plants, to the bold endeavours of human exploration. We'll explore the many ways in which movement manifests, especially where you may least expect it.

Ok, so, let's take a step back. A brand new piece of land is brought forth by volcanic forces from the depths of the Atlantic ocean. It's raw. Untouched. And yet, this unassuming plant, about the size of a loaf of bread, was able to find this place and make it a home.
Sea rocket is not a plant that looks particularly interesting at first sight. Its leaves are long and fleshy, like thin blade of grass. it grows in clumps, and likes to show off its small purple flowers. And yet, what you would not be able to imagine just by looking at it, is how much of an old salt they are.
Sea rocket thrives on coastlines worldwide, spanning from northern Africa and Europe to parts of Asia and North America. It's seeds can handle years of journey at sea like it's no big deal really. And like a botanical Tony Stark, it's equipped with cool gadgets for survival. The seed pods are double jointed. So when mature, one half gracefully descends near the parent plant, and the other embarks on an oceanic odyssey.
SO, it tracks that sea rocket would be the first plant to establish itself on Surtsey WHILE it was still forming. But of course, wondering through the ocean was not the only way plants arrived there.

Olga: I mean, already when the island was forming, scientists observed birds landing on the island, and in 1970 the first birds started laying their eggs there

By 1985 seagulls were starting to form a colony on the island.

Olga: not only did the birds bring in material to build their nests, but they also brought in seeds

Sometimes they got attached to the feathers, or were previously ingested by the birds. But in one way or the other, birds became one of the major transporters of plants to Surtsey. After all, I suppose that having wings does give on that edge

Olga: Yeah haha flying helps a lot, and if you can't fly, you hitch a ride.

Surtsey is teaching us a lot about the interconnectedness of ecosystems, and the importance of what new arrivals can bring.

Olga: Seabirds colonised the island and were these big ecosystem changers. And this did not only impact the plants, but also the soil, insect life and so forth.

It is estimated that 2 to 5 new plant species arrive on Surtsey every year. And As of 2008, 69 different species had been identified.
The case of Surtsey is incredible. But it's not the only case of plants finding a home overseas.

When we think about our planet's oceans, it's easy to just see it as a lot of water with some fish in it . But just like with sea-rocket, looks can be deceiving.
They are in fact one of the greatest highway networks of the world. With thousands of home-seekers voyaging through it every day. So, let me tell you about some old companions of humanity .

Alvaro: The bottle gourd was one of the first plant domesticates that we have as humans. It predates what we would call agriculture by many tens of thousands of years.

This is Dr. Alvaro Montenegro, a professor from the geography department of O-Hi-O State University.

Alvaro: And people would have trees of the bottle gourd. You can eat it, you can use it to make bottles, so it's a very useful plant.

And this usefulness was recognised by ancient humans. The bottle gourd started making its way around the globe. So when people found it in the Americas, it was just assumed that humans had brought it there.

Alvaro: Geneticists went around, got samples of bottle gourd from around the world and did that genetic thing that they do. Trying to separate certain groups from others using the genetic clock.

They found that the American bottle gourd was separated from the old world lineages by more than sixty thousand years. Interestingly, they are also more closely related to the African than the Asian gourds.

Alvaro: Which would further complicate the idea that it was being done by humans. We know that bottle gourds float for about a year, so I just made the model to make the bottle float from Africa. So that would be the most likely source of an American bottle gourd.

Floating from one continent to the other. Just like that. Sweet potatoes are also known for having done a similar voyage. In fact it seems likely that potato seeds were able get from south America to Asia.

But if we are talking about colonisation of new lands, then we must also discuss … coconuts.

Coconuts are great at getting around. They ride ocean currents to find new shores and they start new colonies there. Coming up is Toby Spanner, the director of the International Palm Association.

Toby: The coconut is made up of the hard shell that you know, And then inside that shell is a cavity that's usually partially filled with liquid, and there's like an airspace that sort of helps with buoyancy.

And to wrap it all up, the "Fruit" if you will, it's really just this corky substance that keeps the coconut safe and helps it float.

Jeremy: They're a natural coloniser, and they benefit other species like us that want to colonise.

Jeremy Evanchesky is the membership chair for the Central Florida Palm & Cycad Society. He has been a palm enthusiast for over two decades.

Jeremy: First they can float, they can stay viable anywhere from 6 months to a year before they wash up on a shore and sprout.

And they’re really not that picky.

Toby: They’re very specifically adapted to sandy beaches.

And unlike many other plants, they don’t mind the occasional salt water inundation. This gives them access to exclusive territories.

Toby: They sit in salt water for part of the day, and once that goes down they get some fresh water that sort of pushing out through the sand. And I think that’s sort of the secret to the coconut’s environment. They can survive in any place that has fresh water pushing to the ocean

Jeremy: Really the only thing that will stop a coconut from growing is an inhospitable climate.

These floating seeds have been nature’s way of spreading life across tropical coastlines for millions of years.

Toby: It’s quite staggering I find, what sort of shapes nature comes up with, and how well some of these things fly or float.

It's amazing to think about how coconuts have shaped the environments of so many tropical regions. They’re not just trees; they’re vital parts of their ecosystems, supporting wildlife and even human communities.

Toby: we know from Polynesian culture that they brought coconuts everywhere they traveled and planted it

Basically, they are kind of the Swiss army knife of the sea-farer

Jeremy: One of the things you battle is that you're surrounded by water but it's all salt water, and you need fresh water to survive. Well coconut water, you can drink it and it's very refreshing. And the meat is very nutrient dense, it has a lot of healthy fats in it.

So they offer a very calorie dense food, a refreshing drink, AND they already come wrapped in their own nature-made can? It's actually a pretty good deal

Jeremy: And once you are done with it on top of that If you need to be warm you can burn the husk. So just the nut itself provided a lot of things to people who were trying to colonise other areas. Just like a coconut would float on its own and colonise something else.

So it seems like coconuts played an important role in the lives of early seafarers and settlers in the pacific and other tropical regions. Their ability to provide essential resources made them invaluable for anyone trying to survive the open waters.

Jeremy: If me and you were on a ship and we got a lot of coconuts and we know we're gonna be running a certain route, if we get somewhere where there's no coconuts, and we need to set up a place to resupply. The first thing we're gonna do is go in there and get a bunch of coconuts and put them down in the sand, and if they sprout now we got a place to resupply.

In certain Polynesian cultures coconut palms where known as the “tree of Life”. And its uses go beyond being a snack-in-a-can. The wood would be used to carve drums for rituals, or small canoes and food containers. The leaves could be woven into baskets or fans. And the husks can be also twisted to create nets, or for rigging canoes. Religious meaning was also attributed to coconuts. In ancient Hawai’i opening an unripe coconut for the gods was an act of devoutness.
In the vast expanse of the pacific ocean, where navigation was an art, and survival depended on resourcefulness, the coconut palm became a lifeline for many people across thousands of years.

The story of how Polynesians colonised the Pacific is one of the most remarkable feats of humanity.
But what drove these people to challenge the largest body of water on the planet?

Alvaro: The pacific of course is in many ways more intriguing given the distances that these people covered. But on the other hand, humans with faced with water tried to get to the other side for literally hundreds of thousand if not millions of years before that, right?

Even way back, early humans were crossing bodies of water, sometimes covering tens of kilometres. The same drive that pushed early humans to venture out and see what's beyond likely motivated the Polynesians to explore new islands.

Alvaro: But it’s also not surprising. That’s the other thing, right? It’s happened so many times before, over so many impressive distances… but the idea of looking out in the ocean

and trying to go to see what's beyond the horizon, quite literally is, I think, a motivation as followed even before we were the species that we are today.

And it's important to note that this didn't happen in a vacuum. These people didn't just spontaneously appear in the middle of the Pacific ready to go on boats. They were part of a long tradition of exploration and seafaring.

Alvaro: These were all amazing sailors already. They had great sailing technology, they had great navigational skills. They were tracking resources, and traveling, exchanging things between islands. But the region from where they came from, people had been around and occupying those islands for tens of thousands of years before the Polynesian expansion began. So there must have been some very deep Enviromental, technological, understanding of what navigation is

At this point in my research, I started wondering how interconnected these islands actually were. After all, it's the Pacific Ocean. It's not exactly a exactly pond.
So I asked Alvaro

Alvaro: I think the archaeological record is pretty clear in showing that there was exchange of material between those islands. It wasn't something simple that people did on a whim. But people did it.

They knew were the islands were. And they had the skills and resources to take on these voyages. Of course, some islands were more isolated than others. And some even had to be abandoned at some point, for one reason or another. But Still, they maintained a strong cultural and linguistic connections despite the enormous distances

Alvaro: People in Hawaii and New Zealand tell stories of where they come from. But they have a cultural continuum there.

It's difficult to imagine the problem that peoples from the past had to face. So it feels weird when you realise that they were just like to us. They had similar needs and wants. and at the end of the day, most of them probably just wanted to find a good place to live with their loved ones.

Silvia: I think the human being is born for stability, but he strives towards movements.

Dr. Silvia Geraci is an Archeology PhD candidate from the University of Verona. Her interests led her to study the movement and interconnectedness of ancient Rome & Greece. And despite what one may think, globalisation and connectivity had significant roles even in their lives.

Silvia: it was a prerogative of the ancient society because the ancient world depended on mobility for survival and growth.

Today we are used to have immediate contact with people around the world, so the idea of movement and communication has taken a bit of a different connotation. While it was still faster for messages to get to destination, it would still take several days. And physically moving a person was a whole different deal.
For people, sea transport was the quickest and therefore preferred mode of transportation.

Silvia: But it also concerned dangerous things like weather problems, like the wind, currents the visibility. But also social dangerous things like piracy.

But luckily they were able to find safe ways to move around. The practice of cabotage was adopted. It involved navigating along costal routes only. Going Port to port. Harbour to harbour. Taking the safest route even if it's not necessarily the fastest.
After all, it's certainly better to get there safe and a bit slower, than risking to of not getting there at all.

Being able to efficiently move people and objects through great distances was actually something that the romans particularly excelled at. And their road networks are probably one of the maximum expressions of this.

Silvia: The romans did not invent roads. But, as in many other fields, they took an idea from the previous periods, and really extended this concept.

Over the course of the centuries, it is estimated that the Romans built over eighty-thousand kilometres of paved roads. That's enough to go around the earth TWICE! That's crazy!

Silvia: They used the roads for the troops, but also for the wheeled vehicles. For commerce, food and equipment. It was very important for them to find a way to demonstrate their authority in all the imperial territories.

Seeing how important it was for their society, it makes sense that they put so much effort and care in building and maintaining a path that was stable.

Roman engineers wanted to create the easiest, fastest and most useful way to join one point to another. Natural barriers like mountains and rivers were a big issue. So their objective was to find a way to avoid and overcome them as much as possible.

And there were many reasons to move in this ancient times.

Silvia: you could move for work or you could also move for family. Because if we think about female mobility in the ancient world, if your husband works in Greece, you have to go with him.

But even if you lived your whole life in one place, there were still many opportunities for outside influences.

Silvia: All the society at the time was very touched by mobility. if you stayed in your hometown, you also would be affected by mobility because, you'd find a Greece person that is the slave of your neighbour, or a Phoenicians.

If you were paying attention earlier, you may have noticed that I described this ancient world as "globalised". And it's not an hyperbole or a joke.

Silvia: Now we live in a world that is globalised, but many scholars also study this approach to globalisation in the ancient world. And we can say that the period I study, it Was really a globalised world.

In Roman writings of the time, we can find mentions of how movement and globalisation were perceived. Comedic play writer Plautus offers us a glimpse of this.

Silvia: His characters move through, what seems like borderless world. It was full of foreigners that interact with each other.

But unlike today, movement was rarely linear. Simple migrations of individuals, moving directly from one place to another, were less common.

Silvia: On the contrary it was mainly a cyclical mobility. Meaning that moving to a place would also contemplate a quick return, or a brief stay.

But whole family groups were also known to move. Let's say you have a cousin that lives in Amsterdam. If you had to move, you'd be more likely to go there than somewhere else. and the rest of the family might follow. This is called Chain migration.

Silvia: And also in ancient times there were these kinds of chain migrations. Because we can find clusters of families bearing the same cognomen or surname

Reflecting on the concepts of movement in modern and ancient times, leaves me thinking about it all at a much larger scale.

Just like our ancestors traversed the world, humanity today stands on the brink of exploring new frontiers far beyond Earth.

Space agencies around the world are scrambling to bring humans back to the Moon. Many consider our upcoming little "moon getaway" as a rehearsal for a first steps on Mars.

The next few decades are presenting themselves as very exciting for space exploration. And with all these impending missions, it might be worth taking a step back and consider what could be waiting for us out there.

The universe is a lot of things. It's vast and mysterious. Full of potential. it's where I keep all my stuff. But also it's deadly. It's actually very deadly.
From five-digit temperatures and the coldest anything can be. cosmic radiations and the good old lack of air.
There is so much that could mark the end for a human.

All of this just makes it so much harder when it comes to space exploration. Let's take Mars for example. It's the most likely candidate for humans to go hang out, but it comes with so many problems. The Air is … definitely not great. The temperatures reach a nice and comfy average of negative sixty degrees celsius. And it's so small the Roman roads would have gone around its circumference FOUR TIMES! This means less gravity, and atmopsher-… you get it. It's just not a great place to be. But maybe we can make it more like Earth?
Lets ask Dr. Amy Williams, an Astrobiologist from the University of Florida.

Amy: It is into the realm, I think, of science fiction still, to think about truly terraforming a world. Changing the atmosphere, making into something Terran-like. You know, habitats are probably the way that we would have a more sustained presence, certainly on the moon, and likely on Mars.

Ok, domes. I guess we can make domes work. But Let's face it, humans are really not made for this kind of travel. Thankfully we can, and probably will technology our way

through most of these problems. But while it will take us decades, if not centuries, of science and engineering to just figure it out, there are others for whom this comes more… natural .

Amy: you know, when we think about what is comfortable as far as human existence, it is so much grander when you think about other organisms on earth.
As an astrobiologist I think a lot about microbial life, so things like our bacteria.

And it's not just bacteria. There are so many different kinds of microorganisms that have been found to live in really extreme, and frankly ridiculous environments

Amy: High and low pressure, extreme aridity. Extreme temperature differences, like, they can live in ice, they can live in water that should be boiling but due to high pressure it's not quite yet. There are organisms that can live in the water in a nuclear reactor. Life has just find the way to live in any possible way to live on Earth.

And Jurassic Park Jokes aside, this list of impossible places for life doesn't end there. Remember Surtsey?

Olga: There was a drilling project in Surtsey where they tried to drill into the centre of the magma channel and now there are some interesting results coming out of this drill core. There is life in the rock itself.

Amy: you know sometimes I think we might underestimate what microbes are capable of. I spend a lot of my time thinking about mars and how life could have arisen on Mars and could it have survived to today. And often times we think about the radiation sterilising the

environment on the surface, the extreme aridity. I mean all of these things together, it seems pretty inhospitable, but I would never bet against a microbe to find a way to survive.

When considering all this it's easy to imagine that the odds of finding life on other planets, even if very simple, are pretty high. Of course we really don't know yet, but sometimes using a bit of imagination can be fun.

So on that front, here is one aspect of humanity's future in the sky that you might have not considered yet.

When it comes to space exploration, first comes to observation part. We study and learn as much as we can about the planet. Next comes the actual exploration, bringing people there and discovering things that are out of our reach with just satellites and rovers.

But eventually our foothold would certainly increase.

Amy: For some people the next step is a sustained presence, or colonisation. And that does make me uncomfortable, because humans don't have a really good track record when we try to settle in a new place. We tend to disrupt the existing ecological system.

As we talk about exploring other worlds, the idea of bringing life from Earth keeps coming up.

And This could mean humans and human-adjacent organisms, like plants.

But it could also mean microbes and other organisms that hitched a ride. The introduction of Earth-based organisms to extraterrestrial environments could have unforeseen impacts. It could potentially alter or even devastate any existing ecosystems.

Unfortunately though, we are now dealing with ethics, which means that-

Amy: There's no right answer, I think is the challenge. It's about where do we want to fall on that spectrum. And where are we comfortable, and people are comfortable in different parts of it.

Nowadays space agencies like NASA put particular effort in making sure their spacecrafts are well sterilised. This sterilisation is crucial to prevent contamination of other worlds with Earth-based life forms.
The challenges of interplanetary travel are many. But through careful consideration and advanced technology, we might just find a way to explore the stars without compromising the integrity of the cosmos.

Or maybe we won't, but let's definitely hope for the first one.

We are approaching the end of our journey, and at this point it should be clear to you as much as it is for me, how much movement is a fundamental part of life.

We see this in so many aspects of our world, from all those plants finding new homes, people discovering and experiencing new places. Movement has been a driving force for survival, innovation, and exploration.

It's the flow of ideas, cultures, and species across the globe. It's a bunch of seeds traveling vast distances to survive. It's about people; connecting with one another and finding new homes.

As we look to the future, I want to remember the importance of movement on who we are. It has shaped the past, and is shaping the present. So why would't it be a major shaper of our future?

This podcast was made on Earth, and whether you're a coconut, a Polynesian sailor, a roman merchant, or a simple explorer of the universe, thank you, and remember, to keep it moving.