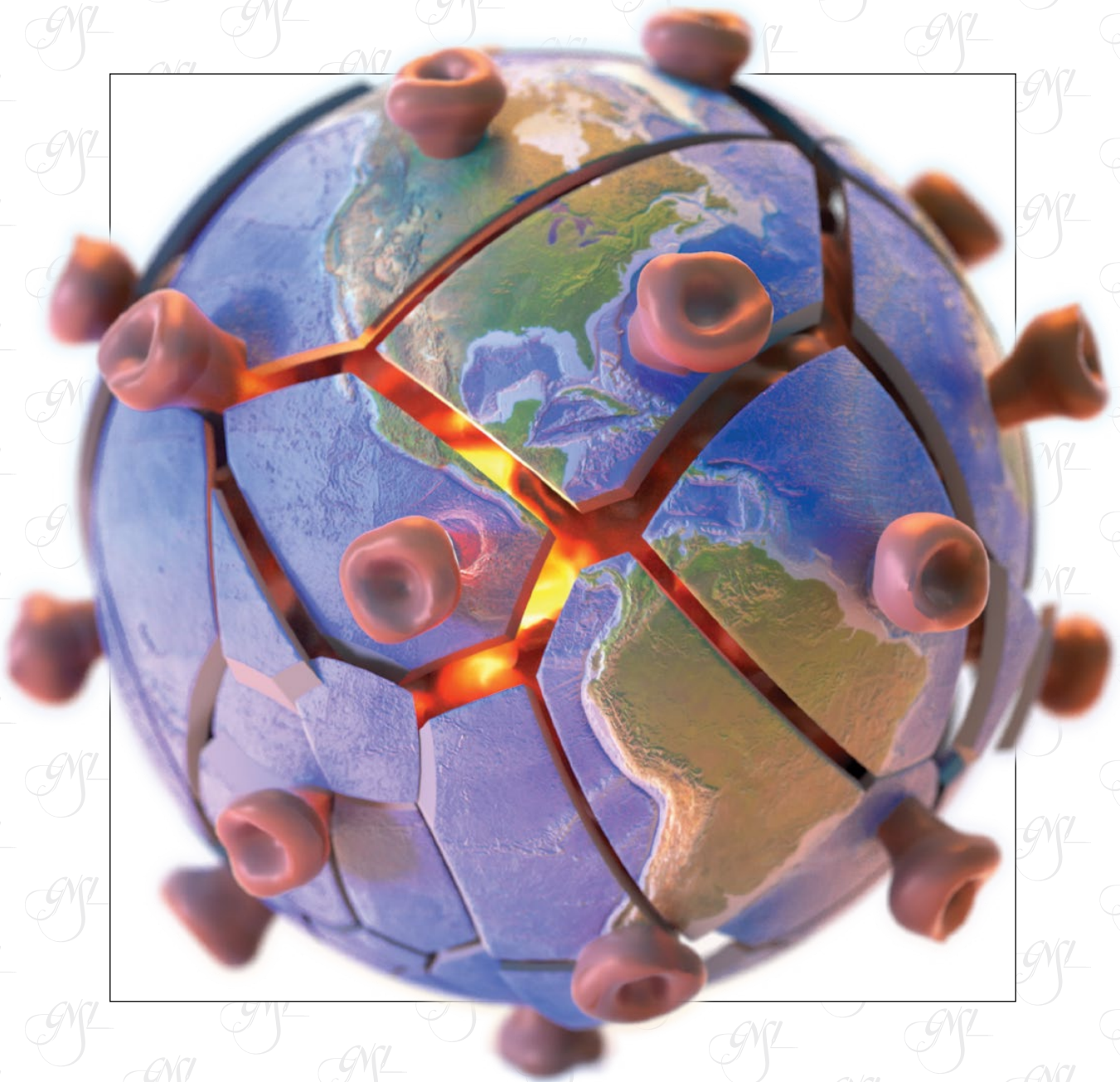


# *Journal of* NATURAL SCIENCE ILLUSTRATION

GUILD OF NATURAL SCIENCE ILLUSTRATORS



VOLUME 52 • NUMBER 2 • 2020

# A Note From...

Gail Guth, Managing Editor, JNSI

The GNSI Journal Team is very proud to present this special issue that tells the story of how science artists have used their skills and creativity to substantially aid the dissemination of information about this very complex virus—and its effect on us all. As science illustrators, our role in translating complicated and confusing information about the natural world has always been vital, albeit often overlooked. There are undoubtedly many science illustrators who have created intelligent and elegant images to better our understanding of this crisis; we are happy to showcase the work of several of our members in this effort.

The stories and images on these pages feature Scott Rawlins's creativity in the kitchen, utilizing limited grocery trips to create "Corona Cuisine;" Quinn Burrell's efforts to educate urban youth about the coronavirus; Emily Adams's visuals aimed at early childhood education, and Bruce Worden's infographics for the monthly academic *Journal of Clinical Investigation*. Jennifer Fairman's article provides an extensive series of illustrations on the structure and function of the virus itself for Johns Hopkins. Chuck Carter presents a gallery of realistic and conceptual interpretations of the virus.

We finish with a recap of our annual conference. The growing pandemic compelled the conference committee to cancel this year's traditional in-person meeting and triggered a four-month-long burst of creativity in crafting an online experience for our members. Although it will never replace in-person camaraderie, the resulting virtual experience was excellent and far better than anyone could have predicted.

The story is not yet over, and we may have more related articles in the future. For now, we sincerely thank these authors for their contributions to the Journal, and more importantly, for their contributions to our understanding of this modern-day plague that has upended our lives.

— Gail Guth  
[journal@gnsi.org](mailto:journal@gnsi.org)

## CONTENTS

|                                                                                            |       |
|--------------------------------------------------------------------------------------------|-------|
| <b>Editor's Note</b> , by Gail Guth .....                                                  | 2     |
| <b>Presidents' Note</b> , by Kalliopi Monoyios and Sara Taliaferro .....                   | 3     |
| <b>How to Evolve Scientific Communication</b> , by Quinn Burrell .....                     | 4–7   |
| <b>Virus Gallery</b> , by Chuck Carter .....                                               | 8–9   |
| <b>Science vs. Virus: Illustrating SARS-CoV-2</b> , by Jennifer Fairman .....              | 10–19 |
| <b>Coronavirus Visualizations for Early Childhood Professionals</b> , by Emily Adams ..... | 20–21 |
| <b>Pandemic Works in Progress</b> , by Bruce Worden .....                                  | 22–23 |
| <b>Corona Cuisine</b> , by W. Scott Rawlins.....                                           | 24–27 |
| <b>Conference Review</b> , by Kalliopi Monoyios .....                                      | 28–31 |

**Cover:** Viral Earth America #1. The cracked viral Earth was Chuck's editorial attempt to show the how the pandemic affects us not only as individuals but also in communities around the world. Rendered with Modo. See Chuck's full statement on *page 9*. © 2020 Chuck Carter

**Background image (next page):** Coronavirus #3.  
© 2020 Chuck Carter

## NATURAL SCIENCE ILLUSTRATORS



The Guild of Natural Science Illustrators is a nonprofit organization devoted to providing information about and encouraging high standards of competence in the field of natural science illustration. The Guild offers membership to those employed or genuinely interested in natural scientific illustration.

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### GNSI JOURNAL

Volume 52, Number 2/2020 • © 2020

JOURNAL OF NATURAL SCIENCE ILLUSTRATION (JNSI)

(ISSN 01995464) is published at 2201 Wisconsin Ave., NW, Suite 320, Washington, DC 20007, by the Guild of Natural Science Illustrators, Inc.

\$28 of your GNSI dues is dedicated to your JNSI subscription; no separate subscription is available.

This paper meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

### POSTMASTER: CHANGE OF ADDRESS

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## Presidents' Note

Dear JNSI Readers,

Setting aside the human suffering that the novel coronavirus continues to cause, it's hard to imagine a scenario that thrusts the importance of clear, accurate, and concise science communication into the spotlight better than a global pandemic. This special edition of the JNSI highlights the many facets of the pandemic that visual creatives are helping illuminate, from critical public health communications to climatic and seismic data collected during this unprecedented global pause in human activity. We hope you are inspired and encouraged by the efforts of these esteemed colleagues and are able to bring that inspiration to your own work in the service of science and science literacy.

The pandemic has influenced the way we all work, and the Guild of Natural Science Illustrators is no exception. In March, we made the difficult decision amidst a thick fog of uncertainty to postpone our annual conference which would have taken place in July in Salt Lake City, Utah. Unwilling to scrap the conference altogether, we were able to pivot quickly thanks to a small team of nimble thinkers and the increasing array of online tools that allow people to gather virtually. After a lightning-fast four months of intense planning, our first-ever virtual conference was held August 8–9, 2020. We are thrilled to report it was an overwhelming success.

With 266 attendees from 14 different countries, we exceeded even our own expectations about how far we could reach and how we might maintain connection and forward momentum in the eddies created by social distancing. Post-conference feedback indicated an appetite among attendees for more of these virtual events in the future. In our eagerness to stay connected and support our members, we will be exploring programming that builds on the experience we have gained. If you have ideas or expertise that you would like to contribute to help shape this new programming, by all means reach out. We'd love to hear from you.

We hope you and yours are staying healthy and stable.

Be well,

Kalliopi Monoyios, President  
[president@gnsi.org](mailto:president@gnsi.org)

Sara Taliaferro, Past-President  
[past-president@gnsi.org](mailto:past-president@gnsi.org)

# Animated Discussion:

## How to Evolve Scientific Communication to Address a Shifting COVID-19 Pandemic

— Quinn Burrell

*In March 2020, I began development of an educational animation about COVID-19 aimed at a young adult audience. Young people were being scrutinized in the media for not observing social distancing behaviors. These attacks seemed condescending and ineffective, and I thought there could be a more sympathetic approach that would get the point across without attacking a specific population. This article details the past few months and evolution of this project.*

As scientific communicators, we are used to covering topics with years of research and consensus behind them. We are not often trying to convey information about a topic as it unfolds, adjusting on the fly as information becomes obsolete or overly saturated in the media. Now, we find ourselves in a moment made up of many overlapping crises. When I began this project, COVID-19 was our greatest concern, but many other issues, such as the Black Lives Matter movement, have come to the forefront. As a result, the struggle to remain current with our information is constant. This project was a unique learning experience as a scientific illustrator and will continue to unfold in months to come as my team and I see responses to our work. I am not far enough away to talk objectively about what worked and what did not, but I am going to do the best I can to talk about what has happened so far, and what I learned.

My team and I thought we could provide a more empathetic, public health appeal to young people. At Ci3, we take an asset-based approach to understand and support the health and well-being of youth, and many of our initiatives include collaborating with them to help meet their needs. Rather than using animation to lecture them during this uncertain time, we used this foundation to carry the project forward.

After my first draft of the script came together, it was clear we were missing something. Around this time, *The Triibe*, a Black millennial news platform, reported on a house party on Chicago's West side, attended by around 100 people in their twenties. The party was a memorial for friends lost to gun violence. It highlighted two issues with coronavirus messaging. First, people's priorities cannot be dictated, and second, there is a substantial rift between younger Black people and mainstream news sources. We rewrote the script to acknowledge additional barriers that people in under-resourced communities face when it comes to following public health guidelines. We applied for and received a grant from the University of Chicago Medicine's Center for Healthcare Delivery Science and Innovation (HDSI) providing financial support for animation work.

As anyone who has worked on animation knows, once you start animating to a voiceover, there is no space to redo a script. Animation is painstaking and time-consuming even when making small changes. However, since we chose a breaking news topic, we had to incorporate changes as new public

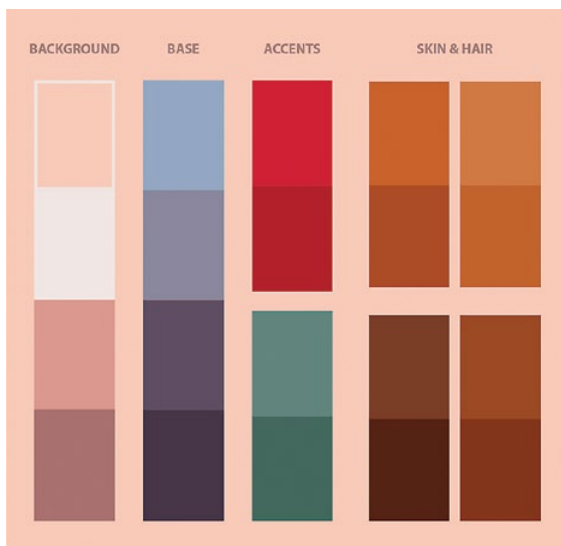
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**"My team and I thought we could provide a more empathetic public health appeal to young people."**

### PART 1: WRITING

At the end of March, I pitched variations on a COVID-19 project to my coworkers at the University of Chicago's Center for Interdisciplinary Inquiry and Innovation in Sexual and Reproductive Health (Ci3). We

landed on an idea to make an educational animation about the virus, directed at teens and young adults. It happened to be Spring Break week for many colleges across the nation, and we were noticing an influx of articles with titles like, "Can Anyone Talk Sense into Millennials and Gen-Z Concerning Coronavirus?"



**Figure 1:** A soft, warm color palette designed by Robin Cogdell and Quinn Burrell for quick selection of appropriate colors while the animation is created.

All illustrations © 2020 Quinn Burrell and Robin Cogdell, unless otherwise noted.

health information became available. As news cycles churned on, and as we started to look at what might happen when people began to emerge from quarantine, we also shifted our message to address long term health strategies, like wearing a mask and hand washing. At this point, we enlisted the help of our Youth Advisory Council to review the script and offer feedback. This year's cohort included Black and Latinx high school students from Chicago. Together, our staff and youth council spent two months refining the script, trying to incorporate any new information we could in order to create inclusive messaging that would resonate among young peers.

## PART 2: ANIMATING

I was very excited to start the animation work in earnest. I was collaborating with another staff designer to get through the work quickly, and there were a few useful steps I took to make this process more streamlined for both of us while I waited for feedback and negotiated detailed script changes.

### Palette

Color theory is not my strong suit, so I wanted some time to sit with a color palette and make changes. I wanted to convey a warm and soft atmosphere, echoing an empathetic vibe we were going for in the images. This would also make picking colors much easier, with less guesswork and adjustment on the fly. My co-animator Robin Cogdell and I came up with a palette we liked and could easily pull from (Fig. 1).

### Characters

I already knew that when it came to “empathetic messaging for young people,” I was going to need to, and really wanted to, show relatable characters. The first order of business was to develop the “look and feel” of the animation. Collecting images of the style

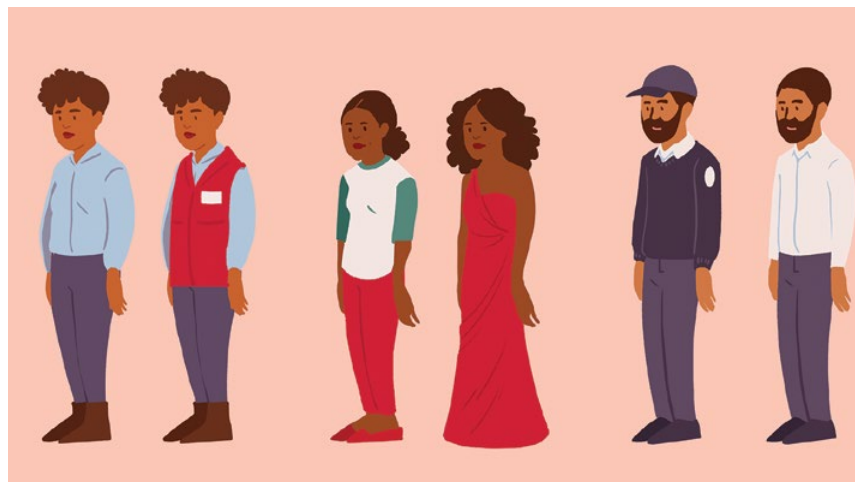


we wanted (often called a “mood board”) gave us a starting point for discussion (Fig. 2).

Character animation is much more time consuming than motion graphics (e.g. moving text and symbols) and this was going to pose a challenge given our limited time frame to complete this project. To address this, I came up with a small cast of three characters (Fig. 3) that I would recycle throughout the animation to save time and reuse animations.

**Figure 2:** (a) Drawings in the appropriate style are collected into a “mood board” as reference for designing the pieces of the animation. These can come from anywhere as they are for internal use only. (b) A still image from the final animation inspired by the mood board.

**Figure 3:** Character sheets to firm up the look of the “actors”.





**Figure 4:** Still image from a walk cycle, side view. We chose to show all characters moving in a side view, to allow easy reuse in multiple scenes.

I also decided I would only show them from side view, eliminating any need for multiple angles. I also illustrated a loopable walk cycle for each character in Procreate® for iPad. Because a walk cycle starts and ends on the same frame, it can be played to fill as much, or as little, time as needed (Fig. 4).

### Backgrounds

Backgrounds were one of the main pre-production tasks I delegated to Robin. Using Photoshop® and Procreate, they worked from our color palette to come up with background images for scenes I planned for these assets. We both worked from a Google sheet that had each individual scene explained and broken down into needed components such as animations, backgrounds, visual effects, and sound effects. This became a great collaboration and general task management tool.

Another coworker recorded the voiceover in late May, and we got to work on animation, with urgency. We tried to nail down script language, but we still started with scenes that we were pretty sure would stay the same. For two weeks, I ended up spending most of

**"...we had to adjust or else the animation would be outdated before it was even released."**

In the second week of June, we made a small change to the script to acknowledge the important protests that were taking place across the country. We spliced in a line about honoring "the other things that are important to you." And we provided safety tips for people who choose to attend meaningful gatherings. It was a tedious update at a critical time, but we

decided this was part of the risk we had taken by tackling an evolving issue, and we had to adjust or else the animation would be outdated before it was even released. In the end, I believe it added to the empathetic tone we intended.

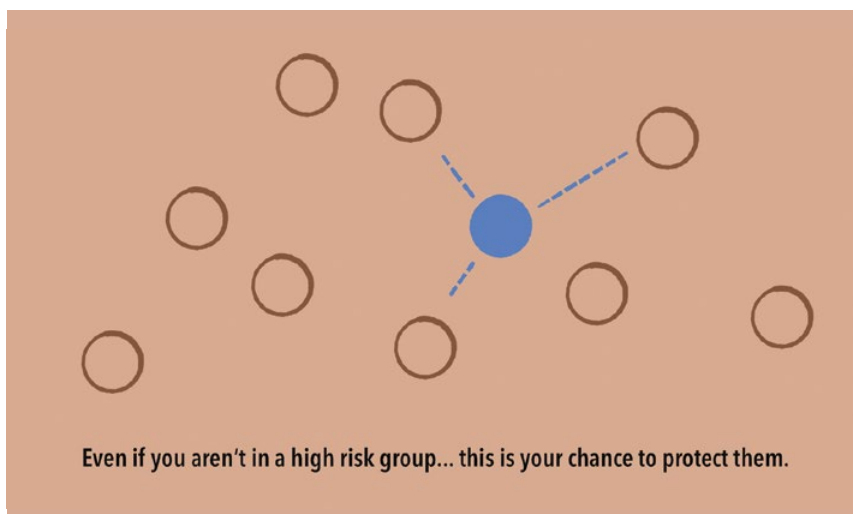
### PART 3: DISSEMINATION

Since the article in *The Triibe* was published, detailing how little Black youth in Chicago trust mainstream news sources, we knew our plan for disseminating the animation to young people was going to be crucial. Ci3's communications team, Valerie Reynolds and Erin Garcia, developed a marketing and outreach plan to get the animation amplified on a variety of youth-friendly platforms like Facebook, Twitter, and Instagram. As part of the project feedback process, our Youth Advisory Council helped us come up with social media hashtags we would use to increase virality. It was also important to include in this outreach plan a strategy to connect with key community partners closely supporting young people, and enable them with graphics and video clips to share the animation on their social media channels so it would reach as many young people as possible.

### CONCLUSION

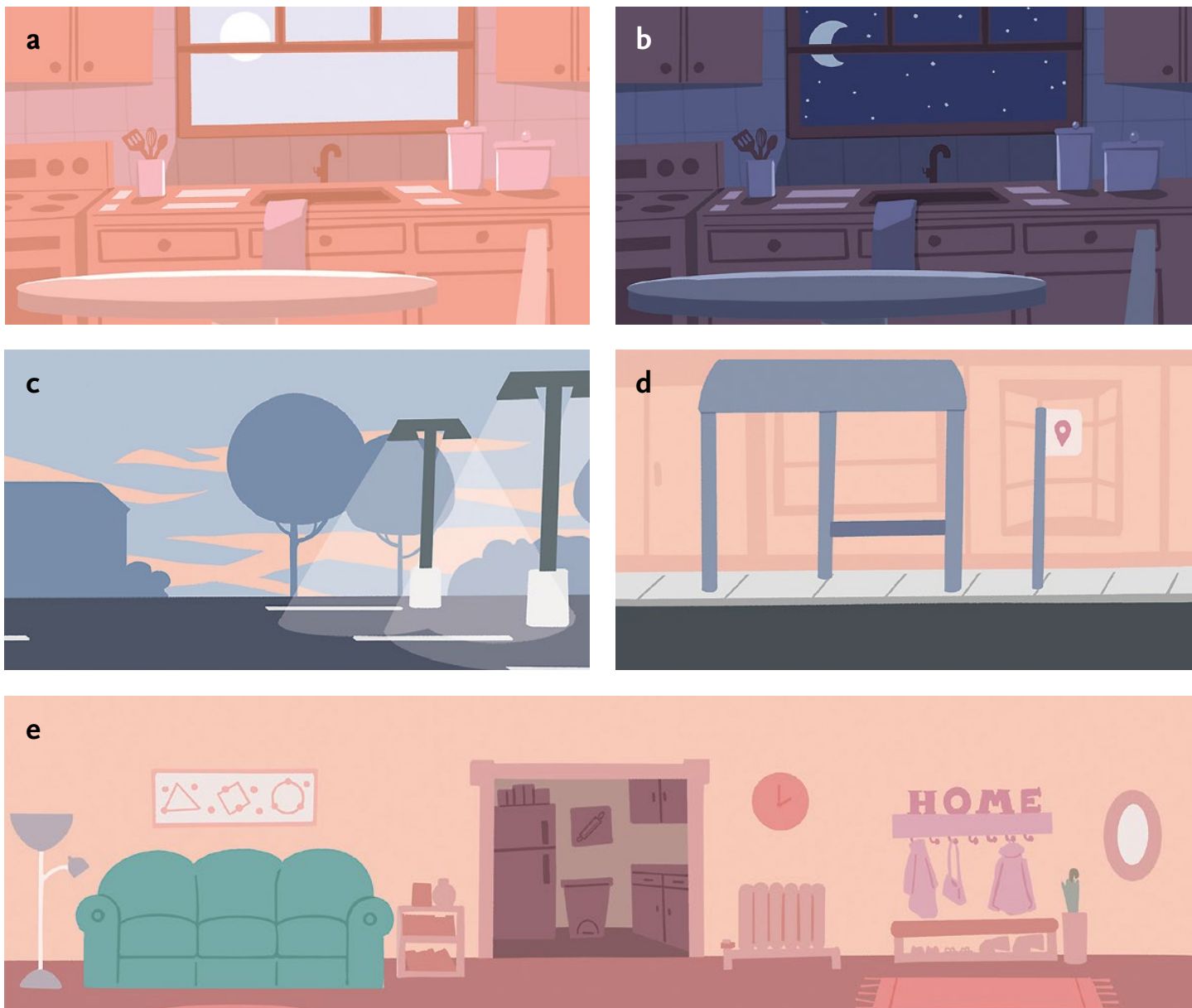
Now that we are in final stages of production, gearing up to release our carefully honed animation to the public, here is what I learned from this process:

- You have no idea what the "next thing" will be in an evolving story. You can either choose to produce something rapidly to provide timely information that may become outdated quickly; or you can go general, leaving yourself room to switch out old information as needed and try to make something lasting.
- Working with other people remotely, no matter what the task, will always take longer. Build as much extra time into your timeline as you can. If you try to push everyone to respond faster, it will only build frustrations.
- Having a robust pre-production art strategy is crucial. Create important and complex assets ahead of time, so during a crunch period you are not burdened with those tasks.



**Figure 5:** Sample storyboard image. Simple images are used to outline the animation action, and are replaced often as the story develops.

my evenings as well as my entire work day staring at an After Effects® timeline, making minute changes and spending hours on seconds of animation. It did not help that after recording, my proposed 90-second animation turned into 3½ minutes of audio. An oft forgotten reason for the incredible amount of time animating takes, is that the more complex a scene, the longer it will take to load and run at a normal speed in a program such as After Effects. You might wait for minutes to load ten seconds of footage.



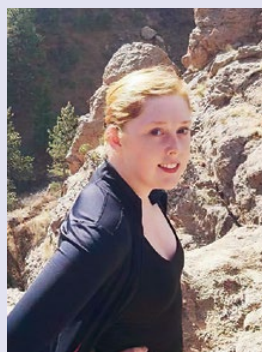
**Figure 6:** Digital paintings, by Quinn Burrell and Robin Cogdell, of some of the backgrounds used for the animation: (a,b) kitchen day/night; (c) parking lot; (d) bus stop; (e) living room. Extended length allows for panning of the camera to follow character movement.

As our society and scientific discovery move into the future, tackling new topics and evolving situations, we as scientific illustrators must adapt our strategies and create a more fluid and evolving workflow. As science is attacked and becomes more of a political issue, we cannot shy away from issues of politics and human rights when they make their way into our work. We must change the way we approach communicating science in response to a new and changing world.



**VIEW THE FINAL ANIMATION ONLINE:**

[bit.ly/Ci3\\_OneDayatATime](http://bit.ly/Ci3_OneDayatATime)



### Quinn Burrell

Quinn is a scientific and medical illustrator. She does consider herself a jack of all trades, branching into stylized art, 2D and 3D animation, and 3D modeling. Currently Quinn works at the Center for Interdisciplinary Inquiry and Innovation in Sexual and Reproductive Health at the University of Chicago (Ci3) making educational health games aimed at youth on the South Side of Chicago. In her free time she makes a lot of animal puns.

[www.quinnburrell.com](http://www.quinnburrell.com)

# Virus Gallery

— Chuck Carter

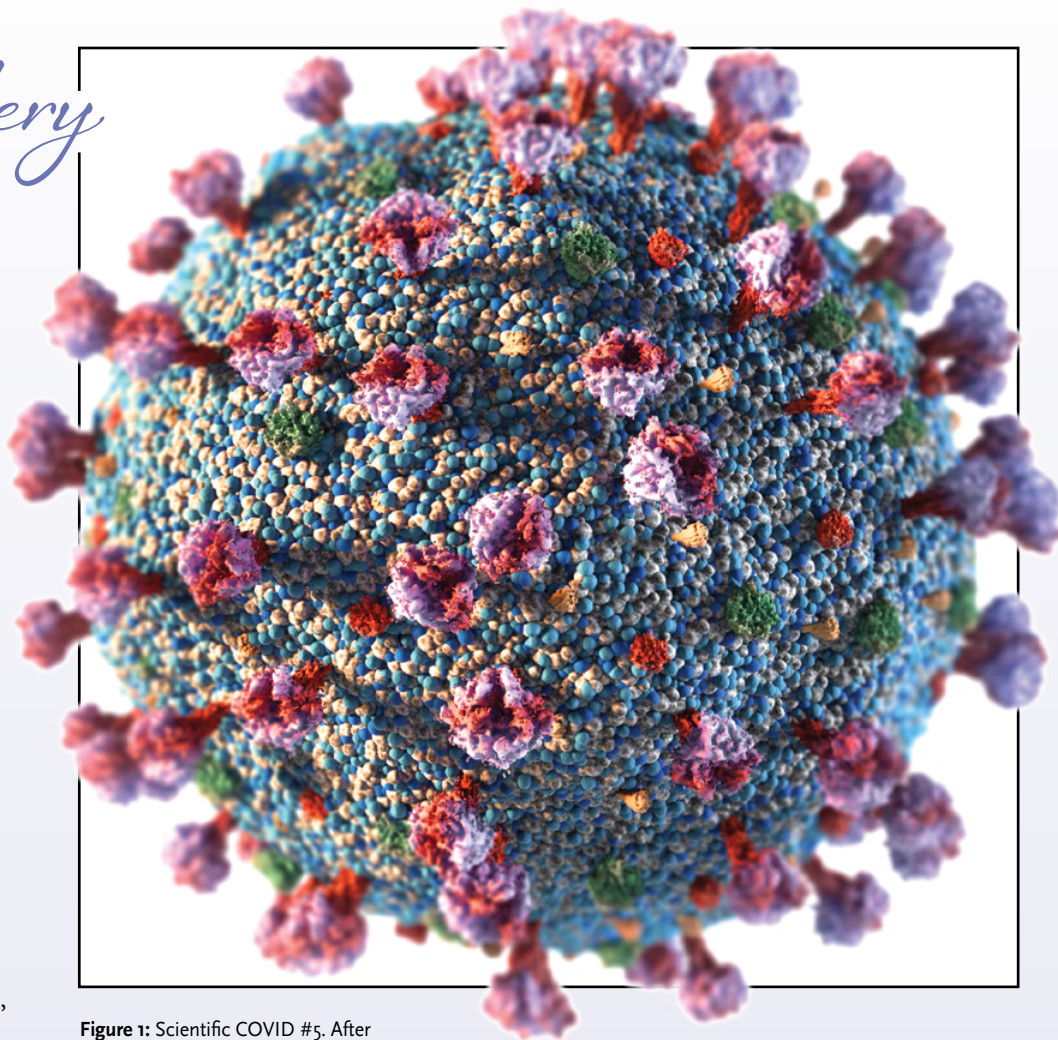
Chuck Carter began his illustration career hand-drawing greeting cards and cartoons in the early 1980s, as well as freelancing for a couple of local Cleveland, Ohio newspapers. He then moved to creating editorial newspaper art full-time, around 1983, and worked in this field until about 1991. During that time, he worked two stints as art director, before moving into video gaming. His work included the graphic adventure puzzle game, *MYST*<sup>®</sup>, which was popular in the early 1990s (and is still available on Steam<sup>®</sup>) and 27 other games.

In 1992, he became a regular illustration contributor to *National Geographic* magazine; an association that still exists today. He has contributed to *Scientific American* magazine, NASA, and a few geology book projects. Now, he splits his illustration time with interactive game projects using his company Eagre Games, which released ZED in 2019.

With spare time on his hands during the lockdowns, Chuck says he completed contract work that was in progress and decided to explore something he rarely gets to do professionally: biology illustration. Relearning old tools and discovering alternative ways to use the software programs he is most familiar with, he decided to try his hand at depicting COVID-19.

And began to play.

All images of the virus are based on those generated by electron microscopy (EM). No matter the resolution, fine details are difficult to see, so some interpretation by the artist is necessary (e.g., Fig. 1). The virus appears to have a crown, or “corona,” surrounding the lipid outer membrane and there are membrane proteins, envelope proteins, and spike proteins. Within this outer envelope is the nucleoplasmid (RNA).



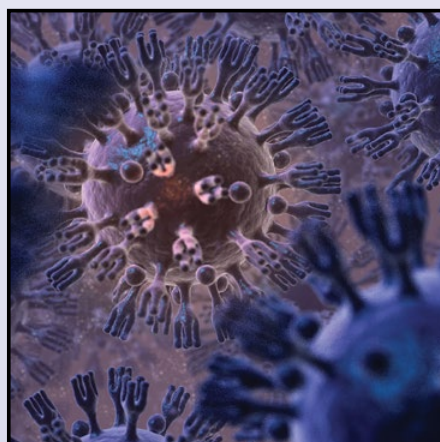
**Figure 1:** Scientific COVID #5. After getting a better grasp of the basic structure of the virus, Chuck explored new (to him) techniques to generate the model using Modo 3D, the primary software he uses for many of his illustrations. © 2020 Chuck Carter

Starting with general virus shapes and those from the available COVID-19 EM images, Chuck came up with some possible visual ideas. His interpretations vary from more realistic images, created for a stock image website, to some

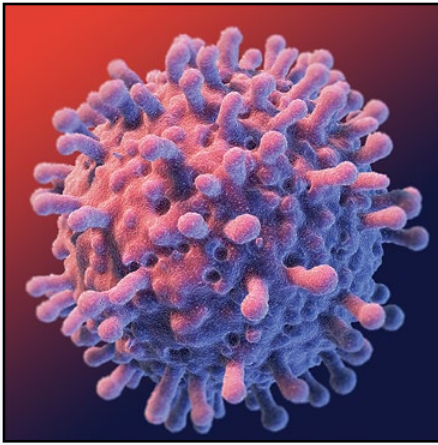
striking editorial illustrations. These, he describes as “a way to try to make a small statement about the state of the world and society in general, using illustration.” Since he started as an editorial illustrator, he has always had a love for making visual commentary using illustration. He feels that an editorial approach was a good idea, because most artists were approaching illustrations from a more scientific basis. As the pandemic regains footholds, he is working on a series of editorial images, continuing to challenge himself from a conceptual and an artistic standpoint.

His “Fork” version of the virus he says, “just looked cool—nothing scientific was really used as a reference

(Fig. 2). Sometimes, something so generic and not at all accurate, can act as the basis for a more or less general piece,” and he was having fun with the



**Figure 2:** Forked virus. Chuck tries to create a novel look, something different from other virus images. Modo 3D was used. © 2020 Chuck Carter



**Figure 3:** Generic virus #3. An early attempt with ZBrush (a very powerful 3D digital sculpting program) to create a more generic virus image. © 2020 Chuck Carter

shapes and modeling them as he rendered them out. He played around with color choices, seeing what looked good and trying to create some pieces that were different enough from other illustrations that he'd seen. His goal was to do something that stood out and illustrated the complexity of the forms.

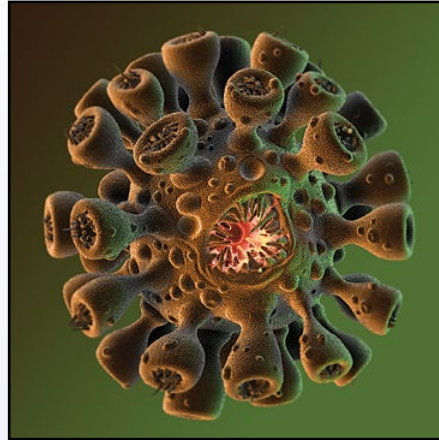
Teaching himself Blender®, he created one of the pieces with that software and designed others using Modo® and ZBrush®. Once the 3D models render, he pulls them into Photoshop® for various tweaks and effects to make the compositions more interesting.

The COVID-19 images he created will mostly be used as he builds out a new portfolio at [chuckcarter.net](http://chuckcarter.net), as well as on a new blog at [chuckcarterdigital.com](http://chuckcarterdigital.com).

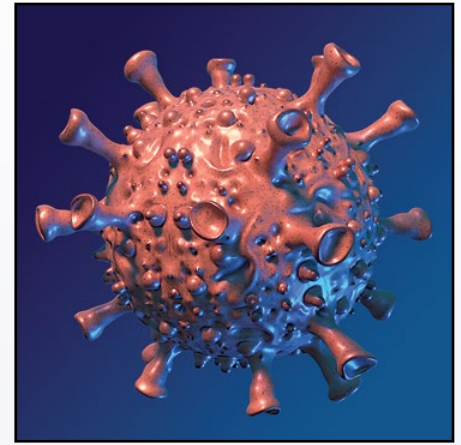


**Figure 6:** Eggshell Earth. This is a more generalized editorial piece showing what the virus has done to the planet as it deals with the economic impact of COVID, illustrating how fragile we are as a global community. Rendered with Modo. © 2020 Chuck Carter

**Figure 4:** Monster COVID #2. A more humorous approach to depicting the virus as some dangerous creature; made with ZBrush. © 2020 Chuck Carter



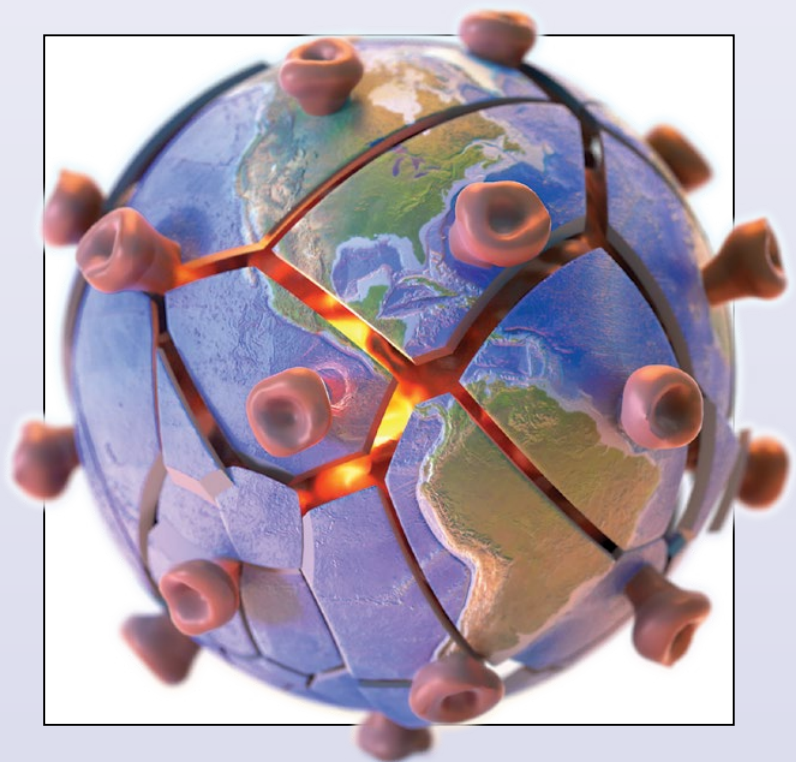
"I'm aiming for more of a balance of both editorial and scientific work and I'm beginning to move back to illustration more. Having said that, with my game experience, I'm exploring ways to put people into playable illustrations and am always looking for partners to see what we can do with all of the wonderful tools at our disposal—like the easy-to-use Unreal® engine and Unity®, among others. I think new tools are really valuable and totally underutilized ways to tell stories... fully immersive, highly informational, and adaptable for science and conceptual ideas. I think this is very promising as a method for designing informational graphics-based media and want to explore it more formally."



**Figure 5:** Generic COVID #2. Another example of a virus image Chuck made to explore a variety of shapes and practice his skills with Blender—a totally free and very powerful 3D software package. © 2020 Chuck Carter

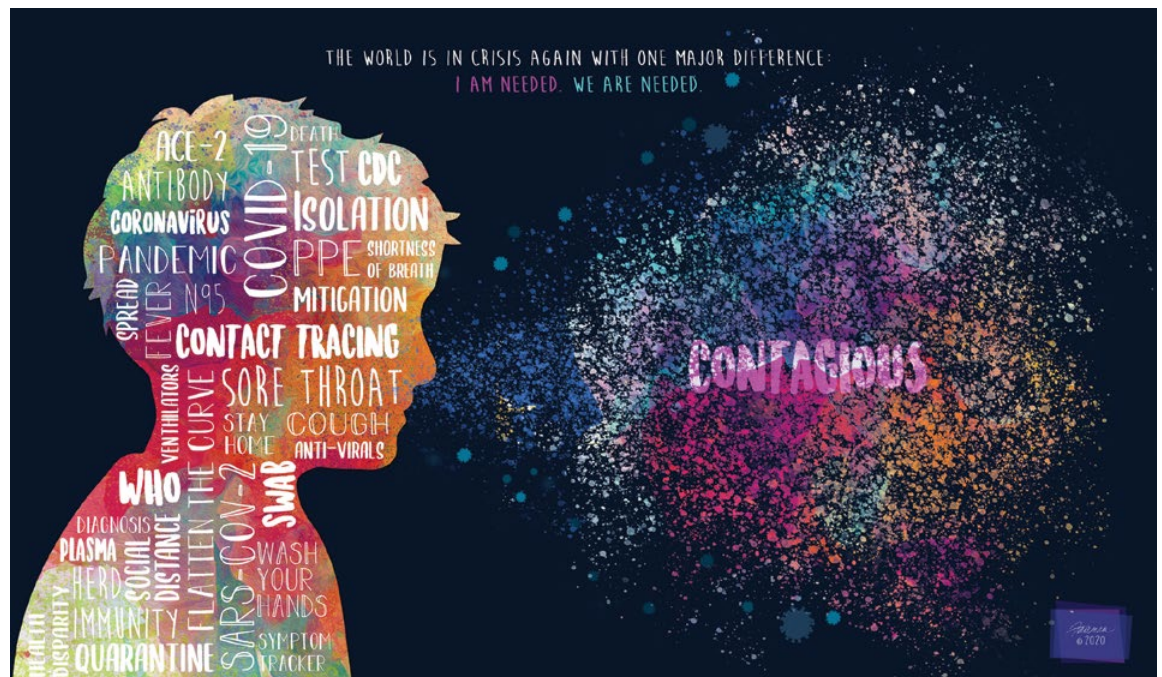
**"I'm aiming for more of a balance of both editorial and scientific work and I'm beginning to move back to illustration more."**

**Figure 7:** Viral Earth America #1. The cracked viral Earth was Chuck's editorial attempt to show the how the pandemic affects us not only as individuals but also in communities around the world. Rendered with Modo. © 2020 Chuck Carter



**Figure 1:** Fine art piece created as a work of self-expression—how the pandemic has made her feel about her role as a medical illustrator—as she continues to teach people about the virus and the disease it causes.

All illustrations © 2020  
Jennifer E. Fairman, unless  
otherwise noted.



## Science vs. Virus: Illustrating SARS-CoV-2

— Jennifer E. Fairman

*I can remember listening to the TV early in the morning on September 11th, 2001. We all know what happened: the chaos, the questions, the surprise, and the unknown future to come. Back then, I was running my small studio practice out of rented office space which was walking distance from my apartment. I didn't know the full impact of what was happening in that moment. With projects on my mind, I turned the TV off too soon and was focused on getting to work early in a hurry.*

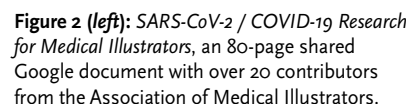
**W**hen I got there, I turned the radio on to NPR. That's when reality began to sink in. I sat focused on impending deadlines, but suddenly realized that none of it mattered. Hundreds of people were dying as I sat there. In that instant, my role as a medical illustrator was completely irrelevant. "I am just a useless artist. How can I help?"

Though the US was experiencing a targeted crisis, the entire world felt it. People came together, put aside their differences, and helped in every way possible.

Now we are facing a similar moment. When the first murmurs hit the media that a novel coronavirus had been discovered in an open market in the city of Wuhan, we knew we might be facing yet another elusive killer. The questions began to flood: Who is

patient zero? What host did it originate from? How fast does the virus mutate? How does it compare to influenza? What are the best ways to prevent the spread? With a boundless global economy, it inevitably would make its way into everyone's backyard in a matter of time.

Epidemic became pandemic. Mortality continues as we speak and as researchers frantically work to find answers, effective treatments, and a cure. Our field is seeing a surge where we can't draw pictures fast enough; indeed, there have been so many that I have lost count! Our best weapon is rapid, widespread, effective communication of trusted factual information and discrediting polarized and politicized misinformation in a fragmented media environment.



was the handbook I would refer and contribute to for every COVID-related project (Fig. 2).

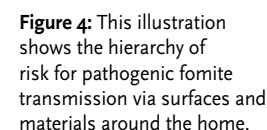
## LEARNING A NEW VOCABULARY

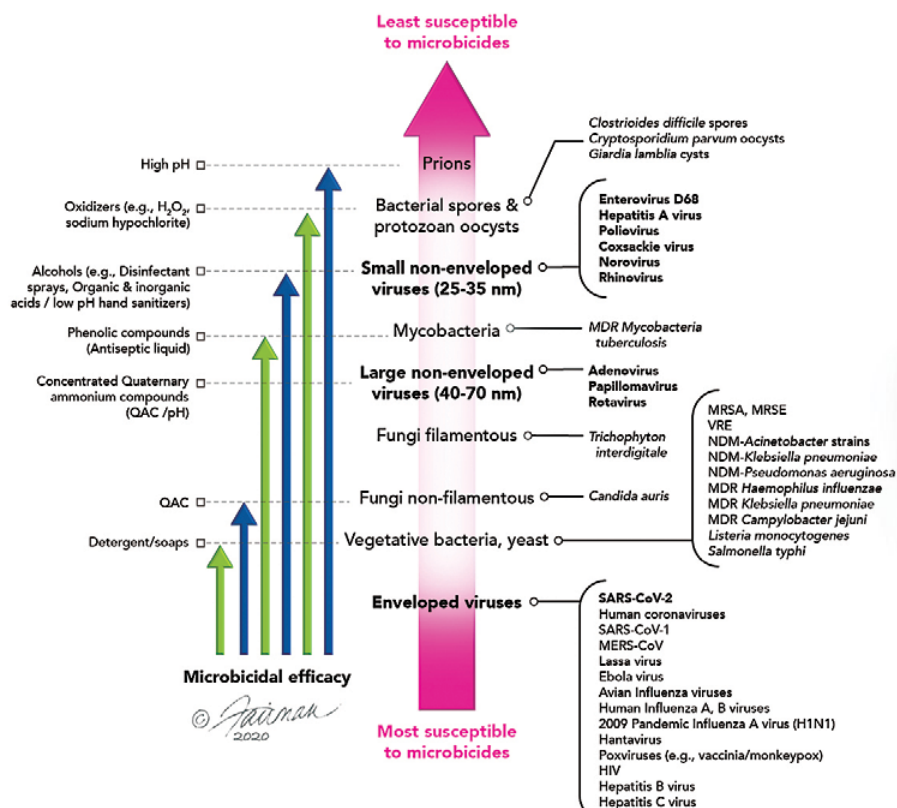
Suddenly, COVID colloquialism became part of everyday speech: novel coronavirus, social distancing, flattening the curve, contact tracing, mitigation, herd immunity... This is where our journey begins. Science communicated through art leads to understanding. Understanding leads to better choices and hence better outcomes. Enter the most seen and disseminated visual of COVID-19, the CDC's didactic beauty-shot of SARS-CoV-2, created by Alissa Eckert and Dan Higgins (*Fig. 3*). These two artists explain,

*“...creating visual representations of diseases provides a way to take something complex and abstract and make it tangible through visualization...”*

## CONTAGION

**Figure 3:** This illustration, created at the Centers for Disease Control and Prevention (CDC), reveals ultrastructural morphology exhibited by coronaviruses. Note the spikes that adorn the outer surface of the virus, which impart the look of a corona surrounding the virion when viewed with an electron microscope. This novel coronavirus, named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), was identified as the cause of an outbreak of respiratory illness first detected in Wuhan, China in 2019. The illness caused by this virus has been named Coronavirus Disease 2019 (COVID-19).





**Figure 5 (left):** Chart shows the hierarchy of microbial susceptibility to microbicides' efficacy based on pH level.

**Figure 6 (right):** Depiction of a NIOSH N-95 respirator mask.

infectious diseases. He was submitting a paper to a journal and wanted to talk about creating visuals that communicated the spread and prevention of various infectious microbes. Our conversation led to how I would need to make a simple infographic that would address leveraging the hierarchy of microbicidal activity and targeted hygiene for infection prevention and control with particular relevance to coronaviruses, not fully realizing that he was referring to this novel and elusive microbe (Figs. 4 and 5).

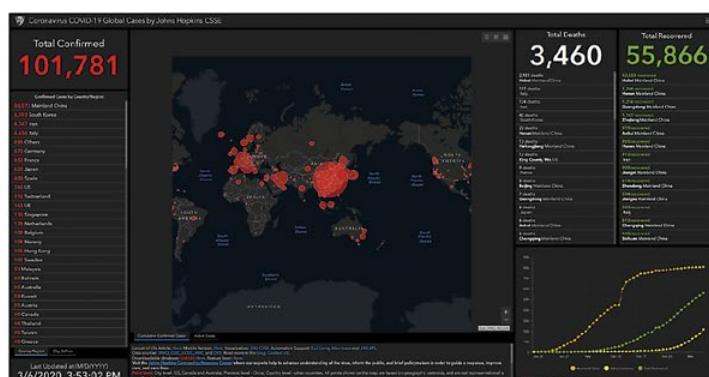
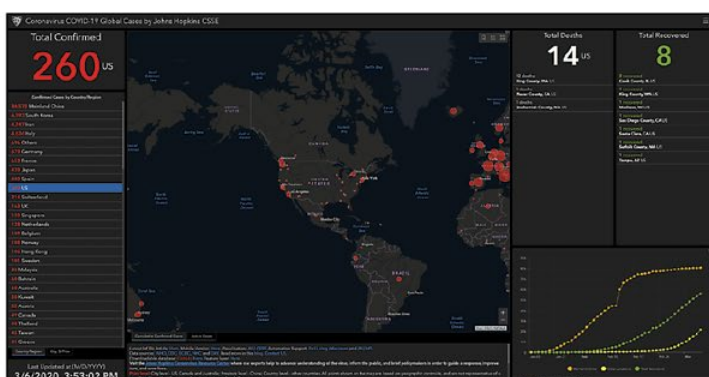
On March 13th, our department conducted a remote-work contingency planning meeting—our first and last. That was Friday. On Tuesday, I received an urgent request from a friend up in Boston:

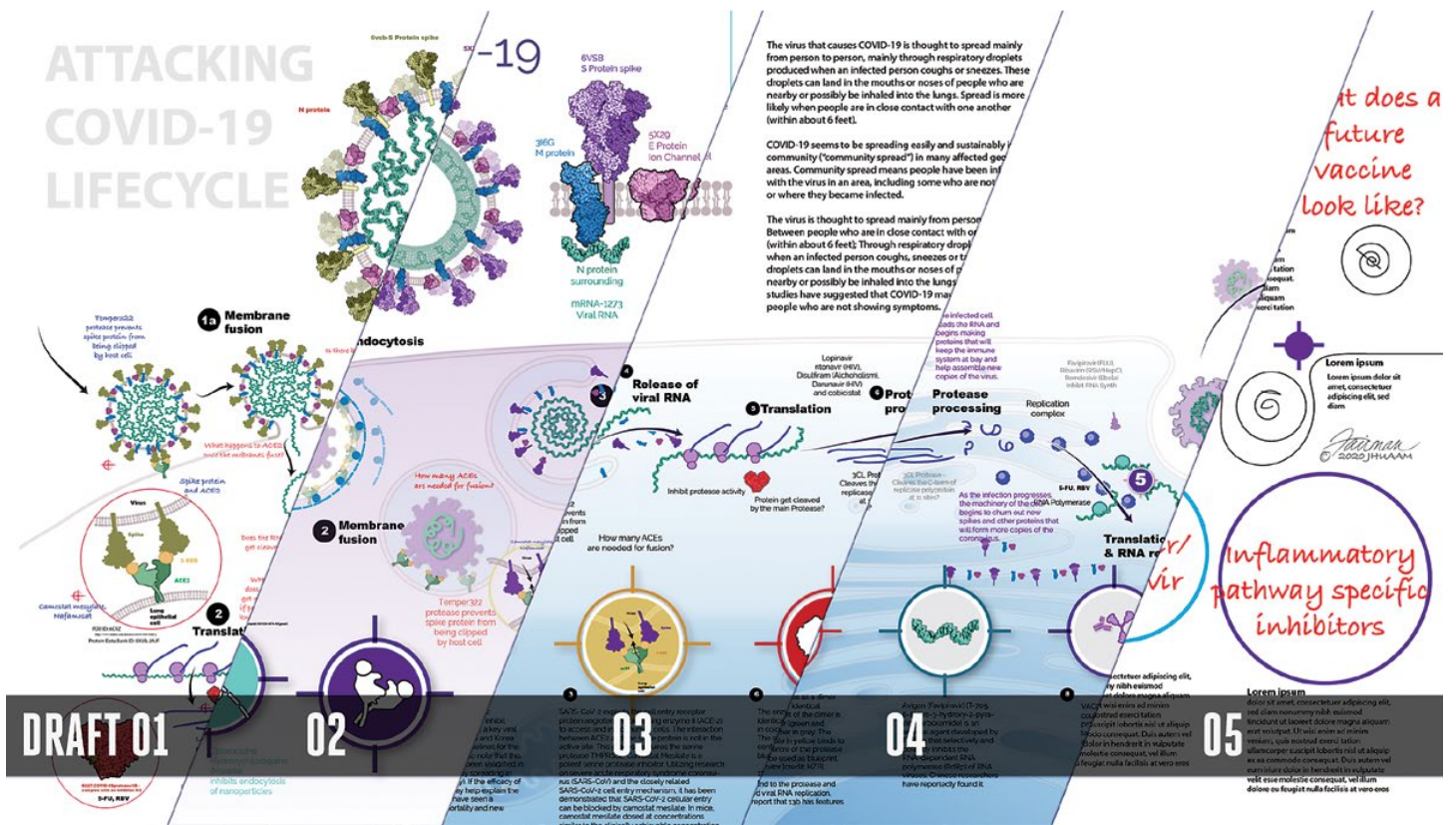
*"I started worrying about COVID-19 in January and I started an effort at that time*

*to produce the N95 respirators in MA from domestic materials. We are scheduled to start production by mid-May at a capacity of around 350,000 per week. We are designing the packaging and would like to have a picture of someone wearing the respirator mask...Our benefit is comfort, less airflow around the edges and easier to ship in large volume (since they are flat). You might be crazy busy, but if not and you are interested in this, we are looking for a high-quality drawing of a face with mask..." (Fig. 6).*

**Figure 7:** Snapshot of the COVID-19 Dashboard at the Center for Systems and Engineering at Johns Hopkins University as of March 6, 2020. Left panel: US confirmed cases; right panel: global confirmed cases.

Next came an early March email from my colleague, Robert Ollinger, the Director of Creative and Brand Management in the Office of External Affairs at the Johns Hopkins Bloomberg School of Public Health (JHSPH):





"We have a new project that we thought you may be interested in for our next issue of Hopkins Bloomberg Public Health magazine. This would be an infographic for the COVID special section of the summer mag: How the virus infects the body, what it does to cells, how it replicates, how a vaccine works, etc. Naturally, we thought of you. We would work closely most likely with Andrew Pekosz, our virus expert..."

Right away this would be one rare magnum opus and a lot to accomplish in one infographic. We had a single in-person meeting on March 6th. I wasn't given a story to tell; I had to learn everything I could and begin my own visual narrative. Soon after, the team and I met again where I was introduced to Andy Pekosz, Co-Director of the Johns Hopkins Center of Excellence in Influenza Research and Surveillance and Professor of Molecular Microbiology and Immunology at JHSPH. His voice would narrate that story. The day before, he and several Johns Hopkins University experts offered a briefing for Capitol Hill officials seeking facts and perspective on COVID-19. Congressional staff and media heard directly from Andy and other Hopkins researchers advising on best ways to mobilize resources, improve care, and save lives.

I had so many questions swarming in my head, I didn't know where to start. What are we drawing that

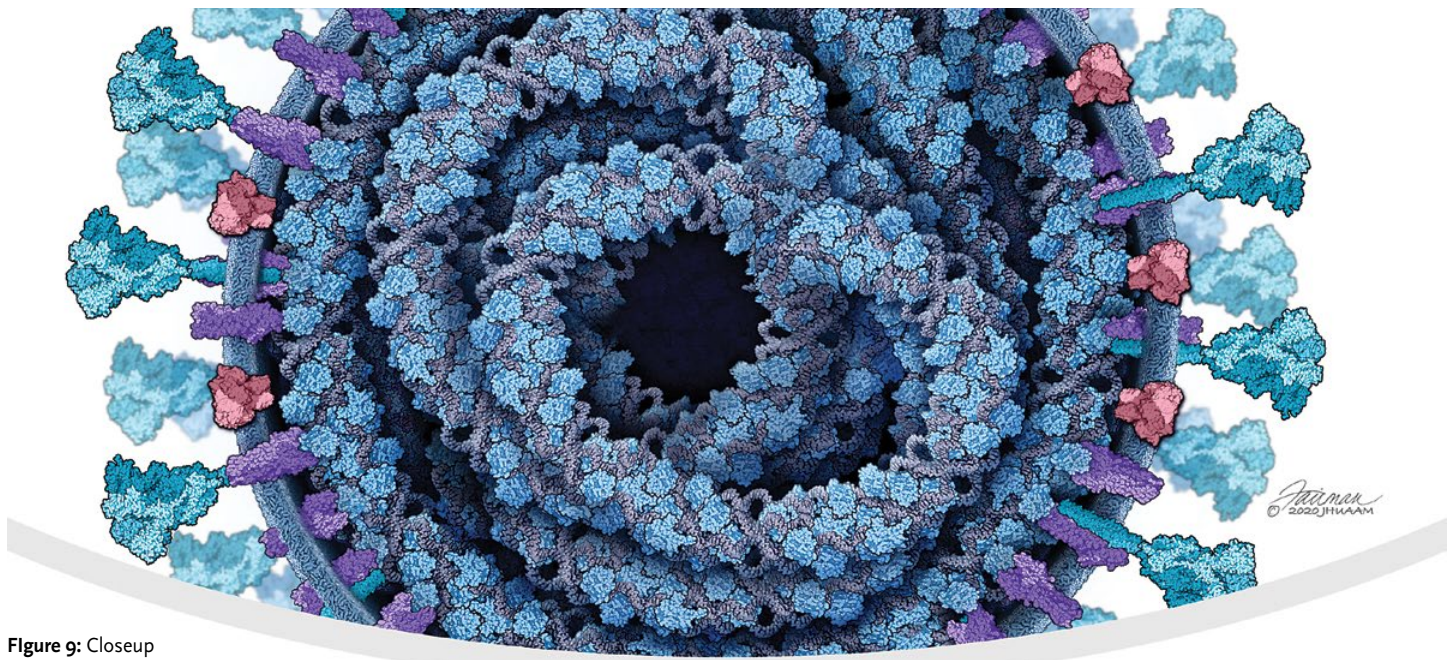
hasn't been visualized by the CDC already? What are we trying to teach, and will it still be relevant by the time this summer issue comes out? Dr. Pekosz began with the most important facts, from structure to lifecycle, viral genome and what proteins were encoded within, facts about its epidemiology, potential targeted therapies, and of course, what mysteries still needed to be uncovered.

This would be our last in-person meeting for this project. In early March, academic leadership at Johns Hopkins University (JHU) began discussing what our contingency plans might be as the first wave of cases hit the state of Maryland. On March 17th, we all began our new normal—teaching and creating visualizations from our home studios under quarantine (Fig. 7).

### CREATING "SCIENCE VS. VIRUS"

The process of creating an engaging, relevant, and audience-specific infographic began with drafting a logical visual and descriptive story with multiple layers information. Before my discussions with Dr. Pekosz, I had contemplated showing the organ systems affected by COVID-19 along with preventative habits the reader could employ. I soon realized that much of the visual materials put out by the CDC served as exemplary resources for educating the public about the novel coronavirus. Instead, our goal was to change the perspective of the everyday narrative (social distancing, wearing masks, and

**Figure 8:** Snapshot of visual brainstorming leading to the final infographic for Johns Hopkins School of Public Health magazine.



**Figure 9:** Closeup of the molecular structure of the novel coronavirus, as researched and interpreted by the artist. Cross sectional view shows all of the structural proteins of SARS-CoV-2 including spike, membrane, envelope, and nucleocapsid proteins.

**"I decided to increase the size of the virus and cut it open in order to show the viewer the detail of the various structural proteins, with special attention devoted to the spike protein."**

washing your hands), placing the story within the context of a researcher's voice, giving the audience the same privilege I enjoyed in discussing strategies in the works to stop the pandemic with a real virologist. Let the audience be the interviewer; what answers might a virologist be searching for? How is the novel coronavirus, which preys relentlessly on its victims' weaknesses, having its own weaknesses targeted? I focused my attention on figuring out how to tell

the audience (1) what made this virus unique (structure), (2) how it replicated (lifecycle), and (3) current research into potential targets (therapeutics) that could lead to effective, life-saving treatments.

When faced with creating an infographic that is packed with so much information, the greatest challenge is the organization of the content. Through several major iterations, I was able to create a top-to-bottom, left-to-right visual flow of my story. As seen in the time-lapse version of my drafts (Fig. 8), I struggled to find the right level of presenting the details of my three-tiered visualization. During one of my client meetings, the editor, Brain Simpson, and art director, Robert Ollinger, were both concerned about the number of labels and arrows I might need to use to lead the viewer through the story, and the level of science that was most appropriate. The best way to avoid this was to keep the lifecycle in as straight a line as possible, so that it was visually logical to follow. Additionally, we planned for the "targets" or weak points in the replication cycle to align underneath

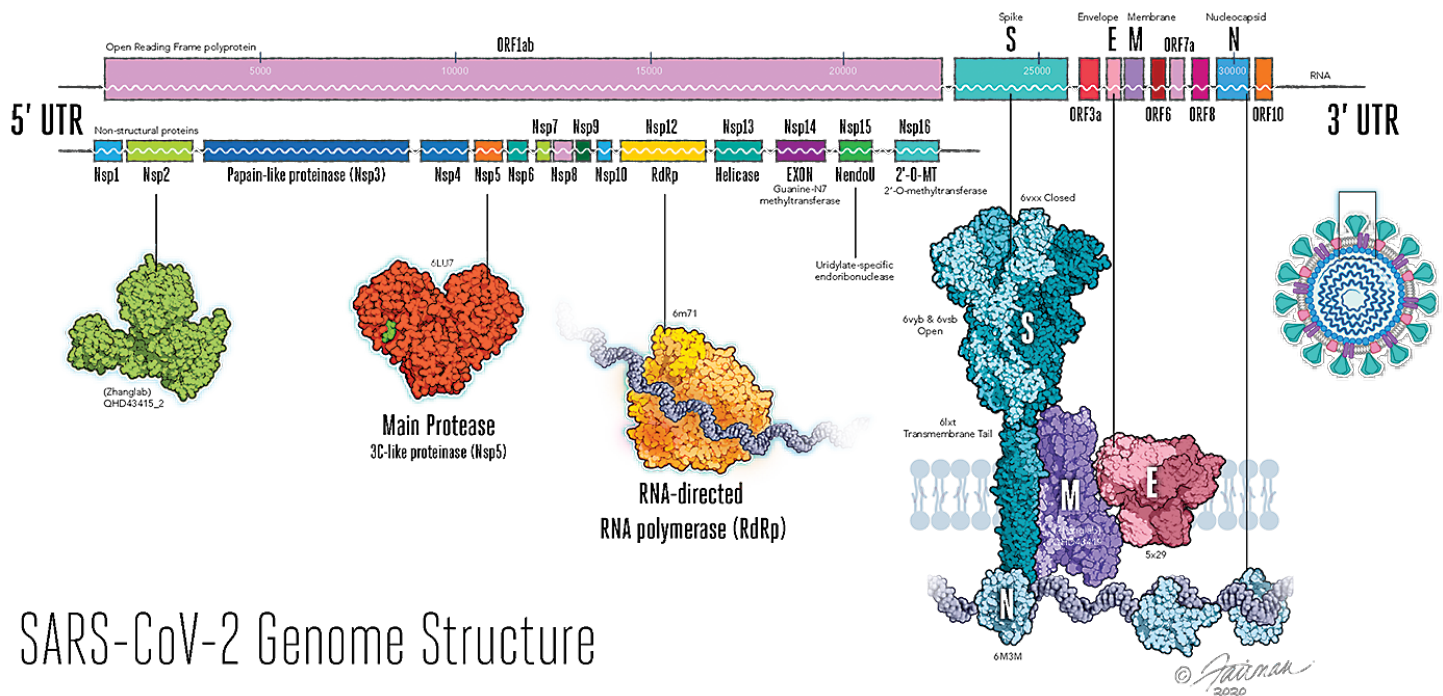
this linear format. This is where we would illustrate and describe our therapeutics.

With those two rows of information organized, Robert inspired me to use my planned virus cross-section as an entry point to the whole spread. He suggested the virus look as if it was right on the horizon of the cell, just at the point of attachment and entry. I decided to increase the size of the virus and cut it open in order to show the viewer the detail of the various structural proteins, with special attention devoted to the spike protein (Fig. 9).

### RENDERING THE VIRUS

The team agreed that bold instructional color would be very engaging. I decided to go with an ocean blue, almost inspired by an architect's blueprint. I wanted to keep the look and feel of the overall composition fluid and calm.

The virus itself was constructed by downloading the most up-to-date versions of the structural proteins from the Protein Data Bank (PDB). I used various web-based molecular visualization packages to render out my representations of each protein including iMol<sup>®</sup> and 3DProteinImaging<sup>®</sup>. I typically export my models as PNGs and import them into Adobe Illustrator<sup>®</sup> where I can convert them to library assets or pattern brushes. For example, the virus lipid membrane is one small section that is converted into a brush that is stroked along an oblong circular path. Next the spike proteins are added to a duplicate path and adjusted such that the virus has the correct number; the average number of spikes is around 70 per particle. With spikes in place, the proportionate



## SARS-CoV-2 Genome Structure

amount of the proteins were distributed along the surface. Lastly, the nucleocapsid-RNA “snake chain” was created using another custom pattern brush. This entire composition was brought into Adobe Photoshop® as a layered file. In Photoshop, I added dimension to the virus using many layers for highlights, shadows, overlays, filters, and textures. Once my rendering of the main virus was complete, I was able to create a derivative simplified version of the virus and intracellular proteins for the lifecycle component (Fig. 10).

### SARS-COV-2 LIFECYCLE

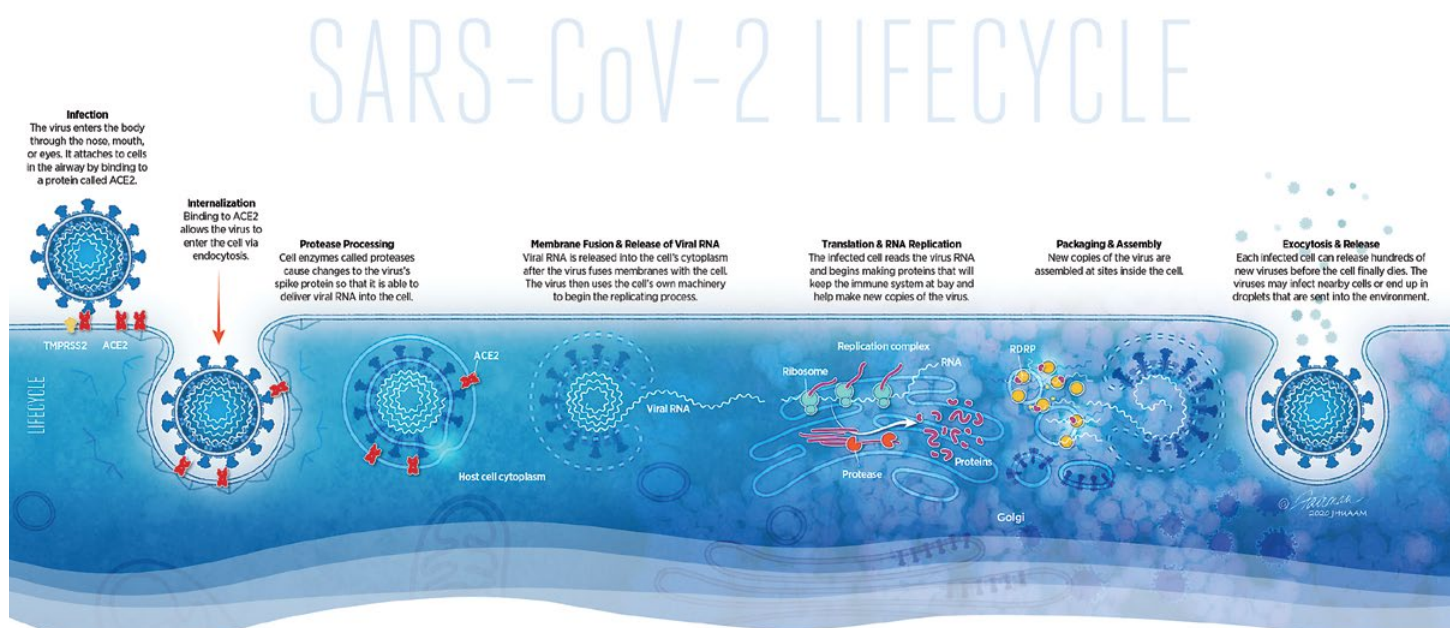
The majority of my drawing for the cell background and its key players was created and composed in

Illustrator, while the nuanced shading and details were added in Photoshop. We decided to simplify the lifecycle into seven steps (Fig. 11):

1. Infection
2. Internalization
3. Protease Processing
4. Membrane Fusion and Release of Viral RNA
5. Translation and RNA Replication
6. Packaging and Assembly
7. Exocytosis and Release

**Figure 10:** SARS-CoV-2 genome structure with intracellular proteins.

**Figure 11:** The lifecycle of the SARS-CoV-2 virus—from infection to exocytosis and release. Magazine layout.



## MOVING TARGETS

For the third portion of the infographic, we focused on what Dr. Andy Pekosz is currently investigating as the virus's vulnerabilities. An enthusiastic and precise scientist, Pekosz has deep research experience regarding how viruses like SARS and influenza interact with the respiratory epithelium. Here, he discusses researchers' strategies and six targets (Fig. 12).

With this last layer of detail, the infographic was compiled into a two-page spread that could be modified for various formats.

These included the printed magazine, an online interactive version ([jhsph.edu/2020/science-vs-virus](http://jhsph.edu/2020/science-vs-virus)), and a 2D animation narrated by Andy himself ([youtu.be/xRTMXvZ75dY](https://youtu.be/xRTMXvZ75dY)) (Figs. 13–16).

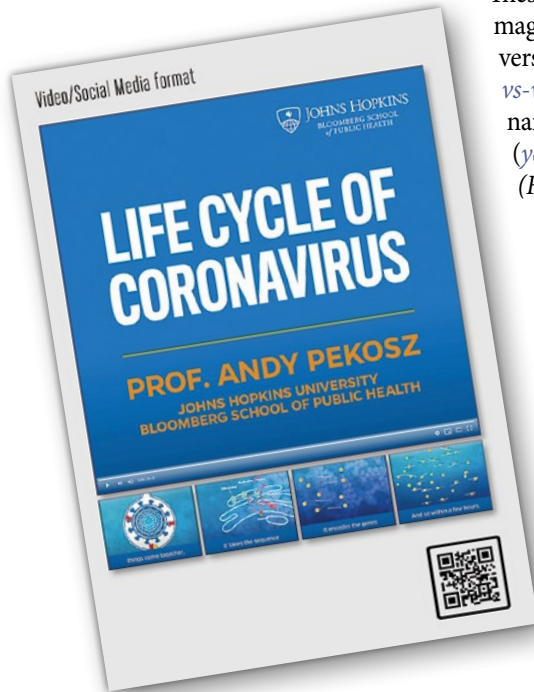
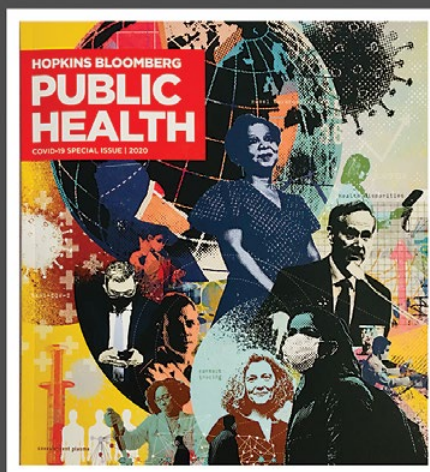


Figure 12 (right): Six therapies currently being researched as weak points in the virus's lifecycle.

Figure 13: Final video of "Science vs. Virus" posted to social media.

Figure 14: Photo of published magazine *Public Health*, Hopkins Bloomberg, COVID-19 Special Issue 2020.



## SIX RESEARCH TARGETS

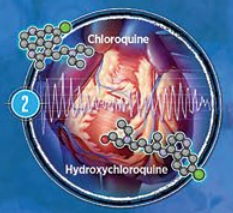
### Monoclonal antibodies & convalescent plasma

Recovered patients have antibodies to SARS-CoV-2 in their blood plasma. Giving these antibodies to patients with active COVID-19 may be effective against the infection. They block the virus from binding to cells and may have other effects as well. They're not a long-term fix, but they may help for a few weeks. Several companies are developing monoclonal antibodies for this same purpose.



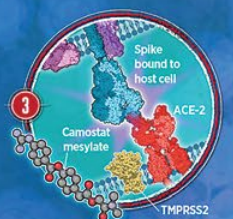
### Chloroquine & Hydroxychloroquine

These drugs appear to offer no significant benefits—but have increased risk. They were shown to have great efficacy in laboratory settings, but that hasn't translated to an effective drug for humans. That's something that happens a lot, actually. Plus, drug trials have shown there is a risk for heart arrhythmia and other heart issues.



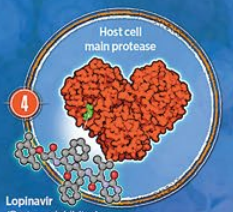
### ACE-2 inhibitors

The advantage or disadvantage of drugs called ACE-2 inhibitors is not entirely clear for COVID-19 infections. Targeting the ACE-2 with antibodies or using "decoy" ACE-2 molecules has the potential to inhibit virus entry in ways similar to antibodies.



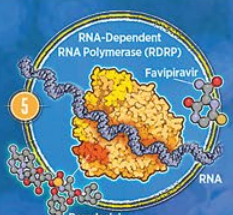
### Inhibit protease activity

It may be that the best antiviral drugs will come from drugs that target the virus's proteases, but they are a long-term project. Proteases are enzymes that perform essential functions for the virus, so if you stop them, you stop the virus. Medicinal chemists love these because they work all the time and have lots of spaces that drugs can be designed to target.



### Inhibiting RNA polymerase

RNA polymerase is another enzyme that SARS-CoV-2 needs to replicate. The drug favipiravir has been shown to be effective in shortening and clearing the infection, as has the better-known remdesivir. Both have been tested extensively in humans because they have activity against multiple classes of viruses, not just coronaviruses.



### Vaccines

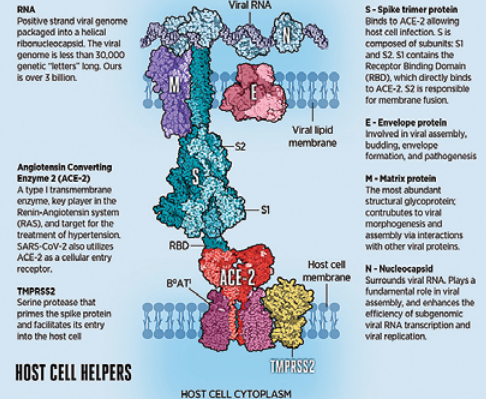
Vaccines could be the ultimate solution to COVID-19. A future vaccine will help the body generate antibodies that target the SARS-CoV-2 virus and prevent it from infecting human cells. More than 100 different candidates are in the works. Vaccines should come on board faster than we've ever seen before, but they still have to go through all the safety testing and efficacy trials.



## MOLECULAR PLAYERS

Roles of Primary SARS-CoV-2 & Host Cell Transmembrane Proteins

### SARS-CoV-2 MYSTERIOUS MACHINERY



## SCIENCE VS. VIRUS

Virologist Andy Pekosz surveys some of the strategies in the works to stop SARS-CoV-2

BY BRIAN W. SIMPSON  
ILLUSTRATION BY JENNIFER E. FAIRMAN

**C**all it humanity's revenge. The novel coronavirus—known for viciously exploiting victims' weaknesses like hypertension and diabetes—is now having its own weaknesses targeted relentlessly. Andy Pekosz, PhD, a professor in Molecular Microbiology and Immunology, is investigating the virus to search out its vulnerabilities. An enthusiastic and precise scientist, Pekosz has deep research experience in how viruses like SARS and influenza interact with the respiratory epithelium—cells lining the upper airways that protect against dust particles, viruses, and other invaders. Here, he discusses the virus's lifecycle and researchers' strategies and targets. Spoiler alert: He's optimistic.

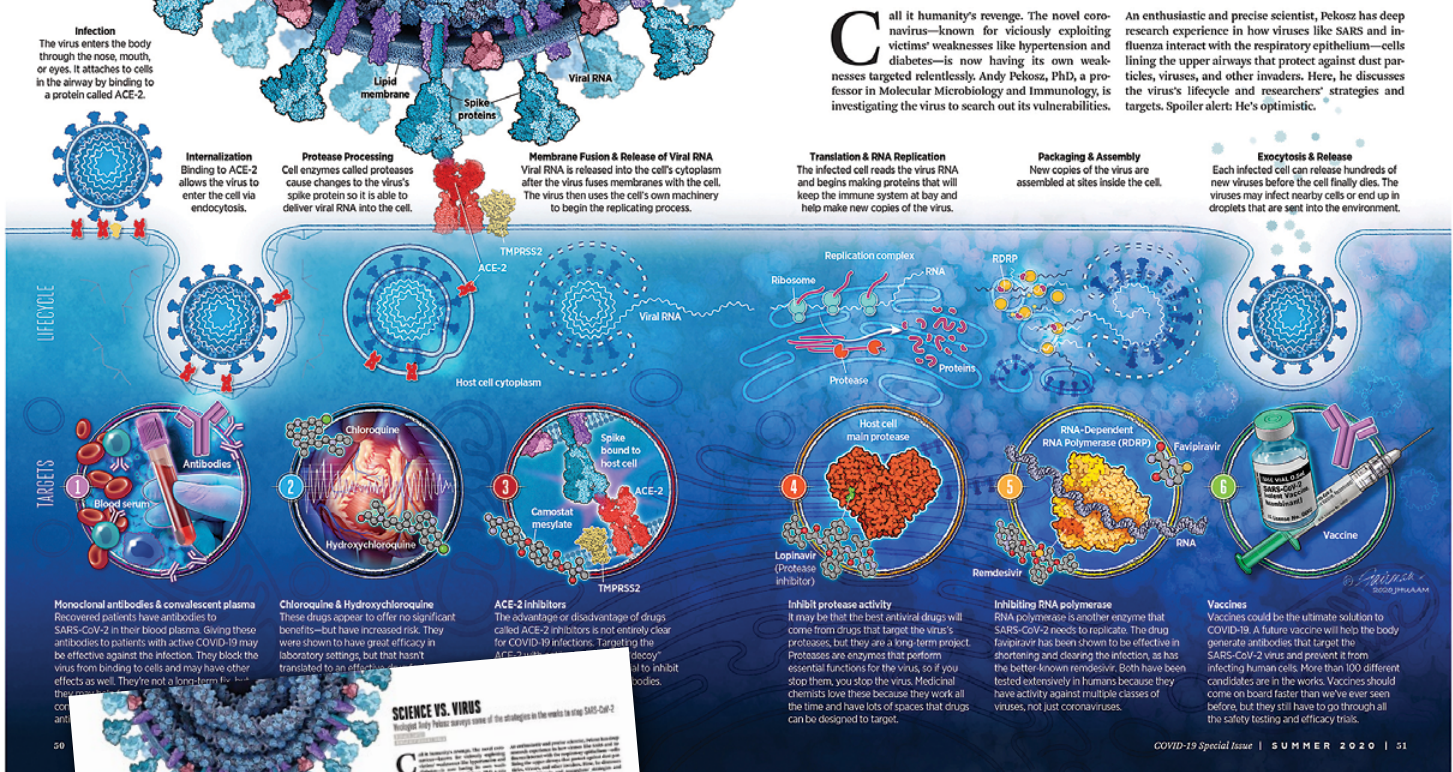
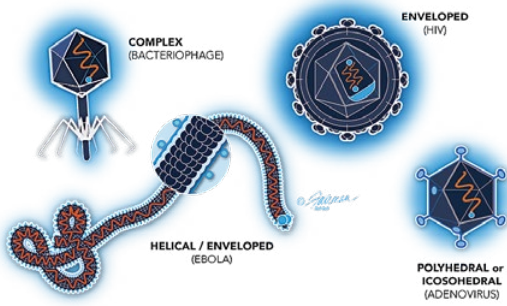
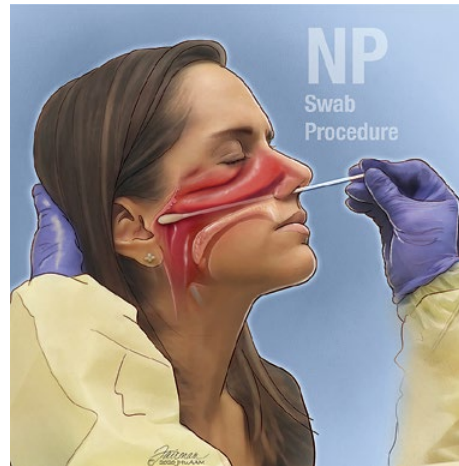


Figure 15: Final poster spread of "Science vs. Virus."

Figure 16 (left): Final magazine spread of "Science vs. Virus." Published in *Public Health*, Hopkins Bloomberg, COVID-19 Special Issue 2020.

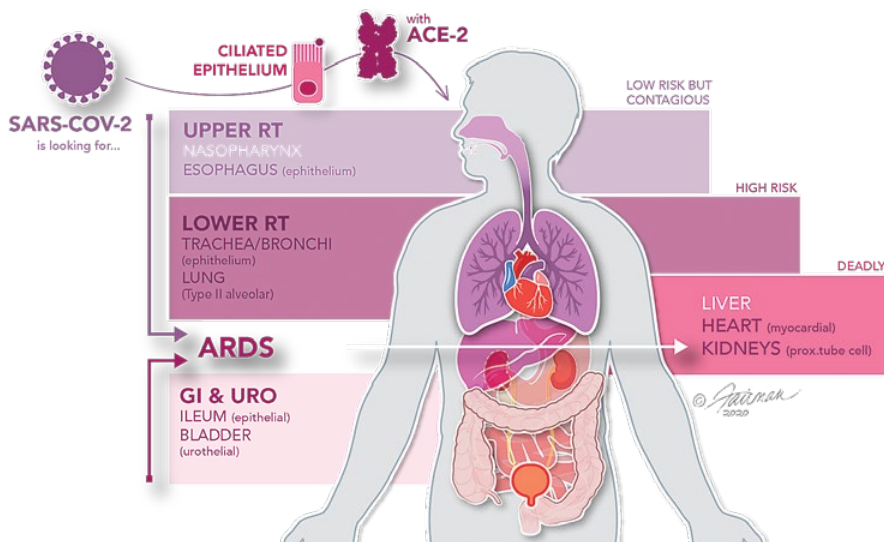


**Figure 17:** Various virus structures including: complex (bacteriophage), enveloped (HIV), helical/enveloped (Ebola), and polyhedral or isohedral (adenovirus).

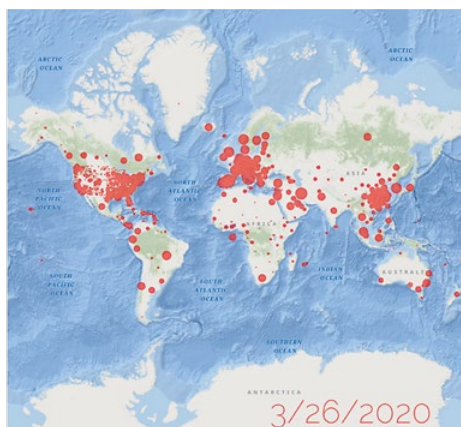


**Figure 18:** Illustration depicting the differences between the nasopharyngeal (NP) swab and nasal mid-turbinate (NMT) swab testing.

**Figure 19:** Infographic of COVID-19 pathogenesis.



**Figure 20:** COVID-19 Dashboard, CSSE, and JHU, showing virus cases from March 26, July 15, and August 6, 2020.

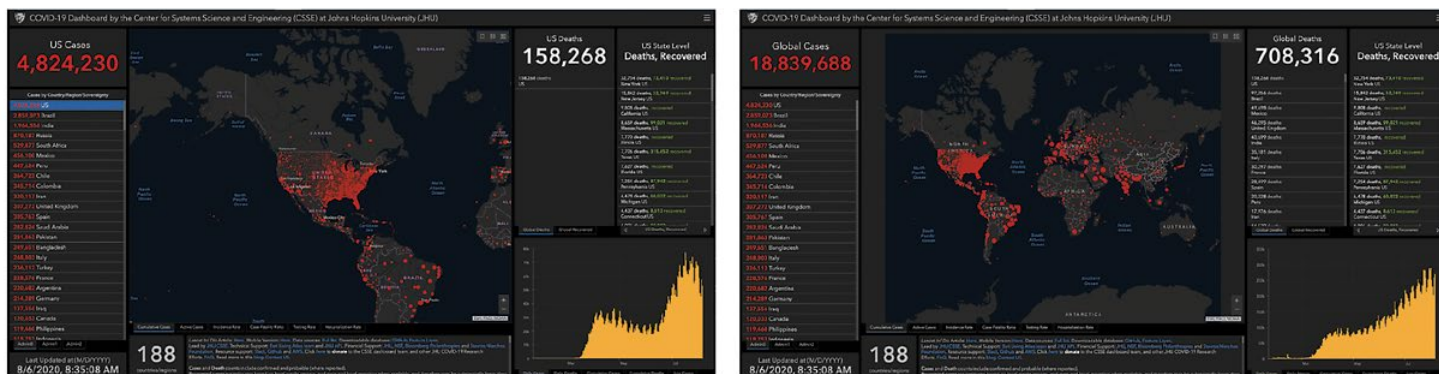


## OTHER VISUALIZATIONS

In addition to this story, there have been many before and since. As I write this article, I have illustrated, animated, even SCULPTED many visualizations: the transmission of the novel coronavirus, various nasal swabbing techniques, therapeutics in clinical trials, structural visualizations, mechanisms of inflammation, and the “cytokine storm” (Figs. 17–19). My most recent endeavor is figuring out how to create a three-foot sculpture... but that is a story for another journal article!

In the meantime, I continue to visit the trusty [COVID-19 Dashboard](#) by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University to see where things stand. It’s a grim picture to realize how much the numbers have changed since we were sent home to work remotely (Figs. 20–21).

This too shall pass. In the meantime, if you continue to wear PPE (Fig. 22), self-monitor, keep your distance, and wash your hands, I know we will see each other again.



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UniProtKB PoDTC5 (VME1\_SARS2)

4NV4 and 5CTG; ZhangLab QHD43419, [zhanglab.ccmb.med.umich.edu/COVID-19](https://zhanglab.ccmb.med.umich.edu/COVID-19)

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**Figure 21:** Snapshot of the COVID-19 Dashboard at the Center for Systems Science and Engineering at Johns Hopkins University as of August 6, 2020. Left panel: US confirmed cases; right panel: global confirmed cases.



**Figure 22:** SARS-CoV-2 pattern designed and sewn by the artist.

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# Coronavirus Visualizations for Early Childhood Professionals

— Emily M. Adams

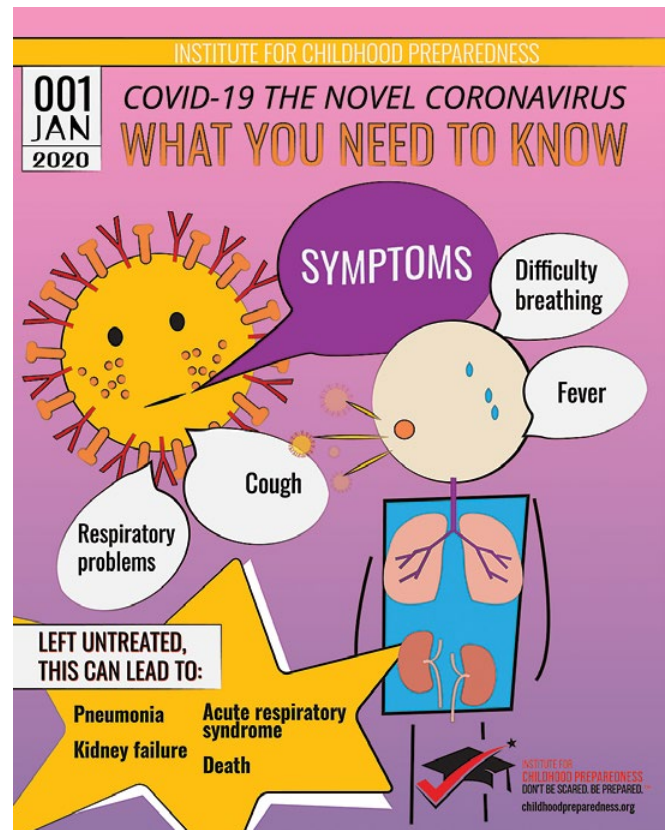
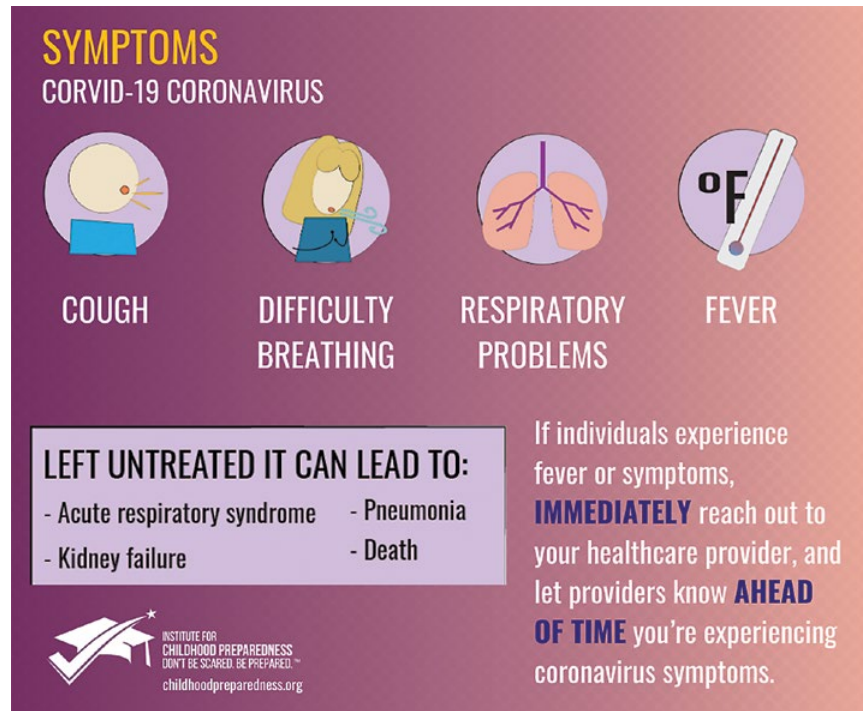
Emily Adams graduated from Iowa State University (ISU) in May 2018 with a degree in Biological/Pre-Medical Illustration (BPMI). While enrolled at ISU she worked part-time as a graphic designer for a church. Following graduation, she accepted a part-time web design internship for a year, before attending graduate school in Medical Art in the Fall of 2019 at the University of Dundee in Scotland. While Emily's employment in graphic and web design was not specifically relevant to her degree, she thought it was important to understand the principles of graphic design so she could better format information in her biological illustration work.

In April 2019, she began her second internship in Graphic Design and Social Media with the Institute for Childhood Preparedness, an emergency preparedness company that creates training and resources specifically for early childhood professionals. As a part of their work, the Institute creates free informational flyers and social media tiles, including safety tips and public health information for early childhood professionals and parents. Over the last year, Emily has produced graphics that utilize a variety of design principles and styles to meet the Institute's needs, with topics ranging from heatstroke awareness to Halloween safety. In late January 2020, there was widespread misinformation about COVID-19. To focus on this issue, the Institute asked Emily to create graphics addressing what was known about the virus at the time. As the situation continued

All Illustrations © The Institute for Childhood Preparedness, unless otherwise noted.

Above Right: final symptoms graphic.

Right: Original symptom graphic which was not used.



to evolve, more graphics were created with tips specifically for childcare providers and parents.

## PROJECT DESCRIPTION

The graphics were originally created for social media and are available on the Institute for Childhood Preparedness website to download and share. They were later formatted as slides to be used in the Institute's online coronavirus course, "What Early Childhood Professionals Need to Know about COVID-19," which has been taken by over 65,000 participants in the US, Canada, and Europe.

A graphic medicine workshop in January 2020, that was part of Emily's graduate coursework, lead her to begin experimenting with comic-like graphics with pop art elements, while creating some graphics about the flu. So, in late January, she expanded the same style to the informational coronavirus graphics. The first graphic created about the coronavirus was intended to mimic a comic book cover. However, the initial graphic was not used because it did not properly align with the audience. It was decided that the harsh and sharp lines along with the outlines of organs affected by the virus were too frightening for the intended audience. To adjust, individual icons of people were used to represent the different symptoms. In places where it was difficult to visualize the text in a non-intimidating way, such as "death and kidney failure", the text was placed in pull-out boxes so that it was still visually interesting. Some of the visuals from the initial graphic were repurposed as icons in the later graphics.

As the pandemic evolved, information was rapidly changing and the need for easily editable graphics became apparent. To address this need, each of the

individual illustrations was exported from Adobe Illustrator® and moved into Canva®, an online graphic design software, making it more efficient for the content creator to edit and update any content that had fallen out-of-date. Later, when the graphics were translated into Spanish, the translators were able to easily access the graphics via link sharing and implement their translated content.

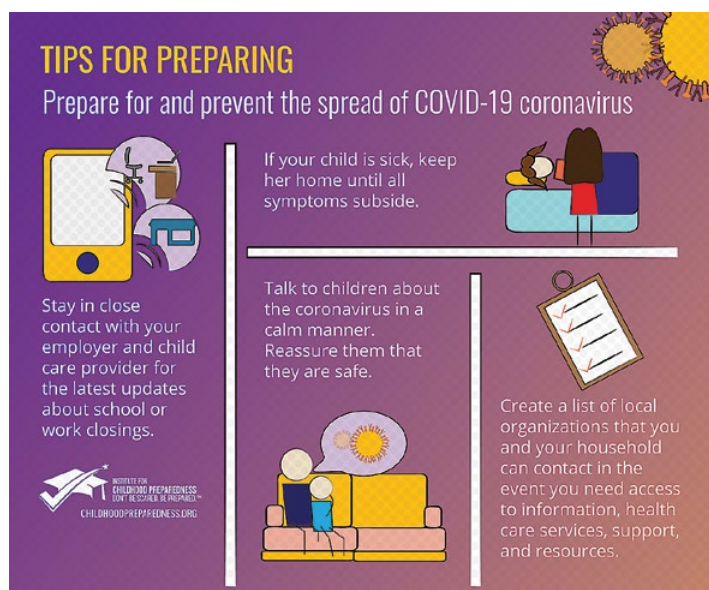
## ADDITIONAL WORK

In addition to the informational coronavirus graphics, Emily worked with the Institute to develop a National Dashboard tracking the COVID-19 childcare status in each state, which was updated once a week for most of the first wave. It has since been archived. More recently, the Institute has been working on creating content for mask safety graphics, explaining best mask practices. Emily has worked with the Institute to create more than 100 different informational graphics in the last year. These graphics can be accessed at [childhoodpreparedness.org/resources](https://childhoodpreparedness.org/resources). To see their most recent visuals, follow the Institute on Instagram (@childhoodpreparedness) or Facebook (/childprepared).



Above: Mask safety tips.

**SEE MORE:** Follow Emily Adams on Instagram as @e.m.adams.inc or visit her website [emadamsinc.com](https://emadamsinc.com).



# Pandemic Works in Progress

— Edited by Cheryl Wendling

*Bruce Worden is the Scientific Illustrator at the Journal of Clinical Investigation, a monthly academic journal for discoveries in basic and clinical biomedical science that advance the practice of medicine. He lives in Ann Arbor, Michigan, with his wife and son.*

**Q: Bruce, as a biomedical illustrator for a journal that focuses on new discoveries, how has the advent of the pandemic affected your work?**

I've been assigned a few COVID-19-related figures for JCI, but they haven't been glamour-shot morphological drawings yet, and probably won't be. We're almost always more focused on some pharmacological pathway, rather than just visual identification.

The first one I did was in an article that got a lot of public awareness in March. It was about using antibodies from recovered patients to create a vaccine (Fig. 1).

Another was about the disease's inflammatory response. So far it's the only one where I actually got to draw a little image of the virus itself. But it's so small, it's pretty generalized (Fig. 2, next page).

Most of the other COVID-19 figures I've been asked to do have been maps and graphs (Fig. 3, next page).

**Q: You follow a particular work flow at JCI. Can you explain the process for us, please?**

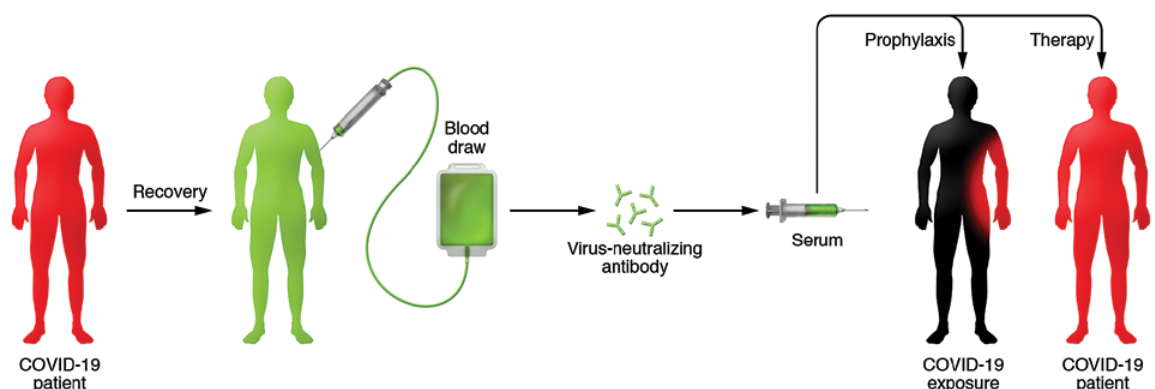
Sure! I'm happy to explain. Here are the steps that I normally follow when generating an illustration:

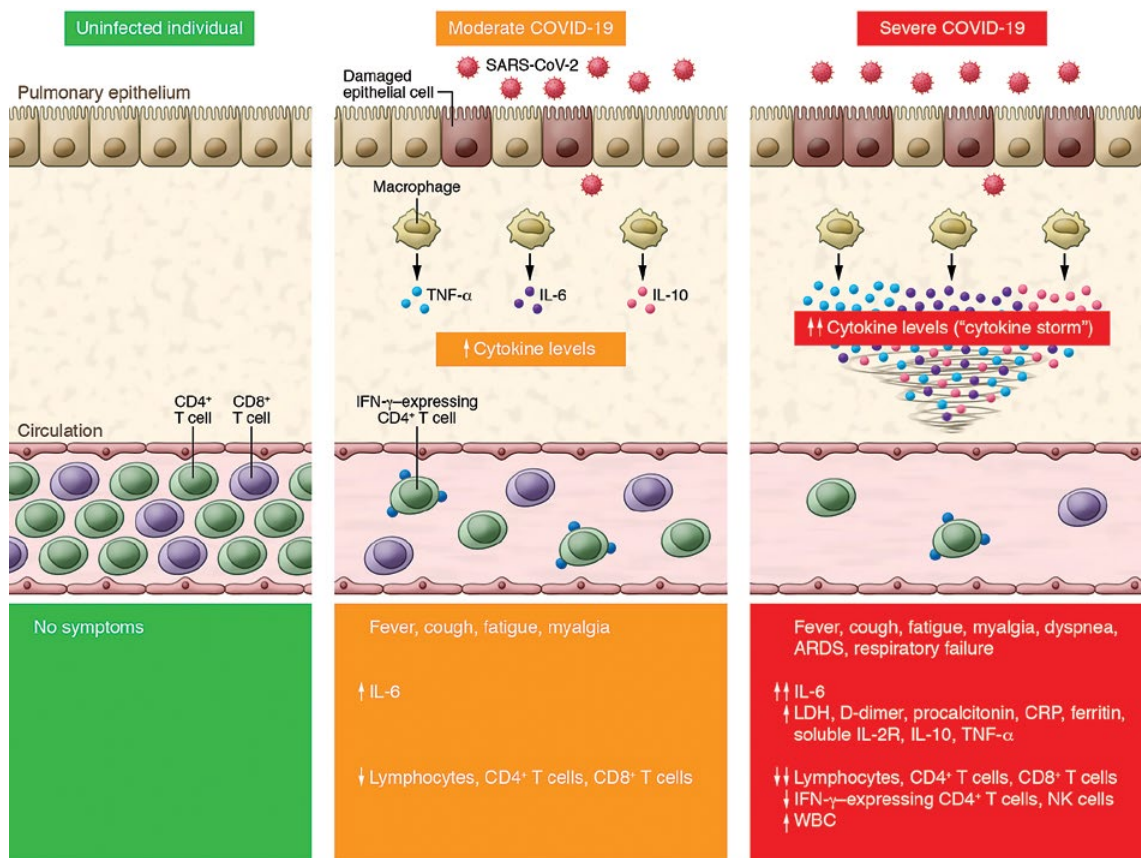
- A scientist will submit some kind of sketch, with a figure legend, to our Science Editors, along with the rest of their paper.

- The Science Editor will then forward the sketch and legend on to me, along with any clarifications or edits they'd like me to make. Then, together, we work out any questions I might have about it.
- I'll then submit back a new sketch of my own. The editors will pass my sketch on to the scientists, who review it and suggest any edits they'd like.
- I incorporate those edits into the next draft, which is cleaner than the original thumbnail—colored, shaded, and prettied-up (we call it “finalized”). And I resubmit that for one more round of edits, if needed.
- If there are any minor edits at that point, I make them and turn the figure over to our Copy Editors, who edit it for consistency with the paper itself.
- When the Copy Editors finish, I fix any errors they found. Then the paper/figure gets laid up into a proof copy of the whole journal—at which point, the scientist takes one last look at it and has that one, final chance to make suggestions and ask for edits. Usually the figure is fine at this point, and it just goes to print. However, sometimes they still ask for some edits at this final stage and I do my best to get it how they want it before it goes off to print.

**Figure 1:** Using antibodies from recovered patients to create a vaccine. Published in "The Convalescent Sera Option for Containing COVID-19" by Arturo Casadevall and Liise-Anne Pirofski, March 13, 2020.

All illustrations © Journal of Clinical Investigation, unless otherwise noted.





**Figure 2:** Inflammatory response to COVID-19. Published in "SARS-CoV-2: A Storm is Raging" by Savannah F. Pedersen and Ya-Chi Ho, March 27, 2020.

All-in-all, the first five steps, before copy editing, take about a week. Copy editing takes as long as they need, but it takes me a minute or two to make their changes. The proof revisions happen at the end of the month, right before the print deadline. So, a complete, edited, approved figure that makes everyone happy can take anywhere from a week to a month. As you can see, there are a lot of checks and balances along the way, which almost always allows us to end up at a place where everyone is completely satisfied with the figure and the way it works within the paper itself. I've been here 15 years, publishing 20–30 figures a month, and I can count on one hand the number of authors who've gone through this month-long process and still been unhappy with the way the figure turned out when it went to print... and I can live with that.

#### Q: Do things always work that way?

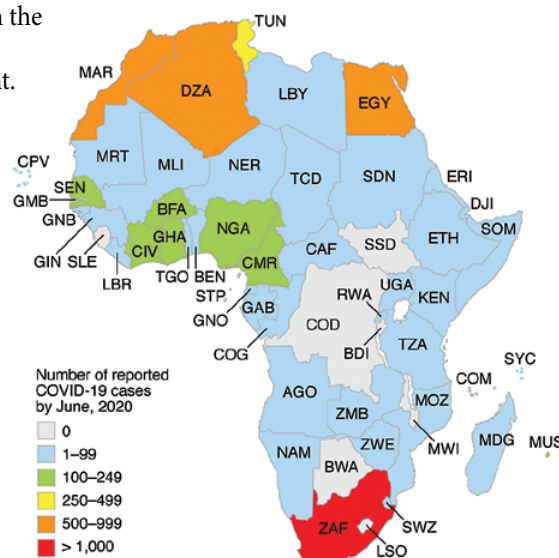
There are exceptions that prove the rule—that first article, the antibody one, they only gave me about four hours start-to-finish for that one. It was a serious rush job that went above and beyond our usual production schedule because of the urgency of the outbreak at the time. There wasn't really any back-and-forth with the scientists on that one. They gave me a written description of what they were trying to say, and I took some risks by pushing the layout around a bit and committing to it without verifying

it before I moved forward. I reused a lot of imagery from previous figures (the IV bag, the silhouettes, the syringe), so I could just paste them in, rather than spend time dealing with unimportant details. The bulk of my work on it was invested in creating a clear layout.

#### Q: Bruce, in general, how has your normal work process changed during the past few months because of the pandemic?

All my communication with the editors happens over email anyway, so that's no different. Many of our authors are on COVID-19 response teams, and labs have been closed during the pandemic, so that has affected author response times. Mostly, my actual work process hasn't changed, except that I'm doing it from home instead of at the office.

**Figure 3:** COVID-19 cases in Africa by June 2020.





Stinging nettle,  
wild garlic, and feta  
cheese omelet

## Corona Cuisine

— W. Scott Rawlins

*Many of us are no longer able to work as illustrators—either because there is no work coming in or we have been prevented from accessing our usual workspaces (and necessary equipment). Without the usual work incentives to persuade us to illustrate, we are finding a variety of ways to exercise our creativity. In addition to dealing with our need to create, these activities are a way to combat depression, anxiety, and stir-craziness. They also allow us to feel more independent, more self-sufficient, and in greater control of our lives.*

A psychologist coined the term “fruitful boredom” to refer to the drive to explore ways to engage ourselves when we are unable to “carry on as usual.” Many of us already spend a great deal of time in front of computer screens—working on digital illustrations or (more recently) participating in numerous online classes and meetings. So, instead of watching films online and playing computer games in our “free time,” what can we do that is more active, appealing, and (potentially) constructive—that is, activities that could produce some satisfying, tangible results?

Some people write to fill their time. Others compose music, garden, or in my case: cook. There is actually a name for it—Quarantine Cooking, which generally refers to savory dishes thrown together that can be eaten as an entire meal, such as soups, stews, and stir-fries. (A subset of this phenomenon is Quarantine Baking that focuses on sweet creations.) Quarantine cooking generally involves “real” food that meets nutritional needs.

Though things are opening up a little throughout the US (and world), people are still staying at home, limiting trips to the grocery store, and having to deal with the realities of a quarantine mindset such as hoarding supplies. I limit my shopping to twice a month, which requires a certain amount of planning ahead, and there’s no guarantee that what I want will be on the grocery store shelves. Online grocery shopping might seem like a good idea, but items are often on backorder, involve complicated delivery procedures, and/or are overpriced. For example, a five-pound bag of flour I ordered online cost me \$18.

I decided that I needed to set some goals for my Corona Cuisine. Number one was to use ingredients that have been in my cabinets/refrigerator/freezer for lengthy periods. I also wanted to be creative, so I decided to devise recipes for items that might not normally be combined. In other words: to play, but still be productive.

### GARDENING AND FORAGING

Gardening can be thought of as another example of “fruitful boredom.” Less reliance on what is available in grocery stores can be achieved by growing your own fruits and vegetables but this is not something that yields immediate results. I will have to continue to rely mainly on grocery shopping for a while, but did manage to do some local foraging. Stinging nettles (*Urtica dioica*) are common weeds in my neighborhood. Conscious of the “produce problem,” I decided to use nettles in a number of recipes, generally substituting them for spinach. And thinking about all of those tufts of wild garlic (*Allium vineale*, a.k.a. onion grass, crow garlic, and stag’s garlic) that

are popping up all over lawns in my neighborhood, I was wondering if I could figure out how to combine these weeds in one recipe. In addition to the usual ingredients for an omelet, I substituted nettles for spinach and wild garlic for onions. Both of these plants were growing in my yard—or my neighbor's yard (I didn't ask, but I don't think she minded me harvesting her weeds).

Voilà—the Stinging Nettle, Wild Garlic, and Feta Cheese Omelet:

## Stinging Nettle, Wild Garlic, and Feta Cheese Omelet

Serves 1

### INGREDIENTS

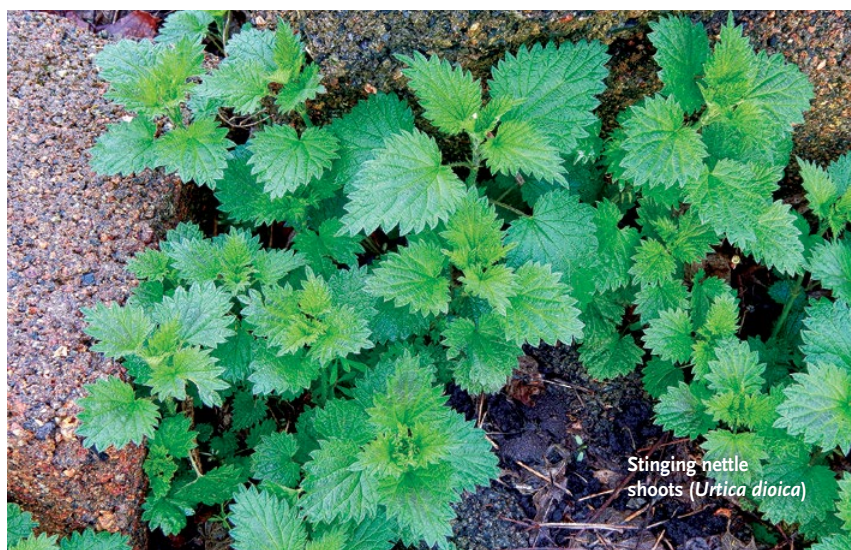
|                           |                           |
|---------------------------|---------------------------|
| ~8 stinging nettle shoots | 2 T. crumbled feta cheese |
| ~20 wild garlic bulbs     | olive oil                 |
| 2 large eggs              | butter                    |
|                           | salt and pepper           |

### DIRECTIONS

1. Pick the nettles using gloves, wash them (the nettles, that is, not the gloves), place them in a small saucepan, and boil them about three minutes. Drain and cool slightly. Using kitchen scissors, remove the stems. (You will be left with something that looks like cooked spinach or green filamentous algae.) Set aside.
2. Pull up a couple of clumps of wild garlic. Grasp firmly and pull steadily upward until the bulbs are free. Wash off the dirt. Trim off the “stems” and the rootlets so that only the bulbs remain. Cut each bulb in half. Save some of the leaves for garnish! Heat a little olive oil in a pan and sauté the bulbs until slightly transparent. Raw wild garlic is kind of strong, so sautéing it will reduce the pungency. Set aside.
3. Using a medium-sized bowl and a wire whisk, beat the eggs until uniform in texture.
4. In a small skillet or frying pan, melt about a tsp. of butter and manipulate the pan so the butter coats the inside.
5. Pour the eggs into the pan and cook as you would any omelet. Before all of the egg has congealed, heap on the nettles, garlic, and cheese. Add a little salt and pepper. Fold the omelet onto itself, flip, and cook the top. Slide the finished omelet onto a plate.
6. Garnish with some chopped garlic leaves.



Wild garlic  
(*Allium vineale*)



Stinging nettle  
shoots (*Urtica dioica*)

### CREATIVE COMBINATIONS

What to do with an excess of carrots? Those warehouse stores can be time and money savers, but everything seems to be available only in large quantities. I adapted a classic glazed carrots recipe using chopped praline pecans that by themselves are so sweet that they make your teeth hurt. Fortunately, when mixed with the carrots, a nice balance was achieved. Along with the carrots, I received a large quantity of celery. Cream of Celery Soup seemed like a good way to use up the excess! The grocery store was out of “regular” rice, so I purchased a bag of jasmine rice. Using leftover flaked coconut, golden raisins, mango chutney, carrots, and various curry spices, Corona Curried Rice was born.

Two wrongs *can* make a right! Those excessively sweet pecans and some overly dark (i.e., very bitter) chocolate, when mixed together, resulted in a perfect combination of flavors in a sweet treat: Corona Chocolate.

All images © 2020  
Scott Rawlins, unless  
otherwise noted.

**ASIDE:** I've been unsuccessfully trying to make omelets for years using olive oil until I encountered an Arcadia chef who, without knowing what my problem was, immediately offered a solution: butter. (Butter seems to be the solution to a lot of things in life.) So—use butter in the pan.

Right: Spaghettini with Mushroom Sauce



I can't recall how long I've had a container of dried morel mushrooms in my refrigerator but decided that now was the time to use them. The result: Spaghettini with Mushroom Sauce.

I tried to buy some sweet potatoes online, but the system would not allow me to purchase more than one. What can you do that is interesting with just one sweet potato? I found a recipe for sweet potato casserole online and made some additions and substitutions: fresh wild garlic for garlic powder, agave syrup for maple syrup, chopped pecans (yes, those overly sweet ones!) for chopped walnuts, olive oil for butter, Italian seasoning for fresh thyme and rosemary, and "regular" seasoned breadcrumbs for unseasoned Panko breadcrumbs. The result was quite acceptable.

### SOME NOTES ON MY QUARANTINE BAKING

I'm not a very experienced cook (though maybe that will change before things get back to "normal"). However, I do have experience baking, so I have done quite a bit of that. The challenge was not how to bake what I wanted, but how to use ingredients I'd been storing for years and where I might make substitutions for ingredients that were unavailable. In addition, for some reason I decided to use the heat from my fireplace to help the bread dough to rise. This increased my sense of self-sufficiency. Some concoctions I tried included:

- Pandemic Applesauce Bread (what to do with uncooked apple pieces—from my own tree!—that had been in my freezer for at least a decade...)
- Cranberry and Pineapple Biscotti (what to do with leftover dried cranberries and pineapple)
- Marmalade Cake (I don't like marmalade but couldn't just throw it out! The cake was OK—and probably very good if you like marmalade.)
- Yellow Cake with Raspberry Sauce (what to do with last year's frozen raspberries)

- Cupcakes (what to do with some Russian cocoa powder I "discovered" in one of my cabinets)
- Oatmeal Bread (what to do with agave syrup that had been around for several years)
- Basic Biscuits (what to do with some old buttermilk powder)

All things considered, I think my experiments with "Corona Cuisine" have been successful. The process has certainly been productive—and instructive—and I've been able to exercise my creative energy. An added bonus is that I now have a lot more room in my refrigerator, cabinets, and freezer! You know what they say—when life gives you lemons... make something interesting with what you have in the refrigerator.



### Featured recipes:

#### Corona Curry

Serves 6

##### INGREDIENTS

|                          |                              |
|--------------------------|------------------------------|
| 2 c. jasmine rice        | 2 tsp. curry powder          |
| 4 c. water               | 2 tsp. vadouvan <sup>1</sup> |
| 3 T. olive oil (divided) | ½ tsp. tumeric               |
| 1 medium onion, chopped  | ½ c. golden raisins          |
| 2 T. mango chutney       | 1–1½ tsp. seasoned salt      |
| 2 carrots, grated        | flaked coconut (for garnish) |

##### DIRECTIONS

1. Add 1 T. of oil to the water and bring to a boil.
2. Add rice and stir briefly. When the water begins to boil again, cover, reduce the heat, and cook about 15 minutes—or until all of the water is absorbed.
3. In a small saucepan, sauté the onion over low heat in 1 T. oil. When the onion has become fairly transparent, add the chutney, spices, carrots, raisins, and salt. Continue to cook, stirring frequently for about 10 minutes.
4. Combine the rice and sautéed vegetables in a large container. Add the last T. of oil and mix well.
5. Add additional salt and/or pepper to taste. Garnish with the flaked coconut.

<sup>1</sup> Vadouvan is another type of curry powder often used in the Puducherry region of India.

## Corona Chocolate-Covered Pecans

24 pieces

### INGREDIENTS

|                                                   |                                       |
|---------------------------------------------------|---------------------------------------|
| ~2 dozen overly sweet praline pecan halves        | ½ T. vanilla extract                  |
| ~20 bite-sized dark chocolate bars (70–80% cacao) | milk chocolate sprinkles <sup>2</sup> |

### TOOLS

|                        |                                          |
|------------------------|------------------------------------------|
| A small double boiler  | A chocolate-dipping fork or a table fork |
| A piece of waxed paper |                                          |

### DIRECTIONS

1. Melt the chocolate bars in a double boiler.
2. Remove boiler from heat, add the vanilla extract, and stir to combine ingredients.
3. Using a fork or chocolate dipper, dunk each pecan half in the chocolate and turn until the pecan half is coated.
4. Place each enrobed pecan half on a piece of waxed paper.
5. Garnish the pecans with the milk chocolate sprinkles.
6. Allow the enrobed pecan halves to cool before removing them from the waxed paper.
7. Store the candies in an airtight container.

## Easter Sweet Potato Casserole

Serves 2

### INGREDIENTS

|                                           |                                                  |
|-------------------------------------------|--------------------------------------------------|
| 1 large sweet potato                      | ¼ c. grated parmesan cheese                      |
| ¾ T. agave syrup                          | 1/8 tsp. salt                                    |
| 20 wild garlic bulbs, washed, cut in half | 1 T. butter, melted                              |
| ¼ tsp. salt                               | Pinches of savory spices (rosemary, sage, thyme) |
| 1/3 c. breadcrumbs                        |                                                  |
| ¼ c. chopped pecans                       |                                                  |

### DIRECTIONS

1. Pierce the sweet potato in several places with a fork and wrap it in a barely damp paper towel. Cook the potato in the microwave for about 7 minutes. Remove it from the microwave, unwrap, and cut the potato in half lengthwise. When it has

cooled a little, remove the outer skin and discard it.

1. Preheat an oven to 350°F.
2. Mash the potato with the agave syrup, wild garlic bulbs, and salt. Spread the mixture into a small 2-qt baking dish.
3. Combine the dry topping ingredients in a separate bowl and mix in the melted butter.
4. Sprinkle the crumb topping over the sweet potato and bake for about 30 minutes.

<sup>2</sup> I used ChocoMaker 100% natural milk chocolate flakes.



Left: Pandemic Pasta

## Pandemic Pasta

Serves 1 or 2

### INGREDIENTS

|                                                                     |                                        |
|---------------------------------------------------------------------|----------------------------------------|
| 1 c. dried pasta (I used rotini)                                    | pesto paste (about ½ t.)               |
| ½ c. cooked nettle leaves, chopped                                  | Italian seasoning                      |
| olive oil (~1 T.)                                                   | 1 small tomato (2" in diameter), diced |
| seasoned salt (about ½ t.; this contained garlic and pepper flakes) | parmesan cheese, grated (~½ T.)        |
|                                                                     | black pepper to taste                  |

### DIRECTIONS

1. Prepare the pasta as directed on the box—note that to achieve an al dente texture you might have to reduce the cooking time by a minute or two.
2. Mix together the olive oil, seasoned salt, Italian seasoning, pesto paste, and cooked nettle leaves.
3. Combine the pasta and the olive oil “dressing.”
4. Assemble the pasta dish. Fill two small bowls or one medium-sized bowl with the pasta. Arrange the tomato pieces on top. Sprinkle with Parmesan cheese. Finish with some freshly-ground black pepper.

**MORE ONLINE:**  
View Scott's complete collection of recipes and pictures at [bit.ly/34ZD6jS](http://bit.ly/34ZD6jS)

# Conference Review

## GNSI's First Virtual Conference

— Kalliopi Monoyios, GNSI President

*Where the current GNSI President tries to make it through writing an article about 2020 without reaching for the low-hanging fruit that begins with “hindsight is...”  
Wish me luck! —KM*

When my city went under lockdown in March, it took about 30 seconds for the first thought about my role as the next GNSI President to hit me with a thud: “*I didn’t sign up to be a pandemic president...*” But the next thought that surfaced, from the Department of Lemonade, was much brighter: “*Wait... this could be a gift if we play our cards right...*”

Cut to the next Conference Committee Meeting, and it became clear that we could not count on having an in-person conference in 2020. Now that this scenario has played itself out in every professional society in the US, let alone worldwide, it seems almost trite to

write it. But at the time, in the fog of uncertainty, it felt like a Very. Big. Decision. and I daresay we felt rather alone. The Salt Lake City Conference Committee had spent a year planning and was about to enter the home stretch by opening up registration. Needless to say, postponing the conference at such a late stage in planning felt like a major letdown, but of course it was necessary.

So the SLC team pivoted admirably and negotiated a postponement of the in-person conference, while a handful of us got cracking on what a virtual conference substitute could look like.

I’m not sure any of us on the virtual conference planning team had attended an actual virtual conference, but that did not deter us from imagining what it could be. Foremost, we felt it most appropriate to shape this meeting around how COVID is shaping our world—as professionals and as creative souls. We decided on a streamlined two-day series of lectures that would take place on August 8th and 9th. We would explore three themes: *Creativity in the Time of COVID*, *Adaptive Practices for Visual Creatives*, and *Online Teaching and Learning*. We also saw the

opportunity to adapt some of our beloved conference events, such as the annual auction and portfolio sharing, to online formats. Though we couldn’t entirely replace the 50-plus-year tradition of our annual conferences with an online facsimile, we felt it was possible to capture the spirit and perhaps grab some wins that in-person conferences can’t—namely cost-savings and the potential for a broader reach. In this period where so many things feel like they are breaking, it was a relief to be a part of something so hopeful.

### WHY NOT ZOOM?

Ok, so an online conference was definitively happening. So what platform would we host it on? Zoom, right? Though Zoom rocketed into the spotlight as the go-to for many institutions and had name recognition and general familiarity going for it, we were keen to choose a solution better suited to our needs. We sought a seamless delivery of lectures that didn’t ask much of our users. We wanted people to be able to follow a link and then sit back and enjoy the show. We were less concerned with being able to see multiple screens of participants, let alone police what was, at the time, an emerging problem: Zoom bombing. We found there were many alternative platforms that offered a much better user experience because they required no special software downloads (if you could navigate to a website, you could attend our conference) and had fewer distractions built in. How many Zoom meetings have been interrupted by careless participants (or worse) unmuting their mics? The platform we ultimately chose, Crowdcast, is an elegant hosting tool that minimizes user error through good design and enjoys success because they resist the temptation to “do it all” in favor of doing a few things exceptionally well.

The downside of choosing a highly-specialized platform is that it left us wanting for more opportunities for attendees to interact. We were not willing to sacrifice the community and networking that our in-person conferences have in spades.

**“Though we have been experimenting with greater online presence for perhaps a decade, the pandemic gives us the excuse to dive in head first to a new era of increased connectedness through online offerings.”**

Though Crowdcast's chat feature was lively and active throughout the presentations, we felt it critical that we also find a way for attendees to enjoy the benefits of networking directly with one another. Enter Remo.

Remo was chosen for our evening networking events and an all-attendee meeting held by GNSI's President (now Past-President) Sara Taliaferro, because it allows for more interaction between participants. When you enter an event, you see a floor plan of tables that seat six. Participants can click between tables to join friends or colleagues and participate in a six-way video chat. Though most people on the whole responded positively to the platform and the ability to converse with old friends and new, some did find it less intuitive and therefore less appealing. On the whole, though, feedback was positive and people reported feeling connected and energized.

### THE DAY-BY-DAY PLAY-BY-PLAY

Intending to keep the conference streamlined, we offered three compact modules. The first, *Creativity in the Time of COVID*, focused on science illustrators delivering messages that tie directly to the science behind the pandemic we are facing. This featured science illustration in a traditional sense—what most people think of when they think of what we do. Professor Jennifer Fairman, CMI, gave a rich and in-depth overview of her illustrations of the virus itself and how she had to be responsive to real-time information coming in on the structure and behavior of SARS-CoV-2. Quinn Burrell spoke about the challenges of creating relevant and timely information for a population that is generally overlooked by mainstream media: Black youth in the South Side of Chicago. In addition, we featured documentary filmmaker Katie Schuler's work on pangolins, a suspected intermediary host for SARS-CoV-2. While a documentary filmmaker might seem an odd choice to kick off a conference for illustrators, her approach to communication and her roots in science illustration resonated with all of us as storytellers and advocates for nature and science.

The second module, called *Adaptive Practices for Visual Creatives*, was designed to showcase a broader range of science communication career trajectories. If you set aside the tools we individually favor—at the core, each of us is working to communicate science visually. We are illustrators, yes, but we are also fine artists, sculptors, cartoonists, animators, exhibit designers, printmakers, muralists, data visualizers, art directors, educators, authors, and more. So this session reached further afield than traditional staff and freelance illustration jobs to highlight examples of people defining their own path in science education and communication. Tania

Marien, host and producer of the *Talaterra* podcast and creator of Talaterra Cowork, spoke about what she's seeing in the community she has built. Rachel Basye, Executive Director of the Art Students League of Denver, detailed how a midsized arts organization that provides ample teaching opportunities for people like us quickly embraced online courses when their model was wholly built around in-person instruction. Julia Buntaine Hoel inspired us with her six-year-old virtual residency program, The Bridge, that pairs scientists and artists together for a four-month virtual residency anywhere in the world. And illustrator Cordelia Norris shared how she channeled her feelings of helplessness about world events into a series of collaborative coloring books that continue to generate work and connections for her and select illustrators while supporting causes she deeply cares about.

Lastly, eager to mix up our offerings, we introduced a panel discussion on the topic of online teaching and learning. Since there are a multitude of platforms and no "right way" to hold online classes, we invited three GNSI members who, collectively, employ a large sampling of different tools with varying strengths to give our attendees the broadest range of perspectives on the topic (Fig. 1).



**Figure 1:** (Clockwise from top left) Past President and panel moderator Sara Taliaferro; panelists Gretchen Halpert, Karen Ackoff, and Christine Elder. © GNSI

For those interested in teaching general audiences, Christine Elder presented her successful model of online drawing classes delivered mainly through Crowdcast and Teachable—two relatively new and hip platforms. Her combination of live and pre-recorded sessions has proved very popular with homeschool circles in particular, but she enjoys the interactions with all age groups and interest levels she gets to teach. Gretchen Halpert, who began her Science Illustration Distance Learning certificate program 14 years ago with free tools like Skype, runs a 40-week intensive program to small classes of dedicated students, several of whom were at

**Figure 2:** Our online portfolio sharing took the form of a Tweetstorm with the hashtag #sciartportfolioweek. It was a resounding success, as evidenced by this single tweet by Tatiana Funk that received 1,228 likes. Photos © Tatiana Funk



the conference and had glowing reviews to share. Lastly, Karen Ackoff illuminated what teaching undergraduates through Zoom in a university setting is like, including insider tips to harness the full scope of Zoom's controls. Judging by the onslaught of questions that followed their introductory presentations, this is an area many of us are looking to expand into.

In addition to these more traditional offerings, we managed to fold in other aspects of our annual conferences, including a very successful auction that raised \$3,400! Virtual portfolio sharing was held during the weeks leading up to the conference on Facebook and Twitter under the hashtag #sciartportfolioweek. The first tweet kicking off the event garnered 6,957 views. Multiple tweets in that series got 500–700 likes and one big winner got 1,228 likes (Fig. 2)! In addition to that Tweetstorm, which allowed participation regardless of membership status, we had 58 members answer a call to share their portfolios on our Facebook page. These Facebook posts averaged about 1,000 views each. And peppered into breaks and downtime, we debuted a new online treat—vignettes we dubbed “shorts” that showcased our spunk and creativity. Ultimately, we presented

shorts by Marla Coppolino (on socially-distant BioBlitzes), Scott Rawlins (on semi-virtual field trips and Corona Cuisine), and Britt Griswold (on the 2008 Ithaca conference).

The annual juried show was another silver lining. With 248 entries and no space constraints, we were able to share 193 exceptional pieces of art with a global audience, no plane ticket required. The online gallery is accessible via [www.gnsi.org/2020vconf\\_exhibition](http://www.gnsi.org/2020vconf_exhibition). Bookmark it for a rainy day or for when you need some inspiration. It showcases the breadth of work and the immense talent and virtuosity of our members. While you're at it, you can search #sciartportfolioweek on Twitter and relive the Tweetstorm there, or visit our Facebook page to peruse the portfolios we shared whenever you need a sciart fix.

### SOOOO, HOW'D IT GO?

Though we were hoping for 150 attendees, we blew that expectation out of the water with 266 registrants from 14 countries (Fig. 3). Besides the United States and Canada, we had attendees from Australia, Austria, Brazil, China, France, Germany, India, Japan, the Netherlands, the Philippines, Portugal, and



**Figure 3:** The 2020 Virtual GNSI Conference had 266 registrants from 14 countries, including Australia, Austria, Brazil, Canada, China, France, Germany, India, Japan, the Netherlands, the Philippines, Portugal, the UK, and the US. © GNSI

the UK. Having so many international attendees highlighted an important theme of this conference: accessibility. In addition to being more geographically accessible, attendees with chronic illness and budgets that are too tight for travel remarked that this conference was special because they could attend on their terms. In addition, the low cost made it possible for us to offer 11 grants for people who applied under three categories: traditionally underrepresented groups (specifically, Black, Indigenous, and people of color), people experiencing extreme hardship from the pandemic, and students. Special thanks to the GNSI Education Fund and an anonymous donor for making this opportunity possible.

Post-conference reviews were overwhelmingly positive with 94% saying the conference met or exceeded their expectations. 90% said they would recommend the conference to others; of those 74% said they would do so emphatically. Our most frequent constructive feedback was that people missed workshops and technique demonstrations. *We hear you 100%!* At the time, faced with four months to plan and execute an entirely new model for a conference, we made the executive decision to keep it as simple as possible. Now that we have more experience under our belt you can be sure we'll be testing out more skills-transfer opportunities virtually. Stay tuned.

#### WHAT NEXT?

For members who have been with us for years, it comes as no surprise that when conference registrants

were asked what they value most about the GNSI, the strength of our community, professional development opportunities, and the caliber of our work came up over and over again. Before this virtual conference, most of our community-building and skills-building happened through our in-person events, especially the annual conferences. But we are firmly in the virtual age now. Though we have been experimenting with greater online presence for perhaps a decade, the pandemic gives us the excuse to dive in head first to a new era of increased connectedness through online offerings. We are buoyed by the success of the virtual conference and energized to expand our online offerings and cultivate more of these interactions throughout the year.

And now, a pitch—*did you honestly think you could escape?! Let's keep the momentum from this pioneering virtual conference going.* With no end in sight for the uncertainty and restrictions we face, let us continue to convene online with an eye for keeping each other informed, advancing our skills, and sharing tips and support as we ride the pandemi-coaster out together. If you have ideas, skills, or inspiration for how we might expand our online presence, please reach out. As you know, we are a volunteer organization and are only as good as our best and most motivated thinkers. *We need YOU!*

Be safe, keep creating, and we'll look forward to more online gatherings soon!

#### FUTURE CONFERENCES:

Given the continued uncertainty around the COVID-19 pandemic, the in-person conference in Salt Lake City, UT has been postponed to 2022. We look forward to creating another rewarding and informative virtual conference in 2021, including interactive workshops!

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*Donations in any amount are greatly appreciated and go to good use! If every member gave just \$5 we could cover the cost of one year of credit card fees we incur!*

Examples of how your donations may be put to work:

- \$50 supports a virtual conference attendee
- \$150 supports captioning for the virtual conference
- \$500 supports delivery of a JNSI issue
- \$1,000 supports two months of online delivery of the content and services you love

Go to [gnsi.org/donate](https://gnsi.org/donate) make your tax-deductible contribution today. We are grateful for your support!



## OTHER WAYS TO SUPPORT THE GNSI:

- Designate us as your charity at [smile.amazon.com](https://smile.amazon.com): Amazon will donate 0.5% of every qualifying sale to the GNSI (not every item is eligible, but tens of thousands are). Your shopping experience is exactly the same as always, you don't need to set up any additional accounts, and the Guild enjoys a bit of revenue from your Amazon purchases.
- Talk to us about setting up a scholarship.
- Volunteer!