

# PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

## *In This Pandemic Theme Issue ...*

Vaccine Hesitancy: Christian Reasons and Responses

Pandemics in Need of a Christian Response

Explorations of God and COVID-19

Communicating Science to the Public during the  
COVID-19 Pandemic

*“The fear of the Lord  
is the beginning of Wisdom.”*

Psalm 111:10

**VOLUME 73, NUMBER 1**

**MARCH 2021**

## Perspectives on Science and Christian Faith

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James C. Peterson

# Evangelicals, Neural Organoids, and Chimeras

While it has seemed all-hands-on-deck to fight the coronavirus, other research has continued—some investigations with remarkable speed. In December, I was surprised when a working group at the National Academy of Sciences asked me to meet with them for an hour to describe and discuss an evangelical perspective on the ethics of neural organoids and chimeras. A frequent first step in seeking to understand any malady is to find or develop an animal or lab model. They told me that in seeking to address Alzheimer’s, autism, and other neural issues, human neural organoids have been grown now to the point of significant neural activity.

It is wise that this working group took the time to hear from scholars on Evangelical, Roman Catholic, Jewish, and Islamic thought. Especially the first two constitute a majority of the people in the United States. Such broad input to the ethics of research, not only helps to maximize funding and minimize regulation, but also acknowledges that all will be affected by this new technology, increases the likelihood of developing more comprehensive consensus, remembers that error is harder to detect, but easier to correct at the start of new technology, and keeps in mind that the eventual majority consensus almost always starts as a minority perspective. For example, advocating social security for seniors was once a fringe movement, but is now assumed.

As to a specifically Evangelical perspective on neural organoids and chimeras, I could find only two op-ed length notices in the literature. And since “Evangelical” refers to the hopes and dreams and thoughts and actions of 83 million people in the US, and many more than that globally, one would expect significant variety. It is still possible though, to enumerate some likely questions and concerns among evangelicals, including relevant points of variation.

Having described who evangelicals are, I suggested four points of contact between evangelicals and the ethical questions of neural organoids and chimeras. The first was that Christians have a long history of

participating in the sciences as an intrinsic good. For example, the Oxford University chemist Robert Boyle, who discovered the relation between pressure and heat that we still call Boyle’s Law. He directed in his 1691 will that all the proceeds from his estate should be spent to translate the New Testament into Native American languages. A renowned scientist, his first priority was to make it possible for people to hear the Bible directly for themselves. An example in our current day would be Francis Collins, who found the gene for cystic fibrosis, directed the international human genome project, and now serves as the Director of National Institutes of Health under yet a third president. As a medical student, Collins was impressed with the thoughtful and confident faith of some of his patients facing death. He decided that he should spend some time investigating life’s biggest questions, and to his surprise, found the Christian faith convincing.

Maybe you have seen for yourself the stone carving in Latin over the door at the entrance of the Cavendish Laboratory at Cambridge University. It is Psalm 111:2. I translate it as “Great are the Works of the Lord, a delight for all who seek to understand them.” Rodney Stark offers a study that the great majority of 52 notable scientists as the discipline formed, were quite devout, and the rest were conventionally faithful for their day. The only skeptical exception he could find was Edmond Halley.<sup>1</sup> Widespread theistic convictions did not disappear as science progressed. When the laboratory complex was recently enlarged, that quotation of Psalm 111:2 was carved again over the new entrance to the now extended Cavendish Laboratory.

In contrast, some philosophers such as A. J. Ayer in the 1900s posited logical positivism, that pure material is the only reality, and only science can discover what is true. That position has been all but abandoned in philosophical circles, but some writers of popular science such as Richard Dawkins and Christopher Hitchens have claimed vociferously that

# Editorial

science shows God to be a delusion.<sup>2</sup> Evangelicals who are convinced that God does exist, from first cause arguments such as those delineated by William Lane Craig,<sup>3</sup> from fine-tuning cosmological constants noted by Walter Bradley and Richard Swinburne,<sup>4</sup> from basic beliefs as discussed by Alvin Plantinga,<sup>5</sup> from comprehensive coherence by Alister McGrath,<sup>6</sup> ... get the message then, that since science is so wrong about God's existence, science might not be trustworthy at other points too. This then opens 40% of the American population to think that anatomical human beings first came to exist less than 10,000 years ago,<sup>7</sup> and many to be part of the anti-vaccine movement. There are evangelical organizations, such as the ASA, actively working to dispel misunderstandings of both science and faith. They advocate that where well understood, science and Christian faith can work together. Where they seem to conflict, such an anomaly is an opportunity to see both better.

A second point of contact with the ethics of neural organoids is that the sciences can be an instrumental good toward healing. There is clear consensus within an evangelical perspective that caring about people's physical health and healing was characteristic of the life of Jesus Christ, and so should also be of his followers. One of the most effective ways we have available to us to heal people is through medical science.

Third, neighbor love should be extended as far as possible. Jesus taught a famous story that concluded that your neighbor is whoever you can help. Rather than narrow who is your neighbor, he extends that call as widely as possible. If in doubt about the presence or moral status of another, do what you can to bless them. This applies of course to differently abled human beings. They warrant our best care and support at every stage and condition of life. This care may in part extend to animals as well who are of God's good creation and world. They can be used to pull a plow or eaten for needed nutrition, but they should be helped to flourish in their own way, and not caused needless suffering.

Fourth, human beings have particular responsibility because they are uniquely in the image of God. For example, only human beings have the ability to intentionally end the life of a species. We do that too often by accident, but we also did so quite deliberately in wiping out smallpox. Human beings, male and female, are described as dust, very much of the earth, yet we are also made uniquely in God's

image. From the Genesis text which first declares that human beings are created in the image of God, on through 2,000 years of reflection, the image has been characterized in three parts: capacity, relationship, and calling. *Capacity* is the uniquely human ability to know God and know that one knows God. *Relationship* is a mirror that reflects the image of something that it is oriented toward. Human beings uniquely can live rightly with God and one another. *Calling* is a job to do, that includes along with God, to sustain, restore, and improve God's world temporarily entrusted to us.

This image was for the first time reflected perfectly, by Jesus Christ. For the rest of us, the image of God is often marred by our destructive choices. Since we are prone to do harm, we must take particular care not to degrade respect for our fellow human beings. We already have a decided human tendency toward downplaying or even rejecting the personhood of others. We see this, for example, in the pervasive worldwide phenomena of both genocide and slavery. In 1857, the US Supreme Court declared Dred Scott to be property, not a human being. Whether the soul, that human degree of consciousness and self-awareness, is assigned in the dualism of say J. P. Moreland, or an emergent phenomenon as in the nonreductive physicalism of Nancey Murphy, any soul deserves due respect as a fellow being. We should not create a neural human being in vitro or in an animal host because such would intentionally condemn a fellow person to be less than they could have been. There would be loss of full life and potential for that particular person who is the subject of the experiment. We have already gone down that path, and rejected the Tuskegee experience. *Primum non nocere* (first do no harm).

So, from an evangelical perspective, research using unconscious tissue inside an animal model or in a laboratory setting is welcome. In parallel to raising food, harvesting a porcine heart valve to replace an ailing human heart valve is already welcome as long as suffering was not inflicted on the animal source. The animal was part of God's creation too. If we could develop a way for an animal to grow a whole human organ such as a kidney for transplant to a human, that would be welcome, if the animal has a good life and suffering is avoided in obtaining the organ. Growing a human organ or some portion outside of a human body, for study or transplant would also be welcome. Growing brain tissue not networked to the point of potential suffering,

in an animal host or laboratory for transplant into a human being to support a damaged brain, or for study, would be welcome.

The likely boundary for evangelicals will be against enhancing the intelligence of nonhuman animals beyond species-typical norms, or conferring human-like cognitive capacities to an entity, because this would cause suffering from a mismatch in the animal, or worse, a locked-in experience to the degree that there is presence of humanity. Scientific research and medical technologies, animal models and sources, building lab tissue models and sources, including neural organoids and chimeras for research, are welcome practices toward understanding, healing, and stewardship, as long as they do not involve killing a fellow human being, or cause an unjustified negative experience for any living creature. This last concern might be met at a *prima facie* level, a subject for a later piece. ⇔

## Notes

<sup>1</sup>Rodney Stark, *How the West Won: The Neglected Story of the Triumph of Modernity* (Wilmington, DE: ISI Books, 2017), 306–12.

<sup>2</sup>Richard Dawkins, *The God Delusion* (Boston, MA: Mariner Books, 2008).

<sup>3</sup>William Lane Craig first stated the full history of this argument in *The Kalām Cosmological Argument* (London, UK: Macmillan, 1979).

<sup>4</sup>Walter Bradley, “The Fine Tuning of the Universe,” *Perspectives on Science and Christian Faith* 70, no. 3 (2018): 147–60; and Richard Swinburne, *The Existence of God* (Oxford, UK: Oxford University Press, 2004).

<sup>5</sup>Alvin Plantinga, *Warranted Christian Belief* (Oxford, UK: Oxford University Press, 2000).

<sup>6</sup>Alister McGrath, *A Scientific Theology*, vol. 1 *Nature* 2001; vol. 2 *Reality* 2002; and vol. 3 *Theory* 2003 (Edinburgh, UK: T&T Clark and Grand Rapids, MI: Eerdmans, 2001–2003).

<sup>7</sup>Megan Brennan, “40% of Americans Believe in Creationism,” Gallup Poll, July 26, 2019, <https://news.gallup.com/poll/261680/americans-believe-creationism.aspx>.

<sup>8</sup>Luke 10:29–37.

**James C. Peterson**  
*Editor-in-Chief*

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**Rebecca Dielschneider**

## Article

# Vaccine Hesitancy: Christian Reasons and Responses

Rebecca Dielschneider

*Vaccine hesitancy is thriving even amid a pandemic. This threatens global health. Understanding the reasons for vaccine hesitancy, especially in Christian and religious groups where it appears to be prevalent, is necessary. This article summarizes common reasons for vaccine hesitancy and proposes factual and logical responses. These responses may be most effective when combined with interventions that include empathy. Christians, who seek truth and love, may be well poised to enact such responses.*

It is difficult to imagine a world without vaccines. What if Edward Jenner never developed a vaccine from cow pox to prevent smallpox infections? What if Louis Pasteur never developed a rabies vaccine? What if Albert Sabin and Jonas Salk never developed polio vaccines? Without these vaccines, the remnants of humanity would likely be waging a war against several pandemics at once.

Vaccination is considered one of the greatest life-saving medical achievements of all time.<sup>1</sup> While the majority of pharmaceuticals *treat* disease, vaccines *prevent* disease. Vaccines train the immune system to detect and destroy an infectious agent. This prevents infectious diseases in the individuals who receive vaccines and also prevents infectious diseases in the broader population by reducing disease transmission. If enough people are vaccinated, then the chance of an infected case passing the disease to someone who is unvaccinated and susceptible is quite low. This population level of protection is known as herd immunity. Therefore, high vaccination rates protect both the individuals who were vaccinated and the few who were not.

Vaccination rates in North America are below the target that achieves herd immunity. For some infectious diseases, 95% of the population must be vaccinated. Results of the 2017 Childhood National Immunization Coverage Survey showed that vaccination coverage in two-year-old Canadians was 73.4% to 90.7% depending on the vaccine. This same survey reported 2.35% of Canadian children were completely unvaccinated at age two.<sup>2</sup> Results of the similar 2017 National Immunization Survey in the United States show vaccination coverage for a similar age (19–35 months) to be between 59.7% and 94.0% depending on the vaccine, and 1.1% of children in this age group were completely unvaccinated.<sup>3</sup>

The success of vaccines is threatened by a growing sense of uncertainty, in secular groups and Christians alike. The World Health Organization (WHO) has described this as “vaccine hesitancy” which encompasses vaccine uncertainty, vaccine delays, and vaccine refusals.<sup>4</sup> In contrast, the term “anti-vaxers” refers to just refusals.

Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccine services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence.<sup>5</sup>

**Rebecca Dielschneider** (PhD, University of Manitoba) is Assistant Professor of Biology at Providence University College in Otterburne, Manitoba. She teaches biological and health sciences and has research interests in the pedagogy of immunology and the understanding of vaccine hesitancy.

The WHO named vaccine hesitancy one of the top ten risks to global health in 2019.<sup>6</sup> This list also includes health challenges such as pollution and antimicrobial resistance, and significant pathogens such as HIV and influenza. In January 2020, the WHO released a list of urgent health challenges for the next decade. This included expanding access to medicines, stopping infectious diseases, earning public trust, and more.<sup>7</sup> Vaccination is a key component in these challenges.

Unfortunately, there are people of faith known for their vaccine hesitancy and for their religious exemptions from vaccines.<sup>8</sup> Recent measles outbreaks in British Columbia, Quebec, and New York have all involved unvaccinated religious groups.<sup>9</sup> In addition, some religious schools in Canada and the United States have vaccination rates well below average.<sup>10</sup>

All American states require regular vaccines for children attending public school. All states accept medical exemptions from vaccinations, as they should. The majority of states (45 to be exact) accept religious, philosophical, and/or personal belief exemptions.<sup>11</sup> In Canada, Ontario and New Brunswick are the only provinces that require regular vaccines for children attending public schools, and both accept religious and/or philosophical exemptions.<sup>12</sup> The New Brunswick government voted down Bill 11 in June 2020 which proposed to remove these exemptions.<sup>13</sup> Vaccination is voluntary in all other Canadian provinces.

The topic of vaccine hesitancy is of acute concern given the current COVID-19 pandemic, and the risk of more pandemics in the future. Mass vaccinations may be the only way to control the spread of pathogens such as SARS-CoV-2,<sup>14</sup> but herd immunity may be difficult to achieve due to vaccine hesitancy.<sup>15</sup> Understanding the reasons for vaccine hesitancy, and addressing them successfully, is of immediate importance. The purpose of this article is to review the reasons for vaccine hesitancy, especially among Christians, and to propose factual and logical responses. Common reasons for vaccine hesitancy among Christians in North America include the idea that vaccines interfere with divine providence, vaccines defile the body—God’s temple, vaccines are not safe, vaccines have side effects and can cause autism, and that vaccine manufacturing involves aborted stem cells.<sup>16</sup> These will be addressed in the following text.

**Reason:** Vaccines interfere with divine providence.

**Response:** Vaccines, like other medical advancements, are forms of divine providence.

As Christians, we believe that God reigns with truth and love. How does God interact with us and the universe? What is God’s will during a pandemic? It depends on whom you ask. Some Christians consider divine providence to only include miraculous healings. Perhaps they rely on miracles because of verses such as Psalm 103:2-3 which says that the Lord “heals all diseases”. Other Christians see divine providence in modern technologies and medicines, perhaps because scripture speaks positively about medicine. Proverbs mentions that a “cheerful heart is a good medicine” (17:22) and there are several examples of the use of medicines in Isaiah 38:21, Ezekiel 47:12, and more. If Jesus could heal with water or mud, why not vaccines?

The argument that vaccines act against God’s will is not new; it dates back to the 1700s when some opposed the use of variolation which inoculated people with smallpox in an effort to induce protective immunological memory. During the 1721 smallpox outbreak in Boston, clergymen such as Cotton Mather and his supporters argued that God gave humans their reason and knowledge. They reasoned that if variolation was against God’s will, then were not all other medical procedures also against God’s will?<sup>17</sup> These words are still insightful three hundred years later.

If vaccines interfere with divine providence, then they do so just as much as seatbelts.<sup>18</sup> Both vaccines and seatbelts are preventative measures that protect people from harm. Both come with slight risks of injury that are greatly outweighed by the risks associated with refusal. Both are uncomfortable and have been met with criticism. However, people cannot file a religious exemption to avoid wearing seatbelts. They can, however, to avoid vaccination.

Vaccines and other medications can be considered gifts from God and products of our God-given wisdom. Christian doctors and scientists say that their passion, abilities, and work products come from God. Dr. Francis Collins is an excellent example of a scientist who is a Christian and views his scientific work as the director of the National Institutes of Health

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## *Vaccine Hesitancy: Christian Reasons and Responses*

(NIH) as “a form of worship.”<sup>19</sup> Dr. Kizzmekia Corbett, the scientific lead of the NIH’s Vaccine Research Center’s Coronavirus team, is another example. In a recent *Washington Post* article, Corbett says that her religion tells her why she “should want to help people, make the world a better place.”<sup>20</sup> Science has shown her a way. Her work on a COVID-19 vaccine could save countless lives. Clearly, we are being blessed through individuals such as Collins and Corbett.

**Reason:** Vaccines defile the body, God’s temple.

**Response:** Vaccines contain ingredients that are also found in our food and bodies naturally.

Vaccines contain a variety of ingredients including adjuvants, stabilizers, preservatives, and inactivated or attenuated pathogens or parts thereof. Two chemicals that have caused some public concern are formaldehyde and thimerosal.

Formaldehyde is a ubiquitous chemical found in nature and in some man-made products such as resins, cosmetics, and vaccines. It inactivates viruses used in the manufacturing of some vaccines. These vaccines have  $\leq 0.1$  mg of formaldehyde, which is significantly less than the 1.1 mg found in the circulation of the average 2-month-old infant due to their natural metabolism.<sup>21</sup> Formaldehyde is a normal component of blood and is involved in amino acid and nucleotide synthesis, which builds proteins and DNA, respectively.<sup>22</sup> Formaldehyde is also a natural chemical found in other animals and plants. In fact, many meats, mushrooms, vegetables, and fruits (especially pears, oranges, and papayas) consumed by humans naturally contain more formaldehyde than a vaccine.<sup>23</sup>

Formaldehyde is problematic when inhaled at significant quantities from fuel combustion, industrial emissions, and industrial products such as resins. The International Agency for Research on Cancer (IARC) assesses cancer-causing agents called carcinogens and has concluded that formaldehyde causes cancers of the nose and throat when inhaled in sufficient quantities.<sup>24</sup>

Thimerosal is a mercury-containing compound which acts as an antimicrobial agent in some vaccines. This chemical ensures that vaccines stay free of contaminants. The vaccines with the most thimerosal (0.01% or 50  $\mu$ g) still have less elemental

mercury than a 3-ounce can of tuna. Furthermore, thimerosal contains ethylmercury which is cleared from the body faster than methylmercury found in fish. While studies have shown that high concentrations of mercury are neurotoxic, repeated studies have shown that the small quantity of ethylmercury in vaccines does not cause neuropsychological deficits. From an abundance of caution, thimerosal was removed from childhood vaccines after the Food and Drug Administration Modernization Act was signed in 1997. Now, it is used only in multi-dose vials of vaccines given to adults.<sup>25</sup>

In summary, if vaccine ingredients such as formaldehyde and mercury defile the body (God’s temple), then so too must foods like fruits and fish which contain these chemicals naturally. However, we cannot avoid ubiquitous formaldehyde-containing and mercury-containing foods, just as we should not avoid vaccines.

**Reason:** Vaccines are not safe.

**Response:** Vaccines are well tested and safe.

Vaccines undergo development and scrutiny that is similar to other pharmaceutical products. A product is first tested in lab cells and animals. If these results are positive, the product is then tested at low doses in phase 1 clinical trials to assess safety in healthy people. These trials often include dose-escalation which compares increasing doses of the product to see which are the safest. If these study results are positive, then the product is deemed safe and it is moved along to more advanced clinical trials. Phase 2 and 3 trials assess not only safety, but also efficacy of the product in a representative human population.<sup>26</sup> If the product is a possible anti-cancer drug, then it is tested in cancer patients. If the product is a possible anti-bacterial agent, then it is tested in people with that bacterial infection. If the product is a possible vaccine, then it is tested in people who may be exposed to that infectious disease. Once tests are complete, the trial data is submitted to independent government agencies such as Health Canada and the US Food and Drug Administration. These groups review all data on the product, along with the pharmaceutical premise, process, and people.<sup>27</sup> If all these meet standards, then the product may be approved for use in humans.

Vaccine development has been on full display in the COVID-19 pandemic. Vaccine developers have openly shared data throughout the pandemic, even



impressively detailed and coveted clinical trial protocols.<sup>28</sup> The phase 3 trial results of the Pfizer and BioNTech-funded vaccine were the first to be published on December 2, 2020, and additional data came later on December 17, 2020.<sup>29</sup> These studies were checked and published in the *New England Journal of Medicine* (NEJM), a prestigious peer-reviewed journal. The vaccine contains short-lived messenger RNA which can show the immune system a portion of SARS-CoV-2. This RNA resembles some of the RNA within the virus itself. A vaccine group funded by Moderna developed a similar product and published phase 1 results in *NEJM* on December 17, 2020.<sup>30</sup> More have followed.

Vaccines that protect individuals from SARS-CoV-2 infection have been developed at record speeds. Importantly, this fast pace does not imply that corners were cut. Rather, it is an indication of progress, collaboration, and shared priority. As time goes on, scientific and medical advancements accumulate faster than ever before. Academics and experts from around the world have come together in unprecedented ways. They have shifted their research focus to the pressing problem at hand. Those that studied other respiratory viruses are now studying SARS-CoV-2. Those that studied other infectious respiratory diseases are now studying COVID-19. Those that studied physical and mental health are now studying these in the context of the pandemic. Researchers have declared war on a common enemy.<sup>31</sup>

Just as researchers have made this pandemic a priority, so too have funding organizations and governmental agencies. Resources to fight this pandemic abound. Clinical trials are being completed so fast because they have had no problem securing funding, hiring trained personnel, and recruiting interested participants. The well-known epidemiologist and blogger Gideon Meyerowitz-Katz (known as Gideon M-K) explains this well.

So it's actually not correct to say we have rushed these vaccine trials. What's really happened, by and large, is that we've removed the usual hurdles such trials face. Funding has been no object, recruitment has been quicker than ever before, and even minor things like finding trained staff has been much easier this year than in previous ones.<sup>32</sup>

Furthermore, the fact that the COVID-19 pandemic is still raging through 2020 and into 2021 means that clinical trial participants had many possible exposures and data have accumulated quickly. After just

112 days, the mRNA vaccine funded by Pfizer and BioNTech had achieved 95% efficacy in a phase 3 clinical trial. Trial participants were divided into two groups: 18,325 individuals received the placebo while 18,198 individuals received the vaccine doses. Results show that 162 participants in the placebo group and only 8 participants in the vaccine group contracted COVID-19.<sup>33</sup>

The abundance and transparency of open access data should address worries of vaccine safety from Christians and non-Christians alike. Anyone with internet access can read all the clinical trial protocols and published trial results free of charge.

**Reason:** Vaccines have serious side effects and can cause diseases, such as autism.

**Response:** Vaccines do have rare side effects, but autism is not one of them.

The idea that some vaccines cause autism originated in the 1990s from the work of Dr. Andrew Wakefield and colleagues. He investigated 12 select children who received the combination measles mumps rubella (MMR) vaccine and who then developed autistic behaviors as reported by the parents, and intestinal inflammation as determined by medical doctors.<sup>34</sup> After significant investigation, the paper was retracted for reasons of data fraud and unethical conduct.<sup>35</sup> This small correlative study initiated a wave of vaccine misinformation that still persists today.<sup>36</sup> Numerous studies have investigated hundreds of thousands of people from around the world and found no correlation between MMR vaccination and autism.<sup>37</sup>

While vaccines do not cause autism, they do have rare side effects. These adverse events are monitored by the Vaccine Adverse Event Reporting System (VAERS) in the U.S., and by Canadian Adverse Event Following Immunization Surveillance System (CAEFISS) in Canada. In the most recent reporting year of 2017, there were 2,960 adverse events reported in Canada. Considering that 23 million vaccine doses were administered, both privately and publicly, this is a rate of 12.6 adverse events per 100,000 vaccine doses. The most common adverse reactions are vaccination site reaction (n=1,339), non-anaphylactic allergic reactions (n=355), and rash alone (n=346). Of all the adverse events, 8.5% (n=253) were serious. The most frequent serious adverse events are neurologic (n=78), most of which were seizures (n=58) which can be induced by fever.

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Death, the most serious adverse event, was reported in 4 individuals. Two of these deaths were in children <2 years of age, and the remaining two deaths were in adults >18 years of age. All four individuals had comorbidities (heart surgery, serious injury, cardiovascular disease, and diabetes) which were deemed the causes of death, not the vaccination.<sup>38</sup>

To put these correlative deaths in perspective, consider the deaths directly caused by vaccine-preventable diseases during the same time period. Between the years 2013 and 2017, Canada averaged less than 1 death per year from *Haemophilus influenzae* (Hib) infection, less than 1 death per year from chickenpox caused by varicella-zoster virus infection, 1 death per year from pertussis (whooping cough) caused by *Bordetella pertussis* infection, over 3 deaths per year from invasive pneumococcal disease caused by *Streptococcus pneumoniae* infection, and 11 deaths per year from invasive meningococcal disease caused by *Neisseria meningitidis* infection.<sup>39</sup> This totals an average of 16 deaths caused by vaccine-preventable diseases per year in Canada. That is dramatically fewer deaths than if vaccination had not been widespread, but still four times more than the number of deaths temporally correlated with vaccine use.

**Reason:** Vaccine manufacturing involves aborted stem cells.

**Response:** Yes, the production of some vaccines uses cells derived from fetuses aborted over 55 years ago. In the absence of good alternatives, we can use vaccines in good conscience.

Lung cells of two aborted fetuses were grown in labs and named WI-38 and MRC-5 by Dr. Leonard Hayflick in 1964 and Dr. J. P. Jacobs in 1966, respectively.<sup>40</sup> The source abortions were elective, and not done for the purpose of vaccination production. The fetal cells were deemed optimal for viral production due to their enhanced replicative potential, which is a benefit given the fact that viruses do not self-replicate. Viruses produced from these cells, but not the cells themselves, were collected and used for vaccine production. Vaccines for rubella (including the rubella portion of the combined measles, mumps, rubella vaccine), chickenpox, hepatitis A, and one rabies vaccine are made with the help of these 55+-year-old fetal cell lines.<sup>41</sup>

The Vatican has researched vaccines made using aborted fetal cells and issued a clear statement in response. While it condemns abortions, it has come to the conclusion that in the absence of alternatives, one should abstain from these particular vaccinations only if the disease poses no risks to children or the population as a whole. The Vatican specifically states that there is reason to accept the rubella (also called German measles) vaccine due to the risks associated with the lack of vaccination.<sup>42</sup> If pregnant women contract German measles, it often infects their fetus too and could cause intellectual disability, blindness, deafness, or death as demonstrated by the severe epidemic of German measles in the United States in 1964.<sup>43</sup>

As regards the diseases against which there are no alternative vaccines which are available and ethically acceptable, it is right to abstain from using these vaccines if it can be done without causing children, and indirectly the population as a whole, to undergo significant risks to their health. However, if the latter are exposed to considerable dangers to their health, vaccines with moral problems pertaining to them may also be used on a temporary basis. The moral reason is that the duty to avoid passive material cooperation is not obligatory if there is grave inconvenience. Moreover, we find, in such a case, a proportional reason, in order to accept the use of these vaccines in the presence of the danger of favoring the spread of the pathological agent, due to the lack of vaccination of children. This is particularly true in the case of vaccination against German measles.<sup>44</sup>

In response to this same topic, Gene Rudd, MD, writes for the Christian Medical and Dental Associations that vaccines are good.

While never condoning evil acts so that good may result, the Judeo-Christian tradition teaches of a loving God Who seeks to make good out of evil. A Christian does not reject the resurrection (good) because of its linkage to crucifixion (evil). Though linked, participation in the good does not endorse the evil. Neither does one need to reject the benefits of vaccination (good) solely because of its past linkage with abortion (evil).<sup>45</sup>

Certainly, vaccines do good. The use of vaccines can demonstrate our commitment to Jesus's second greatest commandment: to love our neighbors as ourselves. Vaccines protect the individual and prevent them from transmitting the infection to their vulnerable neighbors that may be young, pregnant, or immunosuppressed. Despite these vaccine benefits, the use of cells from two abortions over 55 years

ago in the manufacturing of some vaccines seems to be the most significant reason for vaccine hesitancy among Christian groups today.<sup>46</sup> Abortion is a much more contentious issue in the church than in secular society. Ninety per cent of atheist Americans said that abortions should be legal while only 56% of Anglicans, 48% of Catholics, and 30% of Southern Baptists would say the same.<sup>47</sup> Even if, after careful prayer and risk assessment, Christians feel that taking a rubella vaccine makes them complicit in abortion, then at least they can accept other vaccines (like the annual flu vaccine) with a clear conscience.

### Call for Empathy

The responses discussed in this article focus on scientific facts and philosophical arguments. It seems logical to use this information to combat vaccine misinformation that abounds in easily accessible web courses and social media.<sup>48</sup> However, information alone may not address vaccine hesitancy sufficiently. Indeed, the health experts Drs. Sara and Jack Gorman, authors of the book *Denying to the Grave*, state that “the problem is not simply lack of information” and argue that “irrational behavior occurs even when we know and understand all the facts.”<sup>49</sup> Facts and arguments must be combined with empathy, the ability to understand and share feelings, to really respect the vaccine-hesitant individual. The following quote that is often attributed to Theodore Roosevelt explains this idea well: “People don’t care how much you know, until they know how much you care.”

The most effective efforts employ multiple strategies, including those that display empathy and build trust.<sup>50</sup> Among the many strategies, motivational interviewing approaches are common, effective, and supported by professional health experts such as Drs. Sara and Jack Gorman mentioned previously.<sup>51</sup> One such motivational interviewing strategy named the PromoVac strategy has reduced vaccine hesitancy and improved vaccination rates in Quebec. In 2018, this educational interview session was implemented in all maternity wards in the province.<sup>52</sup> This strategy involves health care professionals using motivational interviewing based on three main actions: (1) cultivating a partnership with empathy; (2) fostering engagement; and (3) understanding and then adapting to the needs of the patient or caregiver.

Achieving the first step in the PromoVac strategy may be the most difficult for Christians who dis-

agree about vaccines. In response to difficult topics such as this that involve science and faith, psychologist Erin Smith has reviewed influences on human reasonings and provided a list of suggestions for navigating difficult conversations. Her suggestions include affirming self-worth, agreeing about core values, and highlighting diversity within Christian belief. These three suggestions emphasize personal importance, reduce the feeling of threat, and maintain social connections by expanding the group identity. Smith states that these strategies on their own “will not change minds, but the evidence suggests that they will promote the psychological safety for minds to be open to hear and engage with otherwise threatening ideas and data.”<sup>53</sup> Humans are social and stubborn animals. Without the first step of forming a relationship (partnership, friendship, or other), fruitful discussion may not proceed.

Scripture encourages discussion, truth seeking, and empathy. In Romans 12:15, we are told to “weep with those that weep,” and in Colossians 3:12, we are told to clothe ourselves “with compassion, kindness, humility, meekness, and patience.” Therefore, Christians are familiar with these values and are well equipped to use them to address vaccine hesitancy. Perhaps, someday, Christ-followers will be known for our vaccine confidence and our ability to address vaccine hesitancy, instead of our religious exemptions and vaccine refusal.

### Conclusion

The current COVID-19 pandemic has highlighted the significant problem of vaccine hesitancy, and there is no doubt that this discussion will continue through 2021 and beyond as COVID-19 vaccines are distributed and as future pandemics are encountered. Vaccine hesitancy is a threat to global health, and it could potentially reverse years of medical advancements. This can be partially addressed by understanding the reasons for vaccine hesitancy, especially in a Christian context, and discussing responses that involve scientific evidence and philosophical arguments. These facts and logic, combined with empathy, may constitute the most successful approach to combat vaccine hesitancy. Further research will continue to evaluate and improve these approaches. ⇔

### Notes

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### "Scientific and Spiritual Lessons in the Time of COVID"

presented by

Dr. Francis S. Collins, MD, PhD

at the ASA Winter Symposium  
January 30, 2021



The recording of the event is available at  
<https://www.youtube.com/watch?v=-8gnjH8IRQg&feature=youtu.be>

Dr. Francis S. Collins, MD, PhD is a physician-geneticist noted for his groundbreaking discoveries of disease genes, as well as his leadership of the international Human Genome Project. Since 2009 he has served as the Director of the National Institutes of Health, the largest supporter of biomedical research in the world, spanning the spectrum from basic to clinical research.

He is an elected member of the Institute of Medicine and the National Academy of Sciences, and was awarded the Presidential Medal of Freedom in November 2007, followed by the National Medal of Science in 2009. He is the 2020 Templeton Prize Laureate.

Dr. Collins is the author of the *New York Times* best seller, *The Language of God: A Scientist Presents Evidence for Belief* (2006), in which he describes his own conversion from atheism to Christianity, and presents the case for an intellectually satisfying harmony between the worldviews of science and faith. He is also the founder of the BioLogos Foundation ([www.biologos.org](http://www.biologos.org)) and a Fellow of the American Scientific Affiliation ([www.asa3.org](http://www.asa3.org)).



Luke J. Janssen

# Pandemics in Need of a Christian Response

Luke J. Janssen

*Humanity has survived many waves of attacks mounted by microscopic agents which we cannot see but which have left millions of our species dead, and hundreds of millions more enduring a great deal of pain and suffering, even life-long dysfunction. Pandemics have led to the downfall of whole populations and people groups; they have shaped policies and practices of the societies which survived. These encounters have taught us a great deal about Earth's biology, as well as our own physiology, resourcefulness, and potential. They have shone a spotlight on the essence of humanity: the good, the bad, and the ugly. We have now encountered another pandemic-producing agent – COVID-19 – which has disrupted human activities around the globe. All of this raises many important and even existential questions for humanity in general, and Christians in particular.*

## The Ongoing Global War between Humans and “Bugs”

In the first chapter of the book of Genesis, God, having just created humanity, gives us the mandate to rule over creation: “Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth” (Gen. 1:28, RSV). A few verses later in this passage, we are shown God evaluating his creation: “God saw everything that he had made, and indeed, it was very good” (Gen. 1:31).

Today, we find humanity fleeing in fear and mass retreat from an infectious agent which one cannot even see without an electron microscope. Borders have been locked down. Schools and businesses have been closed, and economic activity has been reduced to Depression-era levels. Governments are struggling to manage their populations, keep the peace, and distribute limited resources. Budgets at all levels have been stretched out of all proportion. Groups of people debate, disagree, and divide (sometimes violently) over how to respond to this existential threat.

The medical and scientific community has refocused nearly all of its attention upon this infectious agent, in the hopes of learning all we can about its structure, “life-cycle,” mechanism of action, pathological consequences, and vulnerabilities. How can we control this threat? How do we help people who have become infected by it? What policies and health practices do we need to develop?

Theologians and believers are asking a whole other set of questions. Was the small piece of RNA now circulating throughout the planet, and which has drawn the attention of all humanity, part of God's original good creation, and how can we gain or regain “dominion” over it and others like it? Is it within God's perfect will for humans to endure so many deadly pandemics? Or are we the victims of our own doing? Is COVID-19 a divine agent sent as a corrective, along the same line as the personal and national

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tragedies described in the Old Testament as punishments for sinning against YHWH?<sup>1</sup> Or was it sent to provide a new perspective such as the personal tragedies apparently orchestrated to teach humanity an important theological lesson?<sup>2</sup> Does the divine mandate given in the first chapter of Genesis not apply to viruses because they are technically not “living things that move upon the earth”? What can we learn about ourselves, about the human condition, and about human nature? Most importantly, how should we respond in a Christ-like manner?

The ASA and its members strategically include both science and theological perspectives: what can we offer to this discussion?

### Key Characteristics of Infectious Disease

Many diseases are caused by viruses, bacteria, and fungi invading the human body, usurping certain of its physiological functions, and otherwise directly damaging host cells and tissues. To better understand and control these diseases, it is useful to define certain characteristics of these infections.

#### *Infectivity*

Most of those infectious agents are easily and quickly identified and neutralized by a healthy host immune system. In those cases, only immunocompromised individuals are susceptible, and even close contact on the part of other healthy individuals usually does not lead to their getting infected. For example, a fungal pneumonia or rabies is generally not easily contagious: an infected individual can come into close contact with many healthy individuals with little or no likelihood of transmitting the pathogen to them. However, some microbes and viruses are more easily transmitted, such that one infected individual can on average infect another individual, leading to an essentially perpetual low-level persistence of the pathogen in the human population. When infectivity (closely related words are transmissibility and virulence) is so high that each infected individual transmits to several other individuals, there will be an explosive growth in the number of infected individuals, a situation often referred to as an epidemic. When this occurs over a large area (e.g., global) and involves many people, it is referred to as a pandemic. A great deal of attention has been paid within the current COVID-19 pandemic upon a measurement tool for transmissibility referred to as R. This quan-

tity is determined by four factors: (1) the duration of infection (how long infected individuals are shedding viral particles); (2) the opportunity of infection (related to social distancing, quarantining); (3) the transmission probability (separation behind glass, plexiglass, or plastic barriers; wearing protective personal equipment); and (4) the susceptibility of the uninfected population (including different subgroups among them).

#### *Pathogenicity*

In addition to the infectivity of a microbe or virus, another important characteristic is its pathogenicity (virulence is a closely related word): the negative effects that it exerts on infected individuals. Some infections can be nearly unnoticeable: innumerable species of bacteria colonize the outside of our bodies and digestive tract, and our genomes are riddled with the residue of all kinds of viral infections (some of which can be “re-awakened” when the host is stressed, as is the case in herpes simplex<sup>3</sup>). Other infections are quite noticeable but easily tolerated because the symptoms are relatively minor and/or quickly resolve (common cold, viral conjunctivitis). The most concerning kinds of infections, though, are those which can produce substantial morbidity and even lead to death (AIDS, Ebola).

#### *Transmission and the Key Roles of Other Species*

Another important consideration pertains to the details around the involvement of other nonhuman species. There are two very different ways in which this aspect becomes important: (1) the mechanism by which that pathogen is transmitted to humans; and (2) the pathogenicity of that pathogen to humans.

First, we will consider the mechanism of transmission. The life cycles of many pathogens that plague humanity require the participation of one or more other intermediate species. On the one hand, that intermediate can serve as a reservoir of the pathogen: the latter infects the nonhuman population without producing major symptoms, allowing the pathogen to propagate and survive until it finds opportunity to infect human hosts. On the other hand, other intermediate species can play an active role in the pathogen’s delivery mechanism into humans. Many infected intermediates introduce the pathogen into the human bloodstream through a bite. For example, malaria is caused by the parasite *Plasmodium* spread by infected mosquitos;<sup>4</sup> Lyme disease, by the intro-



duction of the bacterium *Borrelia* through the bite of various species of ticks (*Ixodes*);<sup>5</sup> and rabies, by lyssaviruses passed on through the bite of an infected animal (dogs, cats, skunks).<sup>6</sup> Other infected organisms simply bring the pathogen into close contact with humans: hantavirus is a life-threatening disease acquired when we are exposed to or inhale the urine, droppings, or saliva of infected white-footed deer mice occupying our dwelling spaces.

The second species-related consideration referred to above pertains to evolutionary origins. Infectious pathogens have long been coevolving in tandem with their hosts. The process of evolution always “seeks” to optimize the characteristics of each organism to maximize its survival and reproduction. In the specific case of infectious pathogens, it is generally not optimal for that agent to become increasingly and highly lethal; otherwise, it quickly destroys the host population upon which it depends for survival and, as a result, it then disappears from the ecosystem. Instead, it is optimal for it to lessen its pathogenicity while increasing its transmissibility, so that there will always be a fresh supply of new hosts. The hosts will develop some level of immunity and other protective mechanisms to which the infectious agent then re-adjusts (through successive generations over evolutionary time-frames), and an equilibrium is reached. A familiar example of this would be the common cold. We all get these every year, and put up with them for our entire lifetime because they do not greatly affect our well-being, let alone our survival.

We have evidence that birds, mammals, and coronaviruses (the family of viruses which give humans the common cold, as well as COVID-19) have been coevolving for 55 million years.<sup>7</sup> But when an infectious agent suddenly finds itself able to infect an entirely new host species, the latter may not have the same defense mechanisms in place to accommodate that infection, or may have a different set of vulnerabilities to the pathogen (for example, humans require a much longer time for maturation to full reproductive potential than birds, bats, pigs, or primates). In this case, the pathogen that coevolved with those nonhuman species, but suddenly develops the ability to infect humans, can be lethal to humans. An example of this would be HIV-AIDS, which is believed to have originally been a simian immunodeficiency virus (SIV) which “jumped” into humans (see below).

Knowledge of the means by which agents infect us can explain many of the features of the diseases they produce, but it can also offer strategic opportunities for controlling that disease. These infectious agents first encounter the protective epithelial barrier of our skin through direct environmental contact, of our lungs following inhalation of aspirated particles, or of our digestive tract through ingestion, and then employ one or more mechanisms to breach that epithelial barrier. That breaching may involve the bite of an intermediate organism (as mentioned above), or can involve the pathogen itself physically penetrating the overlying mucous layer (cholera) and/or the epithelial layer (Trichinosis roundworms) and then innate immune cells (*Yersinia pestis*, or plague). In yet other cases, the pathogen employs a nondestructive molecular mechanism which is intrinsic to the host cells: distinctive markers on the surface of the pathogen bind to specific surface markers on the host cell and trigger a carefully orchestrated internalization process referred to as endocytosis (Ebola, influenza, coronavirus, AIDS). Once inside the cell, the internalized pathogen is then unpackaged and initiates a cascade of normal physiological molecular events which result in infection (usurping of the synthetic machinery of the host cell, insertion into the host genome).<sup>8</sup>

## Global Pandemics throughout Human History

The greatest concern for humanity comes from pathogens which are highly infectious (transmissible) and also highly virulent (pathogenic), including grave morbidity and high mortality. Human history is checkered with many such pandemics.

### *Smallpox*

Rashes observed on the skin of three Egyptian mummies suggest that smallpox may have afflicted humanity at least as far back as the third century BCE.<sup>9</sup> The Antonine Plague (AD 165–180), brought to Rome by soldiers returning home from a campaign against Parthia, appears to have been smallpox: it is said to have killed over 5 million people and contributed to the collapse of the Roman Empire. There are also written descriptions of a disease which appears to have been smallpox from fourth-century China, seventh-century India, and tenth-century Asia Minor. European explorers introduced a variety of novel diseases, including smallpox, to the immunologically naïve indigenous populations of

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the Western Hemisphere, resulting in the American Plagues (sixteenth century) that killed 90% of the latter and contributed to the collapse of the Mayan, Aztec, and Incan Empires. It has been estimated that smallpox has killed 300 million people during the twentieth century.<sup>10</sup>

Smallpox is caused by one of two variants of variola virus of the genus *Orthopoxvirus*. Its genome is a single length of double-stranded DNA which codes for 118 early, 53 intermediate, and 38 late genes enveloped in a host-derived lipid shell studded with at least 20 proteins which recognize and bind to host markers and, in that way, gain entry.<sup>11</sup> Once inside, the virus disrupts the innate immune system by interfering with interferon signaling.<sup>12</sup> The virion is spread through contact with bodily fluids (pus exuded from the skin sores), aspirated droplets (cough, sneeze), or even sloughed skin (on bedding or clothing) of infected individuals. Human-to-human contact appears to be the only means of transmission: there is no evidence that it is spread by insects or animals. Initial symptoms include those that are common to many viral illnesses: fever, muscle pain, fatigue, headache, nausea, and vomiting. Skin lesions can manifest during the next two weeks; these exude a pus and produce scabs, both of which help spread the disease.

In the fifteenth century, the Chinese recognized that deliberate introduction of pus and/or scab from smallpox sores to unaffected individuals could confer a low level of illness and then immunity against the disease (in the unlucky few, the exposure was lethal). In the late eighteenth century, European doctors began to develop this further into what is now known as vaccination strategy, which eventually set the stage for globally directed smallpox eradication campaigns by the World Health Organization starting in 1959. On May 9, 1980, the 33rd World Health Assembly officially declared the world free of this disease.<sup>13</sup>

### *Plague*

The Plague has frequently ravaged humanity.<sup>14</sup> One outbreak claimed up to 10% of the world's population when it struck the Byzantine Empire in the middle of the sixth century. In the middle of the fourteenth century, the Black Death (1346–1353) emerged from Asia and ultimately wiped out over half of Europe's population, and arguably changed the course of Western civilization. The Great Plague

of London (1665–1666), the Great Plague of Marseille (1720–1723), and the Russian Plague (1770–1772) each claimed approximately 100,000 lives.

Plague is mediated by various strains of *Yersinia pestis* bacteria carried by fleas on infected rodents which serve as a reservoir. The bacteria are transmitted through the bite of those fleas, by coming into contact with the tissues or body fluids of an infected animal: for example, hunters skinning infected rabbits or other prey, or a domestic cat which has eaten an infected rodent, or breathing aspirated droplets from another infected human. The Marseilles pandemic seems to have been introduced by a single cargo ship arriving from the Mediterranean, while the Russian pandemic was introduced by prisoners of war and booty brought back by troops returning from war in what is now Romania.

Plague presents clinically with a familiar spectrum of symptoms: fever, chills, headache, and weakness accompanied by either painful swollen lymph nodes near the bite which infected the person (bubonic plague), or internal bleeding and blackened skin (septicemic plague), or by rapidly developing pneumonia (pneumonic plague). Antibiotics are the best treatment, and the degree and time-course of recovery are determined by how quickly those antibiotics are given.

In order to gain a strong foothold within the host before an effective immune response is mounted, this bacterium employs a syringe-like projection (the type-III pathway) to pierce the cell membrane and inject various toxins into the host cell, thereby killing it.<sup>15</sup> The bacteria primarily attack cells of the innate immune system: the macrophages, neutrophils, and dendritic cells. The latter are important for instructing the T- and B-cells of the acquired immune system to identify and neutralize the invading organism, a process which generally takes 8–10 days, but the host is generally overwhelmed and dies before that can happen.

### *Ebola*

The Plague of Athens (430 BC) lasted five years and claimed 100,000 lives with reported symptoms that suggest it might have been Ebola (or typhoid fever);<sup>16</sup> overcrowding caused by the war with Sparta appears to have been a major contributing factor. The first outbreak of Ebola virus disease (EVD) to come to the attention of the modern global medical community occurred in 1976 in two different parts

of Africa (South Sudan and Democratic Republic of Congo). Since then, there have been twenty-six outbreaks of EVD throughout tropical regions of Sub-Saharan Africa. Signs and symptoms can begin as early as 2 days and as long as 3 weeks after exposure, and manifest first with flu-like symptoms (fever, headache, sore throat, joint pain, nausea, vomiting, diarrhea, abdominal pain), which can produce severe dehydration and shortness of breath. However, this initial phase is followed one week later by hematological disruption: all infected patients show decreased blood clotting, and roughly half experience internal and external bleeding (in saliva or stools, into the skin [bruising], in the eyes). Recovery may begin 2 or 3 weeks later; death, if it occurs, is primarily due to low blood pressure from fluid loss. EVD mortality in the many outbreaks that have occurred ranges from 25–90%. At this time, there have been almost 30,000 infections and over 11,000 confirmed deaths due to Ebola.

EVD is caused by a negative sense, single-stranded RNA virus within the genus *Ebolavirus*, of which there are five types.<sup>17</sup> It is surprising, given the massive destruction that EVD causes, that the viral genome contains only seven genes (including, of course, RNA polymerase).<sup>18</sup> Fruit bats appear to be a natural reservoir of Ebola virus. The latter is then transmitted to humans either directly or through other animals (pigs, dogs, primates), often by eating improperly cooked meat. Human-to-human transmission occurs easily via contact with many different bodily fluids (blood, saliva, vomit, tears, urine, semen, breast milk), but apparently not through aerosolized particles (produced by coughing or sneezing), sweat, or mosquito bites. It can infect almost all human cells using different surface markers for each cell type, and enters through several cellular uptake mechanisms, including the endocytosis pathway described above.<sup>19</sup> However, it usually first infects immune cells (compromising immune function) and then endothelial cells (leading to fluid loss and bleeding).

### Influenza

There are four main types of influenza virus (A, B, C, and D).<sup>20</sup> Types A and B are responsible for the annual seasonal flu epidemic. There are many different subtypes of influenza A (belonging to the family *Orthomyxoviridae*), distinguished in part on the basis of the subtypes of two different proteins which make up the protective external shell of the

virus: hemagglutinin or “H” (of which there are 18 different subtypes) and neuraminidase or “N” (11 different subtypes). There are 198 different possible combinations of these 18 hemagglutinin and 11 neuraminidase proteins—although only 131 of these have been detected in the wild—but then there can also be differences within the genetic package of the influenza virus. This variety explains, in part, why the annual flu shot can be a hit-or-miss affair. Several different domesticated farm animals (poultry, pigs) and wild waterfowl can serve as reservoirs for the influenza virus, and through them be transmitted to humans.

The influenza A and B viruses comprise a genetic package (eight negative-sense strands of RNA which encode ten essential viral proteins and several other accessory proteins) contained within a host-derived lipid envelope, decorated by a variety of proteins, including H and N referred to above. When the virion particles encounter the host respiratory epithelium, the proteins on the viral envelope interact with markers on the host cell membranes (sialic acid sugars).<sup>21</sup> Cleavage of H by a cellular protease then triggers endocytosis, which introduces the genetic package into the host cells. Viral shedding is essentially the reverse of this process.

One influenza outbreak in 1889–1890 appeared first in Russia but spanned the entire globe within a few months (despite air travel being nonexistent at that time), leaving 1 million people dead in its wake. The “Spanish Flu” (1918–1920),<sup>22</sup> an H1N1 avian virus, infected half a billion people around the world and killed a fifth of those (wiping out numerous indigenous people groups); its propagation was likely facilitated by the cramped and dirty conditions that soldiers experienced in the Great War (later renamed World War I) and by poor global nutrition. The 1968 Pandemic (1967) was brought on by an H3N2 avian flu that originated in the United States, but ultimately killed over a million people worldwide. The Swine Flu pandemic (2009–2010) originated in Mexico, infecting almost 1.5 billion people around the globe and killing 150–575 thousand of them. It was caused by a novel form of H1N1 avian virus. The US Centers for Disease Control and Prevention (CDC) has estimated that the annual burden of influenza during the decade spanning 2010 to 2019 has been 8–45 million infections, 140–810 thousand hospitalizations, and 12–61 thousand deaths (again, these are average *annual* numbers over that decade period).<sup>23</sup>

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### *Human Immunodeficiency Virus (HIV)*

HIV comprises two retroviral species of the genus *Lentivirus*.<sup>24</sup> It is transmitted through certain bodily fluids (blood, semen, rectal fluids, vaginal fluids, and breast milk), or through direct injection into the bloodstream using a contaminated syringe needle. HIV is believed to be a mutated version of simian immunodeficiency virus (SIV), probably transmitted to humans through hunting and eating of an infected chimpanzee, possibly as far back as the late 1800s. It comprises a strand of positive-sense RNA which codes for nine genes, including reverse transcriptase, enveloped in a host-derived lipid shell studded with proteins which recognize a specific protein (the CD4 antigen) found on the surface of a subgroup of cells involved in the immune response: helper T-cells, macrophages, and dendritic cells.

Binding to the CD4 antigen leads to uptake of the virion into the host cells, whereupon it is reverse transcribed and incorporated into the host cell genome. HIV can then lie dormant for an indeterminate period of time (up to a decade), producing no obvious symptoms. Eventually, however, the latent viral genome is “awakened” when the infected T-cell becomes activated to fight an infection. HIV then usurps cell function to produce more HIV particles and ultimately kills those cells, thus knocking out the immune system (hence, the name of this syndrome: acquired immunodeficiency syndrome, or AIDS). These immunocompromised individuals then go on to succumb to secondary opportunistic infections and cancers, and ultimately to death.

At this time, there is still no vaccine or other treatment for HIV-AIDS. However, disease progression can be controlled by anti-retroviral drugs. Since it was first identified in 1981, HIV-AIDS has taken approximately 35 million lives.

### *Other Pandemics*

There have been many other global pandemics in human history, but space constraints prevent us from detailing all of them within this article. Many of them have been far less pathogenic or destructive, including measles. The common cold could also be included in this category, but we will address the family to which it belongs in detail below, given that the latter has now taken center stage on the global scene.

Polio virus is highly infectious, but a vast majority (72%) of those infected will not experience any vis-

ible symptoms, and the other quarter will experience flu-like symptoms; only a few percent of the latter group will also suffer horrific neurological problems (paresthesia [pins and needles in the legs], meningitis, paralysis).<sup>25</sup>

Other epidemics have affected much smaller populations in more localized regions, including Zika virus. Ebola virus might otherwise have been relegated to this category within this article, but for its exceptional pathogenicity. The same might be said of two epidemics which were caused by coronaviruses: Severe Acute Respiratory Syndrome (SARS-CoV)<sup>26</sup> and Middle East Respiratory Syndrome (MERS-CoV). SARS-CoV will be discussed below in the context of the global pandemic which now threatens humanity.

Yet many other pandemics have been—and still are—as widespread and destructive as the ones described in detail above: cholera, typhus, tuberculosis, leprosy, malaria, yellow fever, and the list goes on. Each of these has a unique story and history, and can also involve other species within the great Web of Life. What place do these infectious agents and these pandemics occupy within God’s good creation? Do these represent a break from his perfect will for humanity? Or have we humans somehow brought these upon ourselves against his will? Questions like these are particularly relevant, given the great looming shadow cast by a microscopic pathogen—which some have dubbed “the invisible enemy”—across the globe today.

### **COVID-19 Knocks Us Down**

Coronaviruses comprise a large group of RNA viruses of the subfamily *Orthocoronavirinae*. Computer modeling suggests that the common ancestor of all coronaviruses goes back 55 million years, which would suggest that it has been coevolving together with the bat and avian species which serve as reservoirs for this pathogen.<sup>27</sup> These infect the respiratory and/or digestive tracts and produce illness that can range from mild (the common cold) to lethal (see below). The virion comprises a positive-sense RNA genome (26,000–32,000 base pairs) enveloped within a host-derived lipid shell studded with club-shaped spikes which give the appearance in electron micrographs of a crown or a wreath (hence the name, derived from the Latin *corona*).

Coronaviruses first came to the attention of modern medical science when a particularly lethal strain (mortality rate of 40–90%) infected domestic chickens in the 1930s.<sup>28</sup> Other forms which affect other animals continued to be discovered: human coronaviruses were first identified in the 1960s.<sup>29</sup> These viruses enter the cells using the typical endocytotic pathway described several times above (binding of viral coat proteins with host cell surface membrane leading to invagination and entry, viral shedding being the reverse of this). However, the target proteins can vary between the strains of coronaviruses: for example, a porcine form infects the digestive tract epithelium by targeting the alanine aminopeptidase receptor protein,<sup>30</sup> while a human form infects the respiratory epithelium by targeting angiotensin-converting enzyme type 2 (ACE2).<sup>31</sup>

The sheer number of different types of coronaviruses, owing to constant changes in coat proteins and genomic content, account in part for why humans have not yet been able to develop immunity to infection and also why these infections are continuously present all year, every year. Until the COVID-19 crisis drew the attention of the entire world toward developing a vaccine for that particular subtype of coronavirus (see below), there had never been a viable vaccine for any form of coronavirus infection, including the last deadly coronavirus that struck the world almost two decades ago (SARS). To discuss here all the subtypes of coronaviruses is beyond the scope of this article. Instead, we will consider in detail only SARS-CoV, the severe and lethal global pandemic which was the predecessor of the one that is now dominating the attention of the world at this time: COVID-19 or SARS-CoV-2.<sup>32</sup>

In November of 2002, SARS broke out in the city of Foshan, in the province of Guangdong, China. All patients reported fever, which could also often be accompanied by other flu-like symptoms such as muscle pain, lethargy, cough, and sore throat. About 10% of patients declined around day 7, with symptoms progressing to viral pneumonia or leading to a secondary bacterial pneumonia, both of which cause shortness of breath requiring supplemental oxygen and mechanical ventilatory assistance. As the name of this disease implies, it can lead to severe acute respiratory distress and fatality.

For weeks, local officials did not inform their general public, but eventually when they found that they could not control the outbreak, they began to tell

the public that people were being infected by exposure to live animals at the local market. However, as infections continued to rise and human-to-human transmission was increasingly being detected, Chinese government officials finally took the decision to be more forthcoming and to share information with World Health Organization (WHO) officials. This delay and secrecy greatly contributed to the virus spreading easily and widely: within months, it had spread to more than two dozen countries worldwide.

The reader will be forgiven for thinking that the preceding paragraphs were describing COVID-19, which is presently sweeping the globe: all of the details are eerily reminiscent of recent events. The reason is that COVID-19 is caused by a genetic sibling of SARS. There may be hope for us in the way later events transpired for SARS. It seemed that medical containment efforts quickly brought it under control, and the WHO declared SARS contained on July 5, 2003. However, another much smaller outbreak was reported in early 2004. By the time SARS had run its full course, it had infected over 8,000 people worldwide and killed almost 800, mostly in Asian countries. Both the numbers of cases and of deaths were greater in Canada than in the United States and were centered almost exclusively in southern Ontario. Treatment of SARS involves antivirals and antipyretics (to moderate the fever), and also supplemental oxygen and mechanical ventilation when required. It is also important to quarantine infected individuals.

Government labs in the United States (CDC) and Canada (National Microbiology Laboratory) obtained the genome for SARS in April 2003, and showed it to be caused by a coronavirus (SARS-CoV) which is spread through a respiratory route (droplets coming into contact with mucous membranes) rather than the fecal-oral route.<sup>33</sup> Intensive efforts to locate the source of this virus found horseshoe bats from a remote cave in Yunnan province as the natural reservoir:<sup>34</sup> the virus is then transmitted to humans either directly or through live animals in local markets, primarily Asian palm civets (a somewhat raccoon-like mammal). SARS-CoV can also appear in raccoon dogs, ferret badgers, and domestic cats. The authors of this investigative work also found other subtypes of coronaviruses in the bats of this cave, and considerable genetic recombination occurring between them, and stated ominously that,

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This cave could be regarded as a rich gene pool of bat SARSr-CoVs, wherein concurrent circulation of a high diversity of SARSr-CoV strains has led to an unusually diverse assemblage of SARSr-CoVs ... Various SARSr-CoVs capable of using human ACE2 are still circulating among bats in this region. Thus, the risk of spillover into people and emergence of a disease similar to SARS is possible. This is particularly important given that the nearest village to the bat cave we surveyed is only 1.1 km away, which indicates a potential risk of exposure to bats for the local residents. Thus, we propose that monitoring of SARSr-CoV evolution at this and other sites should continue, as well as examination of human behavioral risk for infection and serological surveys of people, to determine if spillover is already occurring at these sites and to design intervention strategies to avoid future disease emergence.<sup>35</sup>

Two years later, this prophetic warning materialized in the form of COVID-19. The latter was first reported in the Chinese media in January of 2020.<sup>36</sup> The source of the outbreak has been traced to a market in Wuhan; bats are believed to be the reservoir hosts, and evidence suggests that COVID-19 was transmitted to humans through pangolins.<sup>37</sup> In fact, the evidence suggests that there was recombinant genetic exchange between bat and pangolin coronaviruses which eventually gave them the ability to infect humans by binding to ACE2.<sup>38</sup>

At present, the medical/scientific community are wondering if COVID-19 should be viewed more as a blood-related disease than a respiratory disease. It does indeed use ACE2 to gain entry through the respiratory epithelium, and does wreak havoc on the lungs and gas exchange. But there is increasing evidence that, once inside the body, it also enters inflammatory cells through ACE2 to then initiate an inflammatory response and changes in platelets (possibly through changes in the megakaryocytes which produce the platelets), ultimately resulting in disrupted regulation of blood-clot formation.<sup>39</sup> Destructive, dangerous, and potentially deadly clots can then cause perfusion defects in the lung (leading to destruction and fibrosis), brain (stroke), heart (heart attack), kidneys, skin (rashes seen particularly in children), and many other organs. Health experts are now warning that even those who survive a COVID-19 infection may suffer life-long damage with tremendously negative impact on well-being, including cognitive defects and impaired lung and kidney function.

Although the development of a novel vaccine has otherwise always taken several years, the present situation with COVID-19 has focused all the world's immunological resources on this one task, and many different strategies were developed in parallel. Even optimists were pleasantly surprised when several candidates with exceptionally high efficacy (>90%) were developed within six months. In this "Pandemics" special issue, Rebecca Dielschneider describes this accomplishment in more detail as she focuses on another somewhat unforeseen obstacle which has come up in this strategy to protect the world against COVID-19: vaccine hesitancy.<sup>40</sup> Several polls have indicated that a significant fraction of the population would be reluctant to receive a vaccine.<sup>41</sup> In addition to those in the anti-vaccine movement who would outrightly refuse any vaccine as a matter of principle (this is their *raison d'être*), many have expressed concerns about personal safety (e.g., the surprisingly common view that vaccines cause autism), especially about a strategy which involves direct introduction of foreign genetic material into one's genome, and a growing mistrust of governments and healthcare institutions. A lack of universal cooperation on any global vaccination effort is certain, given the present lack of compliance on the part of the general public (and even some government leaders) with respect to calls for wearing of facemasks, social distancing, testing, contact tracing, and quarantining. There are also massive logistical considerations in unrolling a global vaccination program, as well as ethical questions about deciding which subgroups of people should get priority for limited vaccine doses.

Also, in this issue, Mark Strand shares his experience in educating the general public about the science of COVID-19.<sup>42</sup> The readers of *PSCF* can learn from his example and experience, and use our resources, abilities, and contacts to reach out to the broader community and improve public understanding of this particular issue, and many others (physical distancing, mask wearing, herd immunity).

### COVID-19 Brings Us to the Discussion Table

Pandemics keep appearing in human history in new forms, but they share many features in common. Notwithstanding the morbidity and mortality which attend these blights on humanity, another important common feature is that they frequently play out in a series of "waves": in fact, this article is being published during a third (or fourth?) wave of COVID-19.

Over the course of these pandemics' destruction, they expose humanity's dark side (selfishness, greed, carelessness, hatred, defiance, xenophobia) and bright side (love, altruism, self-sacrifice, compassion, collaboration): they put a spotlight on the human condition. They force us to reconsider what is important, what is virtuous, and how we want to be remembered. Their effect on humanity is often a mixture of societal collapse and rebuilding. They tend to initiate a great deal of policy formulation and refining, often related to medical care (healthcare systems), hygiene (water sanitation, sewage control, hand washing, social distancing), vaccination (development, implementation, enforcement), and other chemical/biological weapons against the pathogens (toxins, phages, genetic vectors).

Given this backdrop of pandemics occurring frequently all through recorded human history, and the current state of alarm over COVID-19 coming two years after the quasi-prophetic statement from the authors of an investigation of the origins of the SARS pandemic only 15 years prior, now is the time for wide-ranging research, discussion, and planning for other potential pandemics, including the potential second, third, and fourth waves of COVID-19. The ASA/CSCA—comprising scientifically trained members with an inclination toward Christian faith—can make a unique and important contribution to this discussion. Again in this issue, Mark Strand offers an example and template,<sup>43</sup> and Rebecca Dielschneider identifies a timely and strategic focal point.<sup>44</sup>

There are not only scientific, medical, and psychological questions, but also sociological, ethical, and economic considerations. How do we prepare for and respond to these looming threats? What kinds of questions need to be prioritized, and what policies and practices need to be developed? There are also theological and philosophical questions. Christopher Southgate has provided an excellent starting point,<sup>45</sup> and this journal will feature other starting points in future issues. How do we make sense of this event within Christian theology? What are the responsibilities of Christians in this? Are Christians called to put themselves into harm's way by "touching the leper" as Jesus did? Do we adopt the attitude that we are specially equipped with the awareness and knowledge that science provides, and also motivated by the Great Commission of the Gospel of Christ? What can we contribute in the way of advocacy and public education, admonition and leadership of the church body, new research directions and medical

strategies, suggestions for public policy, and setting examples of following recommendations from government and health experts? The ball is in your court as the challenge continues. ⇔

## Notes

<sup>1</sup>The sin of Achan (Joshua 7), or the fall of the houses of Eli (1 Samuel 2 and 3) or of Saul (1 Samuel 15; 2 Samuel 1; 1 Chronicles 10), all of which brought on national military defeat to Israel: the nation of Israel was taken into captivity.

<sup>2</sup>The testing of Job (Job 1:13–2:8), or the man born blind from birth (John 9:1–3).

<sup>3</sup>University of North Carolina Health Care, "Discovery Shows How Herpes Simplex Virus Reactivates in Neurons to Trigger Disease: About 90 Percent of Us Live with HSV inside Brain Cells," *ScienceDaily* (December 9, 2015), accessed June 29, 2020, [www.sciencedaily.com/releases/2015/12/151209143105.htm](http://www.sciencedaily.com/releases/2015/12/151209143105.htm).

<sup>4</sup>Centers for Disease Control and Prevention, "Frequently Asked Questions (FAQs)," CDC>Malaria>About Malaria, last reviewed September 20, 2020, accessed January 4, 2021, <https://www.cdc.gov/malaria/about/faqs.html>.

<sup>5</sup>Centers for Disease Control and Prevention, "Lyme Disease," last reviewed November 5, 2020, accessed January 4, 2021, <https://www.cdc.gov/Lyme>.

<sup>6</sup>Centers for Disease Control and Prevention, "Rabies," last reviewed September 25, 2020, accessed January 4, 2021, <https://www.cdc.gov/rabies/>.

<sup>7</sup>Joel O. Wertheim et al., "A Case for the Ancient Origin of Coronaviruses," *Journal of Virology* 87, no. 12 (June 2013): 7039–45, <https://doi.org/10.1128/JVI.03273-12>.

<sup>8</sup>For a useful overview of how this works in the specific case of influenza, see Thomas O. Edinger, Marie O. Pohl, and Silke Stertz, "Entry of Influenza A Virus: Host Factors and Antiviral Targets," *Journal of General Virology* 95, no. 2 (2014): 263–77, <https://doi.org/10.1099/vir.0.059477-0>.

<sup>9</sup>Centers for Disease Control and Prevention, "What Is Smallpox?," last reviewed June 7, 2016, accessed June 29, 2020, <https://www.cdc.gov/smallpox/about/index.html>; World Health Organization, "Smallpox: Historical Significance," accessed June 30, 2020, <https://web.archive.org/web/20070921235036/http://www.who.int/mediacentre/factsheets/smallpox/en/>; and J. N. Hays, *Epidemics and Pandemics: Their Impacts on Human History* (Santa Barbara, CA: ABC-CLIO, 2005), 151–52.

<sup>10</sup>Donald A. Henderson, "The Eradication of Smallpox—An Overview of the Past, Present, and Future," *Vaccine* 29, Suppl. 4 (December 30, 2011): D7–9, <https://doi.org/10.1016/j.vaccine.2011.06.080>.

<sup>11</sup>Zhilong Yang et al., "Expression Profiling of the Intermediate and Late Stages of Poxvirus Replication," *Journal of Virology* 85, no. 19 (2011): 9899–908, <https://doi.org/10.1128/jvi.05446-11>; and Bernard Moss, "Poxvirus Cell Entry: How Many Proteins Does It Take?," *Viruses* 4, no. 5 (2012): 688–707, <https://doi.org/10.3390/v4050688>.

<sup>12</sup>Maria del Mar Fernandez de Marco et al., "The Highly Virulent Variola and Monkeypox Viruses Express Secreted Inhibitors of Type I Interferon," *The Federation of American Societies for Experimental Biology Journal* 24, no. 5 (2010): 1479–88, <https://doi.org/10.1096/fj.09-144733>.

<sup>13</sup>Frank Fenner et al., *Smallpox and Its Eradication* (Geneva: World Health Organization, 1988).

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- <sup>14</sup>Centers for Disease Control and Prevention, "Plague," last reviewed July 23, 2020, accessed January 4, 2021, <https://www.cdc.gov/plague/index.html>.
- <sup>15</sup>Melanie M. Marketon et al., "Plague Bacteria Target Immune Cells during Infection," *Science* 309, no. 5741 (2005): 1739–41, <https://doi.org/10.1126/science.1114580>; and Joseph A. Sorg et al., "Rejection of Impassable Substrates by *Yersinia* Type III Secretion Machines," *Journal of Bacteriology* 187, no. 20 (2005): 7090–102, <https://doi.org/10.1128/jb.187.20.7090-7102.2005>.
- <sup>16</sup>Centers for Disease Control and Prevention, "Ebola (Ebola Virus Disease)," last reviewed November 18, 2020, accessed January 4, 2021, <https://www.cdc.gov/vhf/ebola/index.html>.
- <sup>17</sup>Laura Falasca et al., "Molecular Mechanisms of Ebola Virus Pathogenesis: Focus on Cell Death," *Cell Death and Differentiation* 22, no. 8 (2015): 1250–59, <https://dx.doi.org/10.1038%2Fcd.2015.67>.
- <sup>18</sup>See *ibid.*
- <sup>19</sup>See *ibid.*
- <sup>20</sup>Centers for Disease Control and Prevention, "Understanding Influenza Viruses," last reviewed July 10, 2019, accessed June 29, 2020, <https://www.cdc.gov/flu/about/viruses/index.htm>; and Edinger, Pohl, and Stertz, "Entry of Influenza A Virus."
- <sup>21</sup>Edinger, Pohl, and Stertz, "Entry of Influenza A Virus."
- <sup>22</sup>Attributing this pandemic to Spain is based upon an artefact: the proverbial fog of war. Spain was a neutral country during the Great War, and therefore was one of the only countries which freely published medical reports documenting infections, while other equally affected countries enforced strict censorship of the press.
- <sup>23</sup>Centers for Disease Control and Prevention, "Disease Burden of Influenza," last reviewed October 5, 2020, accessed January 4, 2021, <https://www.cdc.gov/flu/about/burden/index.html>.
- <sup>24</sup>Centers for Disease Control and Prevention, "About HIV/AIDS," last reviewed November 3, 2020, accessed January 4, 2021, <https://www.cdc.gov/hiv/basics/whatishiv.html>.
- <sup>25</sup>Centers for Disease Control and Prevention, "What Is Polio?," last reviewed October 24, 2019, accessed July 13, 2020, <https://www.cdc.gov/polio/what-is-polio/index.htm>.
- <sup>26</sup>World Health Organization, "WHO SARS Risk Assessment and Preparedness Framework October 2004," accessed June 29, 2020, [https://www.who.int/csr/resources/publications/WHO\\_CDS\\_CSR\\_ARO\\_2004\\_2/en/](https://www.who.int/csr/resources/publications/WHO_CDS_CSR_ARO_2004_2/en/).
- <sup>27</sup>See Wertheim et al., "A Case for the Ancient Origin of Coronaviruses."
- <sup>28</sup>T. Estola, "Coronaviruses, a New Group of Animal RNA Viruses," *Avian Diseases* 14, no. 2 (May 1970): 330–36, <https://doi.org/10.2307/1588476>.
- <sup>29</sup>Jeffrey S. Kahn and Kenneth McIntosh, "History and Recent Advances in Coronavirus Discovery," *Pediatric Infectious Disease Journal* 24, suppl. 11 (November 2005): S223–S227, discussion S226, <https://doi.org/10.1097/01.inf.0000188166.17324.60>.
- <sup>30</sup>Anthony R. Fehr and Stanley Perlman, "Coronaviruses: An Overview of Their Replication and Pathogenesis," in *Coronaviruses: Methods in Molecular Biology*, vol. 1282, ed. Helena Jane Maier, Erica Bickerton, and Paul Britton (New York: Humana Press, 2015), 1–23, [https://doi.org/10.1007/978-1-4939-2438-7\\_1](https://doi.org/10.1007/978-1-4939-2438-7_1).
- <sup>31</sup>Fang Li et al., "Structure of SARS Coronavirus Spike Receptor-Binding Domain Complexed with Receptor," *Science* 309 no. 5742 (2005): 1864–68, <https://doi.org/10.1126/science.1116480>.
- <sup>32</sup>World Health Organization. "WHO SARS Risk Assessment and Preparedness Framework October 2004."
- <sup>33</sup>Infection Prevention and Control Canada, "SARS-CoV (Severe Acute Respiratory Syndrome)," accessed June 29, 2020, <https://ipac-canada.org/sars.php>.
- <sup>34</sup>Ben Hu et al., "Discovery of a Rich Gene Pool of Bat SARS-Related Coronaviruses Provides New Insights into the Origin of SARS Coronavirus," *PLoS Pathogens* 13, no. 11 (2017): e1006698, <https://doi.org/10.1371/journal.ppat.1006698>; also see David Cyranoski, "Bat Cave Solves Mystery of Deadly SARS Virus – and Suggests New Outbreak Could Occur," *Nature* 552, no. 7683 (2017): 15–16, <https://doi.org/10.1038/d41586-017-07766-9>.
- <sup>35</sup>Hu et al., "Discovery of a Rich Gene Pool of Bat SARS-Related Coronaviruses Provides New Insights into the Origin of SARS Coronavirus."
- <sup>36</sup>XinhuaNet, "New-Type Coronavirus Causes Pneumonia in Wuhan: Expert," *Xinhua* 2020-01-09 11:41:48, accessed June 29, 2020, [http://www.xinhuanet.com/english/2020-01/09/c\\_138690570.htm](http://www.xinhuanet.com/english/2020-01/09/c_138690570.htm).
- <sup>37</sup>Duke University Medical Center, "Evolution of Pandemic Coronavirus Outlines Path from Animals to Humans: The Virus's Ability to Change Makes It Likely That New Human Coronaviruses Will Arise," *ScienceDaily*, May 29, 2020, accessed June 29, 2020, [www.sciencedaily.com/releases/2020/05/200529161221.htm](http://www.sciencedaily.com/releases/2020/05/200529161221.htm); and Tommy Tsan-Yuk Lam et al., "Identifying SARS-CoV-2-Related Coronaviruses in Malayan Pangolins," *Nature* 583, no. 7815 (2020): 282–85, <https://doi.org/10.1038/s41586-020-2169-0>.
- <sup>38</sup>Yushan Wan et al., "Receptor Recognition by the Novel Coronavirus from Wuhan: An Analysis Based on Decade-Long Structural Studies of SARS Coronavirus," *Journal of Virology* 94 no. 7 (2020): e00127-20, <https://doi.org/10.1128/JVI.00127-20>; Duke University Medical Center, "Evolution of Pandemic Coronavirus Outlines Path from Animals to Humans."
- <sup>39</sup>Bhanu Kanth Manne et al., "Platelet Gene Expression and Function in Patients with COVID-19," *Blood* 136, no. 11 (2020): 1317–29, <https://doi.org/10.1182/blood.202007214>.
- <sup>40</sup>Rebecca Dielschneider, "Vaccine Hesitancy: Christian Reasons and Responses," *Perspectives on Science and Christian Faith* 73, no. 1 (2021): 4–12.
- <sup>41</sup>Stephanie Miceli, "Vaccine Access and Hesitancy: The Public Health Importance of Vaccines," *The National Academies of Sciences, Engineering, and Medicine*, June 5, 2020, accessed June 29, 2020, <https://www.nationalacademies.org/news/2020/06/vaccine-access-and-hesitancy-the-public-health-importance-of-vaccines>.
- <sup>42</sup>Mark Strand, "Communicating Science to the Public during the COVID-19 Pandemic," *Perspectives on Science and Christian Faith* 73, no. 1 (2021): 32–44.
- <sup>43</sup>*Ibid.*
- <sup>44</sup>Dielschneider, "Vaccine Hesitancy: Christian Reasons and Responses."
- <sup>45</sup>Christopher Southgate, "Explorations of God and COVID-19," *Perspectives on Science and Christian Faith* 73, no. 1 (2021): 23–31.

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Christopher Southgate

# Explorations of God and COVID-19

Christopher Southgate

*This article explores a range of theological insights into the COVID-19 pandemic, as viewed from the perspective of the late fall of 2020. It considers different approaches to the compatibility of the virus with affirmations of the world as the good creation of a loving God. It explores different underlying narratives by which Christians respond to the pandemic, making reference in particular to Brueggemann's analysis of lament Psalms. It proposes a strategy of "three-lensed seeing," by which the same event may be contemplated from the perspective of old creation, Cross, and eschaton, and shows that hope may be derived from contemplation through each of the three lenses. Significant spiritual insights from prayer and poetry are introduced. Finally, the article proposes what may be the least-worst theodicy within which to respond to the pandemic.*

This article responds to the lucid and helpful provocation of Luke Janssen in his essay "Pandemics in Need of a Christian Response."<sup>1</sup> Janssen points out, importantly, that the effects of the virus are not confined to the respiratory symptoms that have been the principal cause of deaths from COVID-19: the damage to the circulatory system and, hence, to the brain, heart, and kidneys, plus other possible long-term harms to general mental and physical health, have yet to be fully understood. Beyond this, it is gradually coming to be realized what a huge loss of opportunity for human flourishing has been occasioned by the economic catastrophe of the pandemic.

At the time of writing this article, I feel, on the one hand, the urgent need for Christians to bring biblical and theological insights to this time which has been so baffling to the human heart. On the other hand, I feel that it is too early for a settled, systematic treatment of the subject. Therefore, this is more a set of linked reflections than any attempt at such a treatment.

## Issues of Theodicy—First Exploration

In a podcast in mid-2020 for the organization BioLogos, the eminent New

Testament scholar N.T. (Tom) Wright and the Director of the National Institutes of Health Francis S. Collins, discuss the coronavirus.<sup>2</sup> They fight notably shy of pressing the question as to *why* a loving God would allow such a virus to ravage human populations as it is currently doing. Wright wants rather to ask, "not why, but *what* is God now going to do?" This is, indeed, an approach much more characteristic of the New Testament. However, three-quarters of the way through the podcast, they finally turn to the question of why there should be such a virus in a creation which God has pronounced to be "very good" (Gen. 1:31).

Wright gives an answer in terms of a "dark power that from the start has tried to destroy God's good handiwork."<sup>3</sup> Not only are humans "out of sync" with the creation because of the Fall, but more than that, the text of Genesis hints at nonrational, incomprehensible elements that intrude into God's good processes, as instanced by the chaotic deep of Genesis 1:2 and the talking serpent of

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Genesis 3. This is not for us to understand; it is, by definition, beyond rational understanding. We know only that Jesus has vanquished these “anti-creation” forces on the Cross, and that the new creation is inaugurated at the Resurrection.

Collins, however, gives a very different answer. He is also at pains to emphasize the Cross, though more in terms of God’s fellow-suffering than the defeat of evil. He acknowledges (as we all must) that human folly may have been an element in the specific triggering of the COVID-19 pandemic. But Collins goes on to liken the pandemic to earthquakes and other natural disasters, and to hint at this answer: that, just as one cannot have a planet abundantly fruitful for life without tectonic plates that produce earthquakes, so also it may be that a creation that contains “all sorts of wonderful biological entities” will also necessarily contain pathogens. Viruses have their uses, as indeed seen in the design of some potential vaccines for COVID-19, and “nothing is all good or all evil in biology.”<sup>4</sup>

How are we to adjudicate between these very different types of explanation—the semi-dualistic understanding of the cosmos to which the New Testament gives ample support, and the “package deal” understanding of the natural world to which very many biologists are naturally attracted? That is the ultimate destination of this article.

Before attempting such an adjudication, it is worth making clear that both explanations have great weaknesses. The package deal understanding seems to imply that there were limits to God’s power to realize a good creation, one lacking in devastating forces of destruction. *Why* could God not have created an earthquake-free world? *Why* could God not have created an evil-free biology? What are these constraints on the power of God, whom Christians confess to be the reason why anything exists at all?<sup>5</sup>

It will at once occur to the reader, however, that a related criticism can be leveled at the “dark power” explanation. How does it happen that the dark power, this incomprehensible irrationality, is powerful enough to radically distort God’s very good creation? How can this power stand against the creator of everything out of nothing? How is it powerful enough to corrupt creation so that it contains pathogens, and how can that process of corruption be understood?

Many Christians, faced with these types of questions about natural evil, reach gratefully for the story of Adam and Eve in Genesis 3, the great “get out of jail free” card of so much Christian discourse on the problem of evil. But as Luke Janssen’s lucid and helpful challenge-piece for this issue makes clear, the evolutionary origins of coronaviruses are likely to lie more than 50 million years ago, a time we now know to be long before anything resembling a human being walked on the earth.<sup>6</sup> Pathogenicity long predated human decision making.

Moreover, there is a sense in which the God who is the origin of everything that exists must necessarily be responsible for whatever causes suffering.<sup>7</sup> The instinct that where the people suffer, God should, must, be cried out to in sorrow and protest is very strong in the Old Testament (and informs the New Testament more than we might at first imagine<sup>8</sup>). Wright himself lays much stress on this in his recent book, as does Walter Brueggemann, the other major biblical scholar to have offered us an “instant book” on the pandemic.<sup>9</sup>

That reflection takes me to a place very different from the booklined academic studies from which a pair of Christian intellectuals of great distinction pronounced to BioLogos on the COVID-19 pandemic. The Jewish scholar Elie Wiesel, who survived Auschwitz, recalled that one night in the camp three rabbis put God on trial for the unimaginably terrible sufferings occasioned to the People. Movingly, the rabbis went from the trial to the saying of prayers. Wiesel made this story the subject of a play, *The Trial of God*,<sup>10</sup> which he set in the Ukraine during the seventeenth-century pogroms, in which whole populations of Jewish villages were massacred. The play is extraordinary, and contains much humor despite the bleakness of the subject. What is significant for our enquiry in this article is that toward the end of the play a character appears to defend God. The one survivor of a previous pogrom rails at God for the unimaginable brutality he was forced to witness. Here are some of the defender’s replies:

God is just, and His ways are just. Now and forever ... Our task is to glorify Him, to praise Him, to love Him—in spite of ourselves ... Faith in God must be as boundless as God Himself.<sup>11</sup>

The final, terrible twist of Wiesel’s play is the revelation that these words are spoken by Satan. The play thus arrives at the same conclusion that is threaded

through the Book of Job: that efforts to shift the ultimate blame for suffering away from God are misplaced, and that only God can mount God's defense. God does this, not by submitting to the charge, but by emphasizing the sheer Godness, the sheer transcendent otherness, of God (Job 38–41).

## Narrative Shapes

The great Christian temptation is to counter the despair of this time with the proclamation of resurrection. Bleak as the experience of the pandemic has been, the hymns and sermons of Easter sing out that death is not the end, rather a joy awaits believers which is utterly beyond all the sufferings of the present time (Rom. 8:18). But, in an important critique of too blithe a recourse to this proclamation, Shelly Rambo, writing in the context of trauma, goes so far as to say that "the language of resurrection is, in many senses, the language of the oppressor."<sup>12</sup> She means that a gospel that finds no place to express past pain and disillusionment, endurance through suffering, cannot speak to real human experience. One can gain a flavor for this stance by imagining an Easter service in April 2020 that made no mention of the ongoing fear, anxiety, and suffering occasioned by COVID-19.

There is a danger, however, of going too far in the opposite direction. It is possible for Christian congregations to default to a narrative that is so purged of hope of redemption that it resembles rather the contours of the Book of Ecclesiastes. Human life knows cycles—times to weep and times to laugh, times to mourn and times to dance (cf. Eccles. 3:4). We all lose our breath and die, humans and other animals alike (Eccles. 3:19). To seek a more directional metanarrative, to identify saving deliverance from these cycles, is "vanity." A genre of congregational story lacking in supernatural hope is identified by James Hopewell, drawing on the literary analysis of Northrop Frye, as "ironic" in genre.<sup>13</sup> This genre is brilliantly evoked in the twentieth century by such authors as Samuel Beckett and Franz Kafka. As Hopewell characterizes this genre, "Miracles do not happen; patterns lose their design; life is unjust, not justified by transcendent forces."<sup>14</sup> Godot never comes; no system of justice ever emerges in *The Trial*. Hope placed in leaders, in the end, disappoints. This genre is adept at accommodating paradox, as in Beckett's famous "I can't go on. I'll go on."<sup>15</sup>

This, then, is religion from which the hope of God's redemptive initiatives has been stripped away. It serves as an antidote to what might be termed "magical Christianity," in which God finds believers their every last parking space. For that reason alone, it is important that Ecclesiastes continues to be read, "performed," and preached within Christian communities. Collins's conclusion, noted above, that there is nothing all good or all evil in biology, could inform such an underlying narrative. The world is just the package deal that it is. Let us then eat, drink, and be as merry as social distancing permits, for tomorrow we die.

I have a theory that Christianity practiced without hope of redemption, either personal or cosmic, is much more common than church leaders might be willing to admit. It is resilient to disappointment, and that must be very attractive as the COVID-19 crisis deepens and stretches out. But it does not seem to me that such a spirituality is faithful to that great longing in the Lord's Prayer, "thy kingdom come, thy will be done, on earth as it is in heaven" (Matt. 6:10). Hope, expressed privately and publicly as that great yearning for a Godward reorientation of the world, is an inescapable part of a whole Christian faith.

But Christianity as practiced in affluent sections of the West also suffers from the converse problem—an overcomplacent trust that the resurrection and the personal salvation of individuals solve all deep questions.<sup>16</sup> Walter Brueggemann has been an important voice critiquing this type of practice. He writes:

Much Christian piety and spirituality is romantic and unreal in its positiveness. As children of the Enlightenment, we have censored and selected around the voice of darkness and disorientation, seeking to go from strength to strength, from victory to victory.<sup>17</sup>

Shades of Rambo's critique of the oppressiveness of unrefracted resurrection faith. Brueggemann continues, "... such a way not only ignores the Psalms; it is a lie in terms of our experience."<sup>18</sup> His tripartite analysis of the Psalms in terms of orientation, disorientation, and new orientation<sup>19</sup> seems profoundly important as we stumble within a time of what, for certain parts of the affluent First World, is a time of disorientation unparalleled since the last world war. As Brueggemann notes, the first phase, orientation, implies a consensus on theodicy among the privileged, a consensus that is shattered by

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disorientation.<sup>20</sup> That surely reflects something of the state of the world in late 2020. Brueggemann draws from Claus Westermann three strategies he sees the people of God adopt in disorientation:

1. Yearning for retaliation against the enemy whose injustice has caused the disorientation,
2. Assaults on Yahweh as the legitimator of the system that has allowed this trauma, and
3. Yearning for return to orientation and acceptance of fault.<sup>21</sup>

The attacks on the United States on September 11, 2001, perhaps the last great shattering of assumptions in the affluent West, led at first to a mixture of (1) and (3), from which, sadly, aspects of (3) became lost in the oversimplifications of (1). With COVID-19 it seems to me we are very much in the territory of (2) and (3), but too blithe a language of “war” and “defeating” the “evil” of the virus again runs the risk of drifting back into response (1) and losing the importance of the second part of (3).

Brueggemann writes the following about disorienting situations and events:

The Jewish reality of exile, the Christian confession of crucifixion and cross, the honest recognition that there is an untamed darkness in our life that must be embraced – all of that is fundamental to the gift of new life.<sup>22</sup>

There is some very interesting phrasing here. The “untamed darkness in our life” might at first remind us of Wright’s “dark power,” but Brueggemann insists that this is a darkness “that must be embraced,” the very reverse of Wright’s emphasis. Rather Brueggemann wants to insist that the witness of the Psalms is that God is, can be, must be found *within* the disorientation to which human lives are periodically subject. The bleakest Psalms refuse either to try and retreat to the old orientation or leap to some imagined resolution (Psalm 88 being the classic example). As in the Book of Job, faith resides in going on speaking to the Lord, even without answer, even when – in the radical formulation of David Blumenthal – God seems to be the abuser.<sup>23</sup>

In the months of lockdown at the start of the COVID-19 pandemic, with the old stabilities and opportunities so severely curtailed, and even parish churches in the United Kingdom locked up, the famous psalmic cry from Babylon, “How could we sing the Lord’s song in a strange land?” (Ps. 137:4), seemed to have a particular resonance. But the Psalm

insists that the foreign power is not the ultimate power, that the people’s vision and focus can remain on the Lord’s dwelling-place “above my highest joy” (v.6).

## Three-Lensed Christian Contemplation and the Locus of Hope

The New Testament, in contrast, identifies the present phase of struggle as part of the eschatological phase of history, inaugurated at the Cross and Resurrection.<sup>24</sup> This enables the same event to be viewed through three lenses,<sup>25</sup> in a way that provides an important breadth of perspective. The first “reading” lens is that of the protological creation, which sets the “ground-rules” for creaturely existence; these ground-rules are characterized by a world governed by physical laws and the constraint of limited resources, and also by the emerging of freedom of choices within the unfolding of the biosphere. These hugely generative constraints on life established the conditions that ultimately made possible the Incarnation, just as the human drive to escape those constraints, by seizing at more than can be justly attained, set up the conditions for the rejection of the incarnate sign of God’s glory.

The second lens is that of Christ’s passion and death. Reality contemplated through this lens means that no abyss of suffering, no extent of impotence before the wicked and torturing powers of the world, is a place absent of the presence of Christ. He remains, through his Passion, the ultimate sign of God’s involvement even in conditions contrary to the divine nature, an involvement borne out of supreme love for God’s creatures.

The third lens is the eschatological perspective that characterizes the bulk of the New Testament. The Christian confession wants to claim that incarnate involvement in the world is not only compassion at its purest, but is also transformative. It is associated with the power of the resurrection in a way that no other powers, however evil, however cynically brutal, can subvert. In addition, it inaugurates a process that must lead to that condition of creatures in which there is no more crying or pain (Rev. 21:4), for God will be all in all (1 Cor. 15:28).

How, though, are these three lenses of seeing the same event to be linked? How are they to be held together without one dominating? There is the risk, noted above, that the protological lens leads to a kind

of hope-free fatalism, whereas the eschatological lens might lead to an unreal piety that does not attend to the depth of the suffering and loss that is being experienced. Too-intense a focus through the lens of the Passion has run the risk, throughout Christian history, of glorifying suffering at the expense of human flourishing.

Earlier I criticized hope-free narratives as sub-Christian, so it is important to press a major question confronting Christians in this time of pandemic: where is hope to be found? Where, in particular, can Christian faith and thought contribute hope to a situation remarkable (at the moment of writing) both for its severity for the whole world and its uncertain duration? Perhaps surprisingly, I propose that hope can be derived from all three of our lenses.

The protological lens seems to provide the least obvious locus of hope. It reveals that God's "very good" creation (Gen. 1:31) is nevertheless an ambiguous place, where no biological entity (to return to Collins's analysis) is altogether good or evil, but pathogens can occasion profound loss of both life and flourishing. How can this be a source of hope? Both because in the classic Christian confession, God is the source of all creaturely existents, and therefore a God of unimaginable power and resourcefulness. (It is noteworthy that that great voice out of exile, Deutero-Isaiah, infers God's saving and delivering power from God's status as sole creator, including "of weal and woe alike" [Isa. 45:7].) But also because the creation attests to God's faithfulness. Reflection on the rationality and consistency of the processes of the universe suggests that God is very far from being a God of whim or caprice. Rather, God is faithful to the laws and processes by which the universe has unfolded, bringing forth extraordinary varieties of life as well as a species in which the divine Son could take flesh and reveal his glory, the glory as of the only-begotten of the Father (John 1:18). This means, of course, that God is faithful to the processes by which viruses function and the processes by which humans will analyze and understand COVID-19 and, ultimately, find both remedies for its effects and means to prevent its spread. That this world is not merely a world where there are times to weep and times to laugh, but also an intelligible and consistent world, is part of the hope that human ingenuity, judiciously exercised, will eventually overcome this current peril.

The easiest lens in which to articulate hope is the eschatological, with its conviction that the raising of Jesus from the dead begins the process by which all creatures will come into a struggle-free existence. But note the realism with which Paul writes of the creation still "groaning in travail" (Rom. 8:22): the birthing of liberation for the children of God may be assured, but it has labor-pains. Yet Paul's conviction at the end of that same chapter of Romans – that neither death, nor life, nor angels, nor rulers, nor things present, nor things to come, nor powers, nor height, nor depth, nor anything else in all creation, will be able to separate us from the love of God in Christ Jesus our Lord (vv. 38–39)—is surely the ultimate expression of hope in this lens.

How then is hope to be articulated in the second lens, through which all creaturely suffering is to be seen in relation to Jesus of Nazareth voluntarily handed over to the powers of fear and oppression, and enduring even unto death the full burden of the Godforsaking of human sin? Here the cry of desolation uttered at the Cross (Mark 15:34) is our great clue. Jesus, in his agony, has recourse to the lament Psalms. This is, therefore, the ultimate validation of that body of poetry, which holds fearlessly to the conviction that out of whatever depths the sufferer faces, the sufferer can cry to God (cf. Ps. 130:1). That connection is always available, and can carry all the bitterness of human experience. Further, Anthony Harvey identifies Paul's "discovery," around the time of the writing of 2 Corinthians, that suffering can be understood as drawing the Christian into a new depth of identification with the Passion, and hence into a deeper relationship with Christ, as therefore making possible a new profundity of consolation.<sup>26</sup> More generally, meaning can be sustained through any human distress by the thought that God in Christ knows every contour of the abyss of suffering, for all has been experienced in the passion and death of the divine Son.<sup>27</sup>

It will at once be clear that our three lenses have much in common with Brueggemann's phases of orientation, disorientation, and new orientation. I would say that three-lens vision stretches each one of Brueggemann's phases. The stable old orientation, more deeply examined, contains all the natural evil and associated suffering that seems to have been intrinsic to the creation from the origin of sentience onwards. The disorientation finds new extremes in Christ's journey through death. The new orientation

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is part of a journey to the full liberty of creaturely glory, beyond all tears.

### Prayer with a Larger Heart

Two years ago, knowing nothing of coronaviruses, I wrote this prayer, in the voice of a Christian community afflicted by a great natural disaster:

You, God, made the great forces that have destroyed our homes, our livelihoods, and taken from us those we held dear. You did not warn us of disaster; you did not have regard to all our prayers and worship. We know of your loving-kindness from both Testaments of our Scriptures, but we have not felt it. Though we sought to bless you, our lives are broken.

In spite of all this, we will pray for Your comfort and mercy. We will use the life, passion, and resurrection of Jesus as our clue to what life with You might ultimately be. We will believe in You because of Him, we will place our hope in You because of Him. Though His care could show partiality,<sup>28</sup> and His teaching an almost unbearable sternness,<sup>29</sup> yet because of His life and His Passion we will yearn for Him, groaning prayerfully within the greater groans of the Holy Spirit.<sup>30</sup> We will wait for the Christ's return, and we will anticipate the time when we will see You in His risen glory. We will love one another and seek even to love the enemy. We will seek to build Your Kingdom as He described it.<sup>31</sup>

I am almost shocked to find how relevant this prayer seems now: not just within contexts such as post-earthquake Haiti, but also for London and Paris and New York. I debated the prayer with a number of clergy groups during 2019. In one memorable session, one priest responded, "You can't say that. It might be true but you can't say that." Another priest, with a background in the developing world, countered that this was a prayer that *must* be said. The key movement of the prayer is in those five words, "In spite of all this," which derive from Blumenthal's memorable prayer at the end of his book on "the abusing God."<sup>32</sup> (How close the phrase "in spite of all this," in Blumenthal's prayer and in my own, comes to Satan's "in spite of ourselves" in Wiesel's play quoted above, reveals what truly tricky territory this is—territory on which the theoretician must always give place and voice to the sufferer.)

Blumenthal himself advocates a strategy of "tackling."<sup>33</sup> By this he means advancing not wholly directly into the challenges of life, now prioritizing reason, now spiritual practice, now the insights of

the arts. "One tack in our lives is to confront what we would rather avoid, with as much courage as we can muster."<sup>34</sup>

I have been very moved recently by reading Rebecca Ann Parker's reflection on her experience of abuse. Parker writes:

I did not defeat negative feelings of anguish and despair because I saw something more lovely and good. Rather I became able to feel more. My feeling broadened. Pain, sadness and despair were not eliminated or overcome. I embraced them with a larger heart.<sup>35</sup>

This larger heart, larger imagination, which can be fed in particular by the radical poetry of the Psalms, might allow those immersed in struggle and suffering to "tack" toward a realistic, resilient, and faithful response, to see with Brueggemann that in the "conversation" with the world,

God assumes different roles ... At times God is the guarantor of the old equilibrium. At other times God is a harbinger of the new justice to be established. At times also God is in the disorientation, being sovereign in ways that do not strike us as adequate.<sup>36</sup>

Three-lensed seeing endeavors to be more "synoptic" than a strategy involving tacking between blame, lament, and praise, or discerning God's different roles in "conversation" with the world. But, of necessity, particular lensings dominate in particular situations. Ultimately, always, God is disclosed to us only through God's own gracious will, so human beings are reliant on God's Spirit to "clean" the lenses and offer them to the praying eye. In a sense, the whole of liturgical worship is the people making themselves available for the three different sorts of seeing into the reality of God's ways with the world—focusing, in turn, on the creation, the Cross, and the eschaton—in order that the Spirit can hone the lenses and keep them in use so that, in turn, when they are most needed they come clear to the contemplating vision.

It seems to me that there is a link here with Rambo's intriguing concept of "the middle Spirit."<sup>37</sup> This is her way of involving the Spirit in an understanding that the journey of the Christian believer is through Good Friday and Holy Saturday, not simply inhabiting Easter Sunday. This is important for her in doing justice to the experience of sufferers of post-traumatic stress disorder (PTSD), "lives that have death in them." Rambo's reasoning is not easy to follow,

but she writes helpfully, reflecting on the Farewell Discourses in the Fourth Gospel, that

Jesus frames love in relationship to the paraclete. This Spirit-figure will link his departure and return ... the territory that the disciples are entering is not the triumphant terrain of resurrection life but the complex territory following a death. And instead of declaring that this is a difficult space that they have to endure in order to reach the triumphant life enacted by the resurrection, Jesus initiates a whole new vocabulary: new commandments to love and to remain, and a description of their lives in terms of vines being pruned and mothers suffering the pains of childbirth.<sup>38</sup>

Rambo summarizes her view by saying:

The middle Spirit cannot be fully explained as an animating life force; neither can Spirit be clearly identified as the Spirit of resurrection or Pentecost. In the aftermath of death, the Spirit is expressed in terms like “remaining” and “persisting.”<sup>39</sup>

A God-breathed capacity to remain, to persist, to witness to the Jesus who commanded us to “remain in my love” (John 15:9) does seem profoundly important in this fraught pandemic. Also, I am attracted to the idea that the Spirit seeks to show us the different ways in which we can respond to God’s presence in events, whether we need to focus more on the character of the creation, on the cruciform nature of all suffering, or on God’s promise that the new creation, resurrection life, is coming on the world in a process that is ultimately irresistible. We may see the Spirit’s gift as showing us whether our particular role in a community is to help others accept what has happened, to remain with those traumatized in different ways by the virus, or to insist that hope must not be lost, but is rather grounded in the Kingdom we pray to come “on earth as it is in heaven.”

One of the most important imaginative responses to the pandemic I have encountered, a fine example of embracing events with a larger heart, is Malcolm Guite’s poem “Easter 2020.”

#### Easter 2020

And where is Jesus, this strange Easter day?  
Not lost in our locked churches, anymore  
Than he was sealed in that dark sepulchre.  
The locks are loosed; the stone is rolled away,  
And he is up and risen, long before,  
Alive, at large, and making his strong way  
Into the world he gave his life to save,  
No need to seek him in his empty grave.

He might have been a wafer in the hands  
Of priests this day, or music from the lips  
Of red-robed choristers, instead he slips  
Away from church, shakes off our linen bands  
To don his apron with a nurse: he grips  
And lifts a stretcher, soothes with gentle hands  
The frail flesh of the dying, gives them hope,  
Breathes with the breathless, lends them strength  
to cope.

On Thursday we applauded, for he came  
And served us in a thousand names and faces  
Mopping our sickroom floors and catching traces  
Of that corona which was death to him:  
Good Friday happened in a thousand places  
Where Jesus held the helpless, died with them  
That they might share his Easter in their need,  
Now they are risen with him, risen indeed.<sup>40</sup>

Here we see Guite moving agilely between lenses to communicate hope “in spite of all this.”

### The Theodicy of COVID-19 Revisited

I promised at the beginning of this article to seek to adjudicate between the explanations of the underlying cause of the COVID-19 outbreak<sup>41</sup> offered by Tom Wright and Francis Collins. The range of reflections above will perhaps persuade the reader that Wright is correct to point us to the human response to the crisis, and God’s part in that, rather than to the “why” question. Finding resources by which human beings can endure, console each other, and find authentic ways to hope and to pray, seems more to the point than exercises in theodicy. Perhaps, indeed, the strategies that I have suggested, which connect COVID-19 to the ancient experiences of the people of God, are the best theodical move one can make.

But the question of underlying causes will not go away. Nor will the contrast between the dark power explanation offered by Wright and the biological “package deal”—nothing wholly good or evil in biology—observation of Collins. In the podcast with Collins, Wright alluded to Genesis 1:2 and Genesis 3 as evidence of the incomprehensible “dark power” responsible for pathogenic viruses. Whether either of these passages reflects the operation of a dark power is highly questionable. For other readings on Genesis 1:2, see Catherine Keller;<sup>42</sup> on the serpent in Genesis 3, see Anne Primavesi.<sup>43</sup> It is generally recognized that the Old Testament contains *Chaoskampf* passages, depicting the struggle of Yahweh with chaotic forces in nature. But the univocal conclusion

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of these passages is that Yahweh is unquestionably victorious over these forces.<sup>44</sup> Therefore, reflection on the Old Testament witness, let alone on the later Christian confession of God as the creator of all creaturely existents *ex nihilo*, places responsibility for the character of the creation squarely at the door of God. In previous writings, I have consistently warned both against explanations that dilute the awesome power of a creator who brought absolutely every created entity into existence from absolutely nothing, and also against explanations that seek to dissect the biological world into processes desired by God and those “sown by an enemy.”<sup>45</sup> Wright’s “dark power” theory seems to me to run into both of these difficulties.

Joshua Moritz has recently extended his previous theodical proposal, his “free creatures defense”<sup>46</sup>—that animal suffering arises from creaturely choices—to include viruses.<sup>47</sup> His original proposal suffers from various difficulties. I always want to pose Moritz the question: are the supposed “choices” that constitute suffering-causing predatory behavior unambiguously evil? Are the supposed choices that led to the modern cheetah, the modern peregrine falcon, “evil” choices, or do the beauty and savagery of these creatures point to the way in which evolutionary values and disvalues are indissolubly intertwined in the ambiguous world God has made?

Setting that on one side, let us explore whether these “choices” in the nonhuman creation really are choices in a theologically meaningful sense. The Augustinian cosmology that provides Moritz with his basis for reasoning requires that a creature with freedom of will, a freedom that was part of God’s good gift to creatures, abuses that freedom such that life becomes turned in on itself, not directed outwards toward the creature’s true telos. So it requires that there be authentic creaturely freedom that was a God-given good, which was then abused. If God is to escape responsibility for this abuse, then that abuse must be a resistance to the divine will. Can we apply this conclusion to the strategies by which viruses became parasitic? Clearly, these are not conscious choices; indeed, Moritz is at pains to show that even certain human behavior that we call wicked can arise from processes not involving conscious choice. Still less can environment-sensing strategies in viral populations be equated with deliberate resistance to the divine will. But if there is no rebellion, no deliberate disobedience to God, it seems to me that

this theodicy begins to unravel. The reason is that the responsibility for the unfolding of evolutionary strategies—beautiful, ingenious, diverse, predatory, parasitic—devolves back to the creator of all.<sup>48</sup> Moritz can also be criticized for taking such a uniformly negative view of viruses. He calls them “liars” and “robbers.” But, as Mirjam Schilling shows, viruses (whether or not they date from the origins of pre-cellular life) make all sorts of helpful contributions to evolutionary development and diversity, and viral genes may even be essential for the formation of the human placenta.<sup>49</sup>

So we are forced back, it seems to me, to Collins’s conclusion that we must recognize the ambiguous character of the biological world that has evolved so amazingly over perhaps 3.8 billion years. Exactly why God created in this way, and how theodicians address what necessitated the co-evolution of values and disvalues, is beyond the scope of this article, but I call the reader’s attention to some very useful resources in this area, especially the recent monograph by Bethany Sollereder,<sup>50</sup> and a series of articles that appeared in the journal *Zygon* in September 2018. I continue to favor what has come to be known as the “only way” argument, the very controversial move that God *could not* have given rise to the values in the natural world except by a process that also contained the sorts of disvalue we experience in the world.<sup>51</sup>

I end with this brave statement by Diogenes Allen in his book *Theology for a Troubled Believer*:

For a Christian, nature operates because it is so created and presently sustained by God. In saying “Yes, Father” to the *unavoidable* effects of nature on us, we submit to nature’s might as something that obeys Another, and not to it merely as a senseless destructive force. Through this act believers claim that the gracious presence of God is known; it flows into oneself and gives a felicity that is beyond the calculation of the pluses and minuses of the pleasant and unpleasant things of this life. The goodness of God is not understood solely in terms of the health and well-being that is enjoyed, and then set over against the untoward things that have happened or may happen to us. God is good in Godself, a unique good, whose value cannot be compared to the creaturely goods and evils we know. And it is God’s own goodness, God’s Spirit, it is claimed, that comes more fully into a person, and comes precisely through the untowardness of material things and a person’s own response to their untowardness.<sup>52</sup>



This returns us to several of the themes we have explored in this series of reflections. Allen would have us receive God's Spirit in new ways within the disorientations that being embodied physical creatures involve. That means that we must face up, beyond theodicies, to the facts of this ambiguous world.<sup>53</sup> But being able to see those facts through the lenses of creation, Cross, and eschaton, guided by a Spirit who knows what death and desolation are, seems to me to be a particular gift Christians can offer into this time.<sup>54</sup> ↔

### Notes

- <sup>1</sup>Luke Janssen, "Pandemics in Need of a Christian Response," *Perspectives on Science and Christian Faith* 73, no. 1 (2021): 13–22.
- <sup>2</sup>N. T. Wright and Francis Collins, "A Christian Response to Coronavirus," BioLogos Podcast, July 12, 2020, <https://biologos.org/podcast-episodes/n-t-wright-francis-collins-a-christian-response-to-coronavirus>.
- <sup>3</sup>Tom Wright, *God and the Pandemic: A Christian Reflection on the Coronavirus and Its Aftermath* (London, UK: SPCK, 2020), 14.
- <sup>4</sup>Wright and Collins, "A Christian Response to Coronavirus."
- <sup>5</sup>Various theodicies of natural evil have been proposed to engage with these difficulties. For a review of such approaches, see Christopher Southgate, "'Free-Process' and 'Only-Way' Arguments," in *Finding Ourselves after Darwin: Conversations on the Image of God, Original Sin, and the Problem of Evil*, ed. Stanley Rosenberg, Michael Burdett, Michael Lloyd, and Benno van den Toren (Grand Rapids, MI: Baker Books, 2018), 234–43.
- <sup>6</sup>The one contemporary account that seriously seeks to tackle the chronological problem of assigning violence in nature to human sin is William Dembski's *The End of Christianity: Finding a Good God in an Evil World* (Nashville, TN: B&H Academic, 2009), with his invocation of "retroactive causation." Dembski's ingenious proposal is briskly and tellingly demolished by Michael Lloyd. Lloyd points out the disanalogy between God's (retroactively effective) saving act on the Cross, and God's supposed retroactive punishment of nonhuman creation for human sin; he also asks Dembski "how is it redemptively coherent for the punishment to precede the crime and to be meted out on other creatures than the criminals?" (Michael Lloyd, "Theodicy, Fall, and Adam," in *Finding Ourselves after Darwin*, 197–210, at 207. It remains the case that later events can sometimes give new significance to previous ones, an observation that fuels Bethany Sollereder's theodicy of animal suffering in *God, Evolution and Animal Suffering: Theodicy without a Fall* (New York: Routledge, 2019).
- <sup>7</sup>Cf. John R. Schneider, *Animal Suffering and the Darwinian Problem of Evil* (Cambridge, UK: Cambridge University Press, 2020), treating a different aspect of natural evil, that of animal suffering in evolution.
- <sup>8</sup>See, e.g., Channing L. Crisler, *Reading Romans as Lament: Paul's Use of Old Testament Lament in his Most Famous Letter* (Eugene, OR: Pickwick Publications, 2016).

- <sup>9</sup>Walter Brueggemann, *Virus as a Summons to Faith: Biblical Reflections in a Time of Loss, Grief, and Uncertainty* (Eugene, OR: Cascade Books, 2020).
- <sup>10</sup>Elie Wiesel, *The Trial of God* (New York: Random House, 1979).
- <sup>11</sup>*Ibid.*, 157.
- <sup>12</sup>Shelly Rambo, *Spirit and Trauma: A Theology of Remaining* (Louisville, KY: Westminster John Knox Press, 2010), 129.
- <sup>13</sup>James F. Hopewell, *Congregation: Stories and Structures* (London, UK: SCM Press, 1987).
- <sup>14</sup>*Ibid.*, 61.
- <sup>15</sup>Samuel Beckett, *The Unnamable* (London, UK: Faber, 2010 [1953]). This paragraph is based on a section of Christopher Southgate, "Trauma and the Narrative Life of Congregations," in *Tragedies and Christian Congregations: The Practical Theology of Trauma*, ed. Megan Warner et al. (Abingdon, UK: Routledge, 2020), 122–33, at 125–26.
- <sup>16</sup>Wright critiques an over-emphasis on the individual going to heaven when he writes: "the inheritance here [to which we are heirs in Rom. 8] is not 'heaven,' as many Christians have imagined. The 'glory' has nothing to do with going to heaven and shining like angels. The 'inheritance' is the whole renewed creation," *God and the Pandemic*, 40.
- <sup>17</sup>Walter Brueggemann, *The Message of the Psalms: A Theological Commentary* (Minneapolis, MN: Augsburg Fortress, 1984), 11.
- <sup>18</sup>*Ibid.*
- <sup>19</sup>Ps. 30:6–12 shows the pattern in miniature. See Brueggemann, *Message of the Psalms*, 127.
- <sup>20</sup>Brueggemann, *Message of the Psalms*, chap. 5. There are fascinating parallels to be drawn between Brueggemann's work on disorientation and the psychologist Ronnie Janoff-Bulman's book *Shattered Assumptions: Towards a New Psychology of Trauma* (New York: Free Press, 1992).
- <sup>21</sup>Brueggemann, *Message of the Psalms*, 174.
- <sup>22</sup>*Ibid.*, 12.
- <sup>23</sup>David Blumenthal, *Facing the Abusing God: A Theology of Protest* (Louisville, KY: Westminster John Knox Press, 1993).
- <sup>24</sup>David G. Horrell, *An Introduction to the Study of Paul*, 3rd ed. (London, UK: Bloomsbury T&T Clark, 2015), 95–100.
- <sup>25</sup>Christopher Southgate, *Theology in a Suffering World: Glory and Longing* (Cambridge, UK: Cambridge University Press, 2018), 14, 152–53.
- <sup>26</sup>Anthony Harvey, *Renewal through Suffering: A Study of 2 Corinthians* (Edinburgh, UK: T&T Clark, 1996), especially chap. 6.
- <sup>27</sup>Even the experience of Godforsakenness itself, as Jürgen Moltmann articulates in *The Crucified God: The Cross of Christ as the Foundation and Criticism of Christian Theology*, trans. Margaret Kohl (London, UK: SCM Press, 1974).
- <sup>28</sup>As in the story of the Syrophenician woman, Mark 7:24–30.
- <sup>29</sup>As, for example, in the teaching on faith dividing families, Matthew 10:35–36.
- <sup>30</sup>Romans 8:23–27.
- <sup>31</sup>Christopher Southgate, "'In Spite of All This, We Will Yearn for You': Reflections on God's Involvement in Events Causing Great Suffering," in *Tragedies and Christian Congregations*, ed. Warner et al., 106–21, at 120.
- <sup>32</sup>Blumenthal, *Facing the Abusing God*.
- <sup>33</sup>*Ibid.*, chap. 5.
- <sup>34</sup>*Ibid.*, 54.
- <sup>35</sup>Rita Nakashima Brock and Rebecca Ann Parker, *Proverbs of Ashes: Violence, Redemptive Suffering, and the Search for What Saves Us* (Boston, MA: Beacon Press, 2001), 115.

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## Explorations of God and COVID-19

<sup>36</sup>Brueggemann, *Message of the Psalms*, 176.

<sup>37</sup>Rambo, *Spirit and Trauma*, chap. 4.

<sup>38</sup>Ibid., 132.

<sup>39</sup>Ibid., 140.

<sup>40</sup>Malcolm Guite, unpublished poem, used with permission.

The reference to “Thursday” refers to the weekly nationwide applause for healthcare workers for which the UK Government called during the lockdown of spring 2020.

<sup>41</sup>I refer here to the pathogenicity of the virus once it crossed into the human. I acknowledge that many elements of human selfishness and folly contributed to the outbreak, and to its subsequent mismanagement in various countries. What is explored here is why the natural world contains the possibility of such harms to humans.

<sup>42</sup>Catherine Keller, *The Face of the Deep: A Theology of Becoming* (New York: Routledge, 2002).

<sup>43</sup>Anne Primavesi, *From Apocalypse to Genesis: Ecology, Feminism and Christianity* (Minneapolis, MN: Fortress Press, 1991).

<sup>44</sup>Even Gregory A. Boyd, whose work focuses on this “warfare,” concedes that “in sharp contrast to the way chief gods are presented in ANE [Ancient Near Eastern] mythologies, biblical authors uniformly portray Yahweh as the sole Creator God who never had to fight for his supremacy and whose supremacy is therefore never threatened by anti-creation forces.” *The Crucifixion of the Warrior God*, vol. 2 (Minneapolis, MN: Fortress Press, 2017), 1014. For a critique of Boyd’s use of the Bible in relation to natural evil, see Sollereeder, *God, Evolution and Animal Suffering*, 18–19.

<sup>45</sup>See, e.g., Christopher Southgate, “Cosmic Evolution and Evil” in *The Cambridge Companion to the Problem of Evil*, ed. Chad Meister and Paul K. Moser (Cambridge, UK: Cambridge University Press, 2017), 147–64; \_\_\_\_, “‘Free-Process’ and ‘Only-Way Arguments’”; \_\_\_\_, “Response with a Select Bibliography,” *Zygon* 53, no. 3 (2018): 909–30.

<sup>46</sup>Joshua M. Moritz, “Animal Suffering, Evolution, and the Origins of Evil: Towards a ‘Free Creatures’ Defense,” *Zygon* 49, no. 2 (2014): 348–80.

<sup>47</sup>Joshua M. Moritz, “Are Viruses Evil?” *Theology and Science* 18, no. 4 (2020): 564–78.

<sup>48</sup>See Schneider, *Animal Suffering*, 32–33 for the same conclusion.

<sup>49</sup>Mirjam Schilling, “A Virocentric Perspective on Evil,” *Zygon*, online version before inclusion in an issue, December 16, 2020, <https://doi.org/10.1111/zygo.12669>.

<sup>50</sup>Sollereeder, *God, Evolution and Animal Suffering*.

<sup>51</sup>Christopher Southgate, *The Groaning of Creation: God, Evolution and the Problem of Evil* (Louisville, KY: Westminster John Knox Press, 2008).

<sup>52</sup>Diogenes Allen, *Theology for a Troubled Believer: An Introduction to the Christian Faith* (Louisville, KY: Westminster John Knox Press, 2010), 79, italics in original.

<sup>53</sup>Southgate, *Theology*, 3.

<sup>54</sup>This research was generously funded through Grant TWCF-0185 from the Templeton World Charities Foundation Inc. The views expressed are those of the author and should not be taken to reflect those of the Foundation.

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Mark A. Strand

# Communicating Science to the Public during the COVID-19 Pandemic

Mark A. Strand

*In the early stages of the COVID-19 pandemic in the United States, people were keen to receive information but overwhelmed by the volume of it. Furthermore, many were anxious and unable to feel confident in the reliability and the benefit of the information they were receiving. In response to a perceived need in the public, the author produced a series of fourteen Facebook Live videos to provide clear information about COVID-19, to guide people to appropriate behaviors, and to instill hope. These videos were viewed 12,229 times. A 12-item survey was sent via Facebook to viewers. Respondents (n=77) reported that the videos improved their knowledge, helped them understand a complex problem, and feel hope. This experience undergirds the importance of providing scientific, nonsensationalized, nonpoliticized information during a crisis. It also shows the equal importance of messages of justified hope during a time of fear.*

Caused by the novel SARS-CoV-2 coronavirus, the COVID-19 pandemic has challenged scientists, public health professionals, and physicians around the world to simultaneously understand and mitigate the effects of the pandemic. As a public health problem, frequent messaging to the public about the severity of the pandemic, the risks to individuals and communities, measures individuals could take to minimize the risk of contracting the disease, and the prospects of suppressing the pandemic was required.<sup>1</sup> Unfortunately, this messaging was marked by miscommunication regarding the true threat of COVID-19 and mitigation measures required of the public, leading to public confusion.<sup>2</sup>

The contrast between the mixed messaging in the United States regarding COVID-19 that ensued, and the public's desire for reliable and nonpoliticized information could not be more stark. First, understanding of the transmissibility and virulence of the virus is something that can be determined only as the epidemic is unfolding, so it was impossible to avoid some mixed messages coming from the World Health

Organization and the U.S. Centers for Disease Control and Prevention (CDC).<sup>3</sup> This meant that the scientific process by which questions like these are ordinarily answered was playing out in real time. Scientific activities typically happen out of the public eye, in laboratories and hospitals, but with COVID-19, the process was taking place in full public view, hastily disseminated through public media sources, with limited ability for the public to gauge the credibility of the individuals giving messages, or the accuracy of their message.<sup>4</sup> The very process of doing science, by which prior paradigms are revised, corrected, or overthrown as more data comes available, is perhaps confusing to the lay public who expect scientific facts to be immutable.<sup>5</sup> This meant that some things which were messaged early in the pandemic, were later reversed. For example, the message that the main route of transmission was through fomites (objects or materials which are likely

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to carry infection) left on surfaces and not through an aerosolized virus, was later reversed; this increased concern for wearing face masks.<sup>6</sup> In their haste to publish or promote new information about COVID-19, even well-meaning journalists contributed to the proliferation of misinformation, or reported inaccurate portrayals of correct information.<sup>7</sup> Finally, that this pandemic was occurring during a presidential election year added to the tendency to politicize information about the COVID-19 pandemic.<sup>8</sup>

In contrast, what the public needed was reliable information about the emerging issues and concerns of the day, removed from the conflicts of interest introduced by politics or religious loyalties. This contrast created anxiety in the public, and uncertainty about whom to trust to provide reliable information to calm their fears and inform their decisions.<sup>9</sup> During a pandemic, the governmental and public health authorities need to provide scientific messaging, and they need to have the courage to challenge sensationalized and nonfactual claims which might harm the public.<sup>10</sup> It has been shown that susceptibility to misinformation even compromises people's compliance with public health guidance, including willingness to be vaccinated.<sup>11</sup> People needed accurate information, but many lacked fundamental health literacy to understand the details of scientific information; therefore, they needed individuals who were able to translate complex information into understandable and usable messages.<sup>12</sup> Basic epidemiological terms such as pandemic, case fatality ratio, reproductive number, contact tracing, and various mortality indicators became common parlance, but few people had the background knowledge to understand these concepts.

It was against this backdrop that the author began to produce and post short COVID live videos using Facebook Live during the early days of the 2020 COVID-19 pandemic. This was done in response to the fear and lack of information present among many people in the public. The author wanted to provide answers to the questions people had, educate them about epidemiology, and give them hope in the face of uncertainty. *The question was asked: What do people need most during a pandemic, and what is the best way to communicate public health messages during a pandemic?* It was anticipated that viewers would welcome having complex ideas explained in comprehensible ways, and thus experience the benefit that knowledge and hope bring to increasing one's

self-efficacy.<sup>13</sup> The purpose of this article is to report on this experience. Self-reported needs among the public during a time of uncertainty and how to provide informational and emotional support to people under the circumstances of a global pandemic will be explained. Lessons learned about how to communicate public health information, and what information was needed, will be introduced, as well as ideas for a dispassionate way to mitigate misinformation and conspiracy theories.

## Methods

### *Facebook Live Video Production*

On March 13, 2020, President Trump declared an emergency for COVID-19 under Section 501(b) of the Stafford Act, pledging funding in response to it. On March 14, sensing the beginning of a long-term struggle with COVID-19, and being hit with many questions about COVID-19 from concerned friends and family members, the author created a 2:18 minute Facebook Live video, preparing viewers mentally for what was anticipated would become a personal and public health challenge on a global scale unlike anything they had experienced before. The author is a chronic disease epidemiologist who teaches an Essentials of Epidemiology course to Master of Public Health students at North Dakota State University. Seeing the positive response to the first video by his Facebook friends, the author decided to do a follow-up video the next day. Thus, in this spontaneous way, began the creation of a series of Facebook Live postings.

During a period of 43 days, from March 15 to April 26, 2020, fourteen videos were produced. The videos were on average 12:08 minutes in duration, with a range of 2:18 to 17:21 minutes. The presentations utilized Power Point to display from four to seven slides, including data, information, and images on topics of current interest. Many of the topics came in response to questions that individuals were posing to the author on Facebook or in other formats. Topics covered included basic epidemiological terms such as case fatality ratio, reproductive number, infectious disease transmission dynamics, pandemic, herd immunity, social distancing, contact tracing, time course case curves, flattening the curve, and mortality indicators; and important issues such as typical COVID-19 symptoms, expected number of deaths, hospital surge capacity, COVID-19 testing, comparison of COVID-19 with influenza, the

evidence for wearing face coverings, and comparing global mitigation strategies. Each of the videos ended with a message of hope. These messages of hope spoke to such issues as loss and grieving, confidence in science, the importance of tending to one's physical and mental health, the role of one's faith, and the importance of social support. The messages of Lent and Easter from the Christian tradition were also included.

These Facebook Live videos were posted publicly to the author's Facebook friends, of which there were 221. Therefore, initially the videos could be seen only by these 221 friends, but could be seen by others if any of those 221 friends chose to share them with their Facebook friends. This resulted in the Facebook Live videos being viewed on average 874 times per video, with a total of 12,229 views. This level of interest in the videos gave the author confidence that the public wanted current and factual information about COVID-19 from a source they could trust, and within a framework of hope and positive messaging. The presentations ended when the author decided that the content was becoming repetitious and the urgency for information was waning. The public, after 43 days, had moved through the phases of confusion, denial, and uncertainty and now were prepared to handle the ongoing pandemic informationally and emotionally. The last Facebook Live video was delivered on April 26, 2020, at which time the author invited viewers to complete a short survey about their attitudes toward COVID-19 and the government's mitigation measures, and their own self-perceived value of viewing the COVID-19 Facebook Live videos (appendix).

### *Survey Design*

A 12-item survey with one additional open-ended question for personal comments was created (appendix). Eleven of the questions were ordinal variables, using a variety of Likert scales. These were measured by proportion of respondents for each response. One of the questions required respondents to rank five responses. This was measured using a weighted mean rank score, and a Friedman test was used to determine the statistical significance of differences observed. Four of the items in the survey were taken from one used by Michael Wolf et al.<sup>14</sup> No demographic or personal information was collected from the respondents.

The survey items were entered into the online survey software Qualtrics. A link was generated, which was

then posted on Facebook, with a request to people to complete the survey, and to share the link with friends whom they had shared the videos with. The survey was open from April 26 to May 11, 2020. It is not known how many people received the link, so it is not possible to determine the response rate.

Data analysis was performed using SPSS Statistics v27 software. Descriptive statistics (mean with SD and proportions) were calculated for all characteristics and respondents. Associations between variables were analyzed using Spearman's rho correlation analysis for ordinal variables. Only values significant at the 0.05 level are reported in the results. The Friedman test was used to test significance of ranked items. The significance level was set at  $\alpha=0.05$ . No formal qualitative data analysis method was used to analyze the comments to the open-ended question. Representative comments were selected to be included in the results.

## Results

### *Quantitative*

Seventy-seven individuals responded to this survey. In response to the question "how serious of a public health threat do you think COVID-19 is or might become," respondents scored it a mean of 8.1 out of a possible 10 points (0=no threat, 10=very serious threat) (table 1). Half (50.7%) of respondents were somewhat to very "worried about getting COVID-19," 83.2% felt it was somewhat or very likely that "themselves or someone they knew would get sick from the COVID-19 that year," and 77.9% considered the risk of mortality from COVID-19 to be 1% or higher.

Associations among the variables surveyed were evaluated using correlation analysis. The more serious they reported COVID-19 to be, the more worried they were about contracting COVID-19 ( $r=-0.358$ ), and the more likely they were to think themselves or someone they knew would get sick from COVID-19 ( $r=-0.254$ ).

Many (84.5%) respondents agreed or strongly agreed that COVID-19 "is a complex problem that is difficult for people to understand" (fig. 1). That 50.7% were somewhat or very worried that they would contract COVID-19, coupled with 83.2% concerned that they or someone they knew is somewhat or very likely to contract COVID-19, and belief among 77.9% of respondents that more than 1% of infected

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**Table 1. Attitudes toward COVID-19 and Government Mitigation Measures**

COVID-19 Awareness	Summary Value (n=77)
Mean response (SD) to: Q 1. On a scale of 1 to 10, how serious of a public health threat do you think the COVID-19 is or might become? (0 no threat, 10 very serious threat)	8.1 (2.0)
Q 2. How worried are you about getting the COVID-19 virus?	
Very worried	6.5%
Somewhat worried	44.2%
A little worried	37.7%
Not worried at all	11.7%
Q 3. How likely do you think it is that you or someone you know may get sick from the COVID-19 this year?	
Very likely	49.4%
Somewhat likely	33.8%
Not that likely	15.6%
Not likely at all	1.3%
Q 4. What percentage of people who get the COVID-19 do you think will die as a result? (1, 2, 3, 4)	
Less than 1%	22.1%
1-5%	70.1%
5-10%	3.9%
More than 10%	3.9%
Q 5. How confident are you that the government can control the COVID-19 outbreak?	
Very confident	6.5%
Somewhat confident	46.8%
Not very confident	36.4%
Not confident at all	10.4%
Q 6. In general, the government has done the right thing with implementation of social distancing practices.	
Strongly agree	64.9%
Agree	22.1%
Neutral	2.6%
Disagree	9.1%
Strongly disagree	1.3%
Q 7. The economic impact of social distancing practices has been too devastating, so social distancing should have been left up to individuals to decide on their own.	
Strongly agree	3.9%
Agree	11.7%
Neutral	7.8%
Disagree	33.8%
Strongly disagree	42.9%
Q 8. The COVID-19 epidemic is a complex problem that is difficult for people to understand.	
Strongly agree	41.6%
Agree	42.9%
Neutral	2.6%
Disagree	10.4%
Strongly disagree	2.6%

individuals would die, created a situation of high anxiety (table 1). Another aspect to the public’s anxiety was their perception of how well they were being protected against the worst risks of COVID-19 and their confidence in the mitigation strategies that were being used. Only 53.3% of respondents were somewhat or very confident “that the government could control the COVID-19 outbreak” (table 1). And yet, 87% agreed or strongly agreed that the government “had done the right thing with implementation of

social distancing practices,” and 76.7% disagreed or strongly disagreed that the “economic impact of social distancing practices had been too devastating” (fig. 1). Correlation showed that those supportive of the government’s actions were those who were more concerned about contracting COVID-19 ( $r=0.231$ ), had more trust in the government ( $r=0.448$ ), less concern about impact on the economy ( $r=-0.314$ ), and found the Facebook Live videos to be helpful ( $r=0.274$ ).

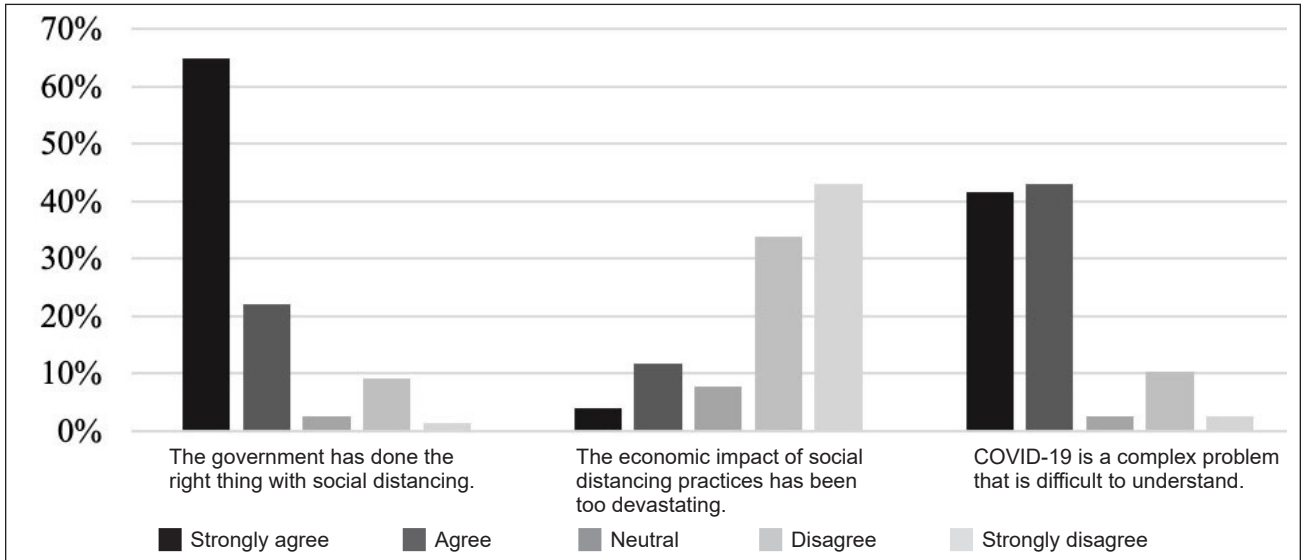


Figure 1. Comparing Attitudes toward COVID-19 and Government Mitigation Measures

Table 2. Perceived Value of Viewing the COVID-19 Facebook Videos

Value of COVID-19 Facebook Live Videos	Summary Value (n=76)
Q 9. COVID-19 Facebook Live videos were helpful in understanding a complex problem.	
Strongly agree	88.2%
Agree	10.5%
Neutral	1.3%
Disagree	0%
Strongly disagree	0%
Q 10. Prior to watching the COVID-19 Facebook Live videos, my understanding of epidemiology was	
Extremely knowledgeable	0%
Moderately knowledgeable	15.8%
Somewhat knowledgeable	31.6%
Slightly knowledgeable	40.8%
Not at all knowledgeable	11.8%
Q 11. Since watching the COVID-19 Facebook Live videos, my understanding of epidemiology is	
Much improved	47.4%
Somewhat improved	42.1%
About the same	10.5%
Somewhat worse	0%

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Only 15.6% of respondents agreed or strongly agreed that the “economic impact of social distancing practices had been too devastating.” These individuals had some common characteristics, including they were less persuaded of the seriousness of the COVID-19 pandemic ( $r=0.416$ ), not worried about getting COVID-19 ( $r=-0.264$ ), and not supportive of the government’s actions ( $r=-0.314$ ).

Respondents were surveyed about their knowledge of epidemiology (the science of counting disease in populations) prior to watching the videos (table 2). Only 15.8% of respondents reported their “understanding of epidemiology prior to watching the videos” to be extremely or moderately knowledgeable, with 72.4% reporting themselves to be somewhat or slightly knowledgeable (table 2). Despite, or perhaps because of, their limited prior knowledge about epidemiology, 98.7% agreed or strongly agreed that the videos were “helpful in understanding a complex problem” (table 2). Furthermore, 89.5% reported their “understanding of epidemiology” to be much or somewhat improved after watching the videos. Those reporting their understanding of epidemiology to have improved were those who believed the COVID-19 pandemic to be more serious ( $r=-0.374$ ) and that they or someone they knew might get infected ( $r=0.206$ ).

Those who found the Facebook Live videos most helpful were those who agreed that the government had done the right thing with the implementation of social distancing practices ( $r=0.274$ ). When asked what it was about the videos that was most beneficial (table 3), respondents ranked them from most to least beneficial: “Scientific information explained in plain language,” “Inspirational messages of hope,” “Answers to questions I had about COVID-19,” “Dispelling rumors and fears about COVID-19,” and “Equipping me to face the epidemic with confidence,” with p-values of significance between each

of these five topics in sequence of 0.014, 0.200, 0.000, and 0.316, respectively.

### Qualitative Results

The final item of the survey invited respondents to leave any comments they thought might be helpful. Below are the general themes and a representative sampling of the comments that were submitted.

Provided needed information in an honest and objective manner

I have a public health background and found the messages very informative and encouraging.

Some very helpful ways of explaining the epidemiology in plain language were very helpful for dealing with enquiries (I am a healthcare worker).

I loved your videos! I wish the mainstream news could give straight facts like you as well as give faith messages like that as well!!

Provided facts in a calm manner without sensationalism and politicalization

Great job! Thanks so much for sharing your knowledge and insight. It is so helpful to have facts without exaggeration.

Thank you. So much information on COVID-19 has a political slant. My gut tells me you are being objective. I have serious underlying health conditions that cause a general apprehension.

The videos were awesome and very helpful! I loved your calm demeanor! I also appreciated how you stated facts and didn’t involve politics.

Thanks for posting your videos. They are a calming voice of reason in a strange time.

Instilled hope

Deeply appreciated honest, unbiased information with no political agenda. Also appreciated mixing scientific information with messages of faith and hope.

**Table 3. Ranking the Benefits Gained from the COVID-19 Facebook Live Videos**

Q 12. Benefits gained from viewing the Facebook Live videos.	Mean rank score with 1-highest and 5-lowest rank*
Scientific information explained in plain language	2.2
Inspirational messages of hope	2.9
Answers to questions I had about COVID-19	3.2
Dispelling rumors and fears about COVID-19	3.2
Equipping me to face the epidemic with confidence	3.5

\*Friedman  $X^2$  statistic is 27.98 (4,  $n = 77$ ),  $p=0.000$ .



I am a high-risk individual who is the primary caregiver of my elderly parent. I also am challenged at times by anxiety related to germs and illness. These videos have given me peace during this time. He has provided a logical, honest, yet hope-filled message which is helping me be rational and set aside the anxiety. Thank you!!

## Discussion

### *Psychological Perceptions*

The COVID-19 pandemic has challenged all Americans to cope with a complex and threatening viral outbreak. This challenge to coping with a pandemic has been complicated by inundation with COVID-19 reporting through the national media and social media. As was hypothesized, this study has shown that during a pandemic, people most value reliable scientific information provided in a timely way. The importance of hope was also demonstrated, leading to the conclusion that reliable information coupled with hopefulness increases one's self-efficacy to cope with the exigencies of a pandemic. While the level of analysis used in this study does not allow for a definitive conclusion, it has shown that the best way to communicate those public health messages is in a calm and nonpolitical manner. This information needs to come from a reliable source that is able to explain complex scientific ideas in a comprehensible way and instill hope.

Respondents in this study considered COVID-19 at the time of data collection to be very serious. The more seriously they took COVID-19, the more worried they were that they and their loved ones were likely to contract COVID-19 disease. The combination of high perceived severity and high perceived susceptibility is a recipe for fear and anxiety.<sup>15</sup> Such anxiety is best dealt with by clear transparent messages about the issue rather than vague or sensationalized pronouncements. Furthermore, the majority of individuals considered COVID-19 to be a complex problem that was difficult for people to understand. This may explain why the viewers who were more concerned about the seriousness of COVID-19 found the Facebook Live videos more helpful. This aligns with other research that has shown that the best predictor of positive behavior change with COVID-19 was that the person was concerned about the severity and susceptibility of COVID-19.<sup>16</sup> However, the way this concern is addressed needs to be factual and calm, rather than dramatic or fear-heightening.

The majority of respondents in this study were worried about themselves or someone they knew becoming ill with COVID-19. Patients with chronic diseases (n=630) surveyed in a clinic, using some of the same survey items as were used in the present study, reported significantly more worry that they would get COVID-19 than people without a chronic disease.<sup>17</sup> That is to say, individuals with a disease, putting them at higher risk of a bad outcome if they get COVID-19, are more worried about getting it.

With high levels of fear, individuals may not think clearly and rationally when reacting to COVID-19.<sup>18</sup> Therefore, when one is inclined to respond with rational arguments or forced to get people to respond appropriately, it will likely only exacerbate the person's fear, and potentially make their behavior even more erratic or noncompliant. A calm, reassuring, nonpoliticized response will better calm their fears and put them in a better frame of mind from which to respond rationally.<sup>19</sup>

### *Political and Government Action*

The creation of fear for political purposes during a pandemic is nefarious.<sup>20</sup> During the COVID-19 pandemic, politically liberal elements have been accused of hyping the pandemic to make the current administration look bad, and conservative elements have been accused of ignoring scientific authorities in order to minimize damage to the current administration's reelection chances. Many people are victimized by these actions because their response to the pandemic is then driven by politics, rather than scientific evidence. Respondents to this study also reported on the importance of the nonpoliticization of the videos. A study using an international community found that the only predictor of positive behavior change (e.g., social distancing, improved hand hygiene) was fear of COVID-19 itself, with no effect of varying political ideologies. Therefore, messaging should focus primarily on calming people's fears, with less concern about profiling people politically in the messaging.<sup>21</sup>

This project was conducted within the context of a society that was experiencing significant distrust in the government, and in authorities in general, at the time of the pandemic.<sup>22</sup> And responses among respondents to the present survey were split evenly regarding whether the government would be able to control the outbreak. Uncertainty about its ability to control the outbreak reflected either concern

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that the government simply was not able to stop the pandemic, or suspicion about the government's integrity and commitment to stop it. The survey would suggest the former; that is, concern about the government's inability to stop the pandemic, not its unwillingness to do what it takes to stop it. This was shown through high levels of belief that the government had done the right thing in implementing social distancing practices.

Those supportive of the government's actions were those who were more concerned about contracting COVID-19, had more trust in the government, less concern about impact on the economy, and found the videos to be more helpful. This study had no data regarding the respondents' responses prior to seeing the videos. So, one can only surmise that their trust that the government was doing the right thing, even if they were not sure whether it would be effective, was influenced by the objective and nonpolitical approach used in the videos. The messages of hope offered at the end of each video also contributed to a perceived benefit by the viewers.

Skepticism about social distancing was found among 10.4% of the respondents. This group of people had some characteristics in common. They were those who were less persuaded of the seriousness of the COVID-19 pandemic, not worried about contracting COVID-19, did not support the government's actions, and were less likely to report the Facebook videos to be helpful. Kaiser Family Foundation polling conducted April 15–20, 2020, approximately the same time as the survey reported here, found 19% of the American people to say that shelter-in-place measures were excessive.<sup>23</sup> This is close to the 10.4% of respondents to the present survey who reported skepticism about social distancing requirements. The source of one's information appears to be associated with attitudes toward COVID-19 mitigation as well. It was reported that Canadians who regularly consume social media were less likely to observe social distancing and less likely to perceive COVID-19 as a threat, while the opposite was found to be true for people who receive their information from official news sources.<sup>24</sup>

Belief in misinformation about COVID-19 is associated with lower trust in science and scientists.<sup>25</sup> The American Scientific Affiliation, which is the parent organization of this journal *Perspectives on Science and Christian Faith*, is well positioned to increase trust in science in society. One of the ways to increase the

dissemination of accurate information and reduce the digging in on one's own position that often comes with debating, is through what has been called "cognitive inoculation."<sup>26</sup> This approach front-loads the public with accurate scientific information in a non-inflammatory way so that when they meet with conspiracy theories or other forms of misinformation they have some degree of "immunity" against it, and are more inclined to be critical of such conspiracy theories.<sup>27</sup> This shows the importance of scientists communicating science to the public consistently in order to provide a steady rational guard against misinformation.

### *Video Effect*

Respondents were overwhelmingly in agreement that the videos were helpful and that they added to their meager understanding of epidemiology prior to viewing the videos. Those who valued the Facebook Live videos also tended to agree that the government had done the right thing with implementation of social distancing practices. In contrast, those people who were not as concerned about the pandemic, and were less supportive of the government's role, were also less interested in learning, as defined by not having found the videos very helpful. Unfortunately, there was no pre-video data to determine whether the videos changed people's opinions about these things.

### *Faith Community*

When asked what it was about the videos that was most beneficial, respondents ranked "Scientific information explained in plain language" the highest and "Inspirational messages of hope" the second highest. A pandemic creates confusion and fear. A trustworthy source of factual and nonsensationalized, nonpoliticized information is important. This is an invaluable lesson for public health in terms of public messaging. One needs to provide objective, nonsensationalized information in a timely fashion, addressing the current questions people have. But it also needs to speak to the emotional reactions people have. There are lessons here for the faith community. Clergy seldom have the scientific knowledge sufficient to speak to their members about science-related issues that might be affecting their well-being. However, they have the trust of their members and are looked to for help with their emotional and spiritual needs. This is an opportunity for faith leaders to call upon members of their church who have the appropriate expertise to provide teaching and

counsel to their members.<sup>28</sup> This leads to a few final thoughts about the importance of communicating science-related information to members of the faith community.

The challenge of introducing science to a lay audience is both a theoretical issue and a communications issue. The theoretical question concerns how one views the relationship between science and scientific evidence and faith. In his seminal work, Ian Barbour described the relationship between religion and science in four different ways: conflict, independence, dialogue, and integration.<sup>29</sup> The approach used in these Facebook videos was in line with Barbour's dialogue category. With the dialogue approach, the results of science are taken seriously on their own terms, but the implications for one's faith experience are also considered in dialogue with that science. In the study reported here, the results of epidemiology research stand on their own, but they are also considered using a faith lens. For example, most churches built their COVID-19 response on state-level public health guidelines, but they also took into consideration the spiritual needs of their congregations. So, decisions of science and faith were made in dialogue, not in isolation. Dialogue is not easy, because all parties need to be flexible and find common ground. This was what the author was striving to do in presenting epidemiological findings within the context of the viewers' personal experience with the COVID-19 pandemic. The communications question involves finding a method of communicating science to a lay audience, to which attention will now turn.

Communicating challenging scientific ideas to a lay audience requires critical thinking and persuasive arguments, but it is most effective when done in a nonconfrontational manner.<sup>30</sup> The viewers clearly appreciated that these videos contained facts, and not politics, and were delivered in a calm manner. This approach to communicating scientific topics to Christian audiences has been well developed by others. Author Greg Cootsona has demonstrated Barbour's dialogue approach in his book *Mere Science and Christian Faith*.<sup>31</sup> Cootsona explains how to understand and communicate complex ideas that lie at the interface of faith and science, covering topics as diverse as neuroscience and climate change and beyond. His curious, and even humorous, approach to difficult questions is a counter to an absolutist approach that some would use to claim biblical domination over scientific ideas. Another author, Andrew Root, has used the experience of a fictional

youth pastor to demonstrate how humility toward science and humility toward faith prevent one from overstating the authority of either.<sup>32</sup> These are good ground rules for dialogue and create the kind of amicable atmosphere conducive to listening, learning, and idea formation.<sup>33</sup> These approaches serve as models of what the author was striving to accomplish in this Facebook Live video series.

Readers of *Perspectives on Science and Christian Faith* are well positioned to apply the principles advocated for in this article. Most of them have some degree of mastery in a scientific field, and participate within a faith community whose members are in need of understanding science through the lens of faith. While translating complex scientific ideas to the lay level is not easy, it is an important step in being a servant to the faith community. Learning how to communicate that scientific information in a way that is not overly technical or sensationalized is worth the effort. It is a better way to heighten lay persons' appreciation for the importance of science than through argumentation. And, of course, participating regularly in a fellowship of scientists who share one's faith perspective can improve one's ability to accomplish this goal.

On a recent day, the author was jogging on a local trail, when the rider of an oncoming bike called out in passing, "Thank you for your Facebook videos, they were great." Not recognizing the rider, the author called back as he rode past, "Can we chat?" The rider introduced himself as a member of the author's church, and went on to say,

Your Facebook videos were fantastic. They gave me the information I needed to understand the pandemic and gave me hope. I was able to share them with my parents-in-law to help them overcome their confusion and to accept the seriousness of the pandemic. And I was able to use the information at my workplace to put in place needed safety measures. I can't thank you enough.

This chance encounter summed up and made personal what was reported by the survey respondents in this study. It also illustrated the opportunity that those trained in science have, as they communicate science to the faith community in ways that inspire and inform.

## Conclusion

This study has shown that, during an infectious disease pandemic, people highly value scientific

# Article

## Communicating Science to the Public during the COVID-19 Pandemic

information which is credible and nonsensationalized and provided in a timely manner. In addition, people want something which speaks to their emotional and social needs as well as to their need for scientific information. This was seen through the importance that respondents placed on inspirational messages of hope, that these should be included with the provision of scientific information. This is now a “scientific world,”<sup>34</sup> and the need for all persons to be able to understand and respond appropriately to scientific information is increasing. Therefore, the call upon people of faith, who are scientists, engineers, and healthcare professionals, to support the lay public with factual and clear communication of science-related issues of significance, cannot be overstated.

This study has several limitations. As a cross-sectional study, the absence of respondent information prior to the COVID-19 pandemic or prior to viewing the videos, eliminated the possibility of determining change in perceptions or attitudes among respondents. Second, responses may have reflected individual personality or current convictions more than the effect of the videos. Thus, the study results do not allow one to determine what the impact of the pandemic or viewing the videos had on their position. However, two of the eleven Likert questions required respondents to compare their change after watching the videos. So respondents served as their own control. This is inferior to having a true control group, but it does reduce bias somewhat. Third, there was a limit to which inferential statistical tests

could be performed in the absence of respondent demographic or personal information. Finally, it is possible that those who chose to respond were not a representative sample of all viewers. Respondents may have been those sympathetic to the views of the Facebook Live video presenter, so nonresponse bias cannot be ruled out. Therefore, the generalizability of the results is limited to the author’s Facebook viewers, but the generalizability of the importance of and methods of communicating science to persons of faith is widely applicable.

This study has raised additional questions that merit further reflection and future studies. Although respondents valued the information and hope they received, what do they actually do with that information? Does it increase their willingness to accept mitigation measures and adopt behavioral practices that will protect them, such as social distancing and mask wearing? Or is it simply a short-term emotional consolation? This study has underlined the importance of providing scientific, nonsensationalized, nonpoliticized information during a crisis, but in the main, how much scientific and health information do people of faith expect from, or desire from, their faith community? Do people prefer to live in a world where these two domains are kept separate? It is the author’s hope that researchers will provide answers to these questions with innovative research efforts, and that readers will take up the challenge to serve as voices of reason in their spheres of influence, during the COVID-19 pandemic, and beyond. ⇔

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## APPENDIX

### Survey

During 2019, the COVID epidemic emerged, creating uncertainty and disruption. In response to a perceived need for information about COVID-19, Mark Strand created a series of short videos posted on Facebook to address this need. This survey is for the purpose of evaluating your experience with these videos and with the epidemic in general. Your participation and candid responses are appreciated.

Q1. On a scale of 1 to 10, how serious of a public health threat do you think the COVID-19 is or might become?

No threat at all  Very serious public health threat

0      1      2      3      4      5      6      7      8      9      10

Q2. How worried are you about getting the COVID-19?

- Very worried
- Somewhat worried
- A little worried
- Not worried at all

Q3. How likely do you think it is that you or someone you know may get sick from the COVID-19 this year?

- Very likely
- Somewhat likely
- Not that likely
- Not likely at all

Q4. What percentage of people who get the COVID-19 do you think will die as a result?

- Less than 1%
- 1-5%
- 5-10%
- More than 10%

Q5. How confident are you that the government can control the COVID-19 outbreak?

- Very confident
- Somewhat confident
- Not very confident
- Not confident at all

The next items make a statement. Select your level of agreement with these general statements.

Q6. In general, the government has done the right thing with implementation of social distancing practices.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Q7. The economic impact of social distancing practices has been too devastating, so social distancing should have been left up to individuals to decide on their own.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Q8. The COVID-19 epidemic is a complex problem that is difficult for people to understand.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

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Q9. Mark Strand’s COVID-19 Facebook videos were helpful in understanding a complex problem.

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Q10. Prior to watching Mark Strand’s COVID-19 Facebook videos, my understanding of epidemiology was

- Extremely knowledgeable
- Moderately knowledgeable
- Somewhat knowledgeable
- Slightly knowledgeable
- Not at all knowledgeable

Q11. Since watching Mark Strand’s COVID-19 Facebook videos, my understanding of epidemiology is

- Much improved
- Somewhat improved
- About the same
- Somewhat worse

Q12. Rank the benefits you gained from Mark Strand’s Facebook videos. Rank the selections from 1=most benefit to 5=least benefit.

	1	2	3	4	5
Scientific information explained in plain language	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspirational messages of hope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Answers to questions I had about COVID-19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dispelling rumors and fears about COVID-19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Equipping me to face the epidemic with confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for your willingness to respond to these questions. The responses will be used to educate public health students about the role of educating the public during a health crisis. Feel free to leave any comments you think might be helpful.

### Notes

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## HISTORY OF SCIENCE

**NEWTON THE ALCHEMIST: Science, Enigma, and the Quest for Nature's "Secret Fire"** by William R. Newman. Princeton, NJ: Princeton University Press, 2019. xx + 537 pages, including four appendices and an index. Hardcover; \$39.95. ISBN: 9780691174877.

If there is one person associated with developments in the physical sciences, it is Isaac Newton (1642–1727). For many, he represents the culmination of the seventeenth-century Scientific Revolution: its point of convergence and simultaneously the point from which science began to exercise its full influence on society. His work is often considered as thoroughly modern: well-designed experiments; precise and clearly articulated mathematical-physical principles which invite deductions further tested by measurement and experiment; and great discoveries in astronomy (universal law of gravitation), in optics, in mechanics, and in mathematics (the calculus). For many, Newton provided the model for physical theory for the next two hundred years.

And yet, this generally accepted description of Newton fails to capture the tension and diversity in Newton's work. The discovery of Newton's alchemical manuscripts (containing no fewer than one million words) by the economist John Maynard Keynes at an auction at Sotheby's in 1936 partially lifted the veil. In 1947, Keynes offered his rather candid assessment of Newton's alchemical work: he "was not the first of the age of reason" but rather "the last of the magicians."

However, in the last two decades, we have come to understand and appreciate that alchemy was not simply deviant behavior by "magicians" or charlatans, but rather part and parcel of the make-up of the Scientific Revolution. Alchemy, or better, chymistry, was a central part of the early modern study of nature. One of the leaders of this historiographical revolution has been William Newman, distinguished professor in the Department of History and Philosophy of Science and Medicine at Indiana University. [For more on this revolution, see my review of Lawrence Principe's book *The Secrets of Alchemy* in *PSCF* 66, no. 4 (2014): 258–59.] Newman has written several seminal books: for example, *Atoms and Alchemy: Chymistry and the Experimental Origins of the Scientific Revolution* (2006) and *Promethean Ambitions: Alchemy and the Quest to Perfect Nature* (2004).

*Newton the Alchemist* displays Newman's fifteen-year dedicated study of Newton's alchemical manuscripts. This is the book for anyone who wishes to understand the background, implementation, and experimentation characteristic of Newton's long and abiding interest in alchemy. Newman introduces us to a Newton who wished to be an adept alchemist (even as a student at the Free Grammar School in Grantham) and kept the alchemical fires burning throughout his life, not only

in Trinity College at Cambridge University, but also as warden of the Royal Mint. Newman also shows that alchemy is not inherently unscientific or irrational, nor that Newton was an outlier. Such contemporary luminaries as Robert Boyle, Gottfried Leibniz, and John Locke were also involved in alchemical endeavors.

In the first chapter, "The Enigma of Newton's Alchemy: The Historical Reception," Newman addresses the claims of two of Newton's most illustrious interpreters: Richard Westfall and Betty Jo Teeter Dobbs. For Dobbs, Newton's belief in alchemical transmutation was a religious quest, with the "philosophic mercury" acting as a spirit mediating between the physical and divine realms. For Westfall, Newton's alchemical research, involving invisible forces acting at a distance, allowed him to develop his theory of universal gravitation, published in the *Principia* of 1687. Newman calls both claims into question based on his close reading of the extant alchemical papers, many of which Dobbs and Westfall were not able to see. Newman wishes to determine the "hidden material meaning of the text" (p. 46), rather than advance any broad metaphysical or soteriological claims on Newton's part.

In chapter 4, "Early Modern Alchemical Theory," Newman reveals how heavily influenced Newton was by European alchemists, above all by the Polish alchemist Michael Sendivogius. Drawing on their experiments, Newton, in the 1670s, developed an all-encompassing geochemical theory of nature, according to which the earth functions as "a 'great animall' or rather an 'inanimate vegetable'" (p. 64). In Newton's view, this process explained gravitation (among many other things), although he would abandon this idea when he came to write the *Principia*.

In collaboration with others, many at Indiana University, Newman has organized, read, and carefully compared Newton's alchemical manuscripts. [Readers can see the results at [www.chymistry.org](http://www.chymistry.org).] In his analysis, Newman employs an approach which he calls "experimental history." This involves at least two elements: (1) a careful textual linguistic analysis of alchemical manuscripts and their experimental details; and (2) an effort to repeat the experiments in a modern laboratory setting. To understand alchemical manuscripts is indeed a challenging undertaking involving an understanding of "materials, technology, and tacit practices," as well as deciphering "hidden terms or *Decknamen*" used for chemical substances, and the intricate symbols employed to designate them (see "Symbols and Conventions," pp. xi–xvii).

Newman repeated many of Newton's experiments, revealing many of his laboratory practices for the first time. The results are sometimes spectacular (see, for example, the colored plates 4–10 between pages 314 and 315). They clearly show how dedicated Newton was in his efforts to improve his knowledge of the natural world. Newman's final assessment: "Nowhere in



Newton's scientific work can we see the same degree of combined textual scholarship and experiment that we encounter in his alchemy" (p. 498).

What may we learn from reading *Newton the Alchemist*? One thing for sure: that our contemporary scientific textbooks and enlightened culture celebrating Newton's "positive" results—the astronomical "System of the World" and his three laws of motion in mechanics—are a one-sided picture of Newton's work and life. By blithely neglecting his interests in alchemy, cabbalism (number mysticism), theology, chronology, and biblical prophecy, as well as Newton's deep sense of vocation (calling), they all too frequently divide his work into two predetermined categories: science and pseudo-science. It is certain that Newton's alchemy is not pseudo-science. History, and scientific practice as well, are never, if ever, so tidy. Newton's passionate pursuit of a coherent worldview is a reminder to us of the rich context in which science is embedded. Newman's book underscores the fact that science, our science too, is impelled by deep commitments, social and political factors, and personal ambition and motives.

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**NEGOTIATING SCIENCE AND RELIGION IN AMERICA: Past, Present, and Future** by Greg Cootsona. New York: Routledge, 2020. 206 pages + index. Paperback; \$44.95. ISBN: 9781338068537.

In *Negotiating Science and Religion in America: Past, Present, and Future*, Greg Cootsona examines the history of religion and science in America in the context of emergent adulthood. He begins with Alfred Whitehead's claim that religion and science are the two strongest cultural forces within American culture, with the future of America being dependent upon the cultivation of a positive relationship between them. Much of the book is a historical exploration of the relationship between religion and science in American culture framed by the categories put forth in Ian Barbour's *Issues in Science and Religion*: conflict, co-existence, dialogue, and integration—although Cootsona chooses to collapse dialogue into integration. While he finds Barbour's typology helpful, Cootsona sees the need for new categories to better reflect the experience of millennials living within the pluralism of the twenty-first century.

Cootsona argues that Protestantism, as the dominant religious force within American culture, contributed to the conflict/co-existence approaches to science and faith throughout much of American history. This situation has now given way to a religious pluralism that makes new forms of integration possible. However, given the increased secularity of millennials and emergent adults, which Cootsona supports with Pew research, the National Study of Youth and Religion, as well with his own qualitative research, this new form of integration is less about a robust dialogue between science and

religion, and more about the manifestation of a tolerant individualism seeking to avoid conflict. According to Cootsona, "As Americans become less conventionally religious, they also become less personally conflicted with science" (p. 163). This explains why Barbour's typology needs to be reworked—as emergent adults disassociate from organized religion, the categories that frame the relationship between science and religion must change. For Cootsona, emergent adults are "religious bricoleurs" who need better maps to frame the conversation in order to discover new trajectories.

The first two-thirds of the book represent the author's version of the map. He divides American history into sections, tracing the relationship between religion and science from Newton to Barbour, with a final chapter focusing on future possibilities. In this way, he models the mapping needed for the future of the religion/science discussion. He provides an insightful historical narrative that describes developments within the religion/science relationship, ending with contemporary models of Barbour's typology—Stephen Jay Gould (co-existence), Richard Dawkins (conflict), and Francis Collins (integration). The final chapters explore the shifting religious experience of contemporary American culture that has seen a decline in religious affiliation, the rise of spirituality, and a new cultural and religious pluralization. Cootsona's historical narrative provides a helpful snapshot of the complicated relationship between religion and science in America. His interdisciplinary focus offers an important lens for interpreting the historical events and movements, providing a helpful model of the mapping that he believes is necessary for emergent adults living in a pluralistic culture, to better engage the conversation. There are, however, a few critiques to consider.

Cootsona's portrayal of Barth's theology follows a predictable, but unfortunate, trajectory. He refers to Barth's opposition to "natural theology" in a way that suggests a lack of concern for science. A close reading of *Church Dogmatics* Book III, however, shows how Barth views the incarnation as the basis for affirming and encouraging scientific exploration. For Barth, this is not merely co-existence, as Cootsona seems to suggest; instead, it is the instance that the revelation of God's love for the world in Jesus Christ affirms every opportunity to learn more about God's good creation through scientific inquiry. Barth writes to his niece,

Thus one's attitude to the creation story and the theory of evolution can take the form of an either/or only if one shuts oneself off completely either from faith in God's revelation or from the mind (or opportunity) for scientific understanding. (*Karl Barth Letters: 1961–1968*)

Barth embraces evolutionary theory, but he strongly opposes any form of human knowledge morphing into a dominant ideology. Cootsona's dismissal of Barth misses an opportunity for a much more robust theological engagement of science that moves beyond

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a “two books” paradigm, to an integrative approach. Barth’s concern with natural theology is in opposition to ideology wherever it is found—be it religion or science. Both liberal theology and fundamentalism are guilty of fostering unhealthy ideological paradigms that short-circuit dialogue. This is central to the conflict with science within contemporary white evangelicalism as they are much more concerned with maintaining political power and social status than having honest discussion about faith and science. The evangelical opposition to science—including issues related to the current pandemic—has less to do with theology or science, and more to do with ideological forces that maintain the cultural status quo. The politics of science and religion, which Cootsona alludes to in his account of the Scopes trial, deserves much more attention.

Finally, there is the absence of contemporary scholarship that might support his project. While Charles Taylor is Canadian, his monumental work *A Secular Age* provides important insight into the rise of secularity in the West, including American culture. Taylor demonstrates how the shift in social imaginary that results from the Reformation creates the cultural conditions in which the scientific revolution and the rise of fundamentalism are possible. A primary focus of his work is to explore the conditions that lead to the current emphasis of spirituality over traditional forms of religion, which is the experience of emergent adulthood. Similarly, both J. Wentzel van Huyssteen (*Alone in the World? Human Uniqueness in Science and Theology*) and Ilia Delio (*The Unbearable Wholeness of Being: God, Evolution, and the Power of Love*) offer important insights for the faith and science conversation that address the contemporary experience of emergent adults in America.

Overall, Cootsona’s book is an important contribution to the conversation about science and religion. He provides a creative interdisciplinary approach that helps religious communities as they engage scientific questions. As a practical theologian, this interdisciplinary approach, along with his desire to articulate new models for an increasingly pluralistic and secular American culture, provides important steps toward the cultivation of meaningful conversations between religion and science.

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**SCIENTISM AND SECULARISM: Learning to Respond to a Dangerous Ideology** by J. P. Moreland. Wheaton, IL: Crossway, 2018. 224 pages. Paperback; \$16.99. ISBN: 9781433556906.

Early in his new book, *Scientism and Secularism: Learning to Respond to a Dangerous Ideology*, J. P. Moreland relates a story of a hospital stay. After telling his nurse that he earned his BS in physical chemistry, his ThM in theology, his MS in philosophy, and his PhD in philosophy,

she observes that he “had taken two very unrelated, divergent paths” (p. 23).

Before she could explain further, I asked if this was what she meant: I started off in science, which deals with reality—hard facts—and conclusions that could be proved to be true. But theology and philosophy were, well, fields in which there were only private opinions and personal feelings ... (p. 23)

In response, Moreland’s nurse looks surprised and acknowledges this “was exactly what she had in mind” (p. 24). Rather than supposing his interlocutor is simply a kind nurse hoping to move on to her next patient, Moreland instead interprets the position he articulates for her as illustrating that “scientism” is “the intellectual and cultural air that we breathe” (p. 24).

Scientism is the nemesis in Moreland’s book. He loathes it. But the precise definitional target of his loathing is not always clear. Early in the book, Moreland distinguishes “strong scientism” and “weak scientism.” Strong scientism claims “something is true, rationally justified, or known if and only if it is a scientific claim that has been successfully tested and that is being used according to appropriate scientific methodology” (p. 27). Weak scientism, by contrast, “acknowledges truth apart from science,” but “still implies that science is by far the most authoritative sector of human knowing” (p. 28). That’s a helpful distinction, even if it is doubtful whether many accept strong scientism (Moreland provides no examples), and depending on how one defines “authoritative,” it is also doubtful whether many people *reject* weak scientism. Having thus introduced the distinction, however, this nuance is often lost in the pages that follow, even in places where the clarity could have proved useful. More problematically, we never get a definition of what Moreland means by “science.” To his credit, Moreland defends the omission, claiming that science cannot, in principle, be demarcated from nonscience (pp. 160–63). Still, it is difficult to follow the implications of Moreland’s argument—effectively, an extended argument against scientism—without a working definition of what science is. Do only the hard sciences count? Or do the so-called soft sciences count as well? Or might empirical-leaning philosophy and theology and history count too? These distinctions are not readily available, and so it isn’t clear precisely what position Moreland is arguing against. It is clear only that Moreland really dislikes it.

When Moreland offers data to support his argument, the results are also disappointing. For example, while reflecting on the supposed conflict between science and religion, Moreland estimates

*that 95% of science and theology are cognitively irrelevant to each other ... in that other 5% or so of science, there is direct interaction with Christian doctrine. Within this category, I would say that 3% of science provides further evidential support for Christian teaching ... that leaves 2% of current scientific claims that may seem to undermine Christian theology.* (pp. 173–74, emphasis Moreland’s)

None of these data are cited. They instead appear to be precisely what Moreland says they are—Moreland shooting from the hip. Oddly, he includes a pie chart to illustrate his guesswork.

Worse than these eccentricities, Moreland regularly falls prey to the very kind of scientific thinking he decries. On one hand, he proposes that “[t]he primary academic disciplines suited to studying the nature of consciousness ... are biblical studies, theology, and philosophy of mind” (p. 85). This view, to be frank, seems rather idiosyncratic and is not one that many academics, including religious ones, would ascribe to. Theistic philosophers rarely lean on biblical scholarship in developing their views of consciousness. On the other hand, Moreland’s own variety of scientism appears in his defense of intelligent design, a position that accepts God’s direct action throughout evolutionary history. Moreland strongly endorses intelligent design understood this way. Moreover, he emphasizes that we have scientific reasons to endorse the position:

intelligent design advocates believe that they can and have discovered scientific data that is best explained by an intelligent designer—the origin of the universe, life, consciousness, cases of irreducible complexity, and so on. (p. 171)

Understood in this way, intelligent design takes the hypothesis of an intelligent designer to be our best *scientific* explanation for a range of phenomena. Intelligent design thus stands against rival theistic accounts of evolution such as theistic evolution. Theistic evolution rejects the perspective offered by intelligent design, claiming that a creator is not best construed as a scientific hypothesis. Rather, according to theistic evolution, our reason to believe in God comes largely from nonscientific disciplines such as theology or philosophy. Accounts of creation such as theistic evolution are therefore comfortable with the claim that we can know about God as creator without requiring that this knowledge be distinctively scientific. For Moreland, by contrast, it seems God’s creative action is best understood as empirically detectable, and that science offers a privileged perspective on our knowledge of God as creator. In discarding rival theistic accounts in favor of his brand of intelligent design, Moreland thus seems to embrace the very kind of scientism he pleads with us to reject.

Do some of Moreland’s arguments land? Of course! Moreland is a professional philosopher with an impressive record. For example, his argument that scientism is self-refuting (p. 47–51) has strong moments: if scientism claims that science offers our *only* route to knowledge, then accepting that claim entails that we ought not accept scientism, since the position stakes a claim that can’t be scientifically verified. Of course, this kind of argument works only for a particularly strong version of scientism, one that resembles the discarded logical positivism of the early twentieth century more than the subtler kinds of scientism that are widely held today.

Likewise, some of Moreland’s arguments for the immateriality of consciousness (pp. 86–88), the cosmological argument (p. 133–39), and the fine tuning argument (pp. 141–47) track contemporary conversations, even if these arguments are more controversial than Moreland gives them credit for. The problem with Moreland’s book is not that it is completely devoid of clear philosophical thinking. The problem is that the wheat is mixed thoroughly with the chaff, and the two are difficult to separate.

Do we recommend the book? Not for the casual reader. Moreland’s book is misleading; dangerous for the believer in its mischaracterizations and simplifications, infuriating for the unbeliever in its handling of both science and religion. Importantly, we (the reviewers) agree on this despite coming from different places: one of us (Vukov) is a Catholic and philosopher; the other (Burns), an atheist and biologist. For the careful scholar, though, the book may be worth skimming, as a spur to more careful reflection. Whether scientism is true or false, it has wide-reaching implications. We agree that the subject merits a serious and careful book-length discussion. That’s just not what Moreland’s book delivers.

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## ORIGINS

**A WORLDVIEW APPROACH TO SCIENCE AND SCRIPTURE** by Carol Hill. Grand Rapids, MI: Kregel Publications, 2019. 240 pages. Hardcover; \$29.99. ISBN: 9780825446146.

On February 4, 2014, Bill Nye and Ken Ham debated matters of creation, science, and faith. Because this encounter pitted two very public figures against each other—a famous PBS personality and a very flamboyant creationist—this event was highly anticipated. Unfortunately, the results were frustratingly inconsequential. The debate, however, did crystalize the irritations that often gravitate around debates of science and faith. So often, the participants talk past each other instead of engaging each other. The person of faith will often lament the scientist’s narrow-mindedness and fallaciousness because they ignore variables valued by positions of faith. Conversely, the person of science will likely mock the faithful as naive simpletons who cling to their texts and ignore data that confronts their vested interests. Such tendencies are tragic since both sides perpetuate discord and prevent any substantive collaboration.

In the book reviewed here, Carol Hill offers another crack at navigating the chasm between science and the Christian faith. Thus, Hill’s work is not necessarily novel or innovative. And it is certainly not the first to

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boast an author who is globally accomplished in their field of scientific inquiry and a committed Christian (e.g., Francis S. Collins, *The Language of God* [New York: Free Press, 2006]). However, the potency of this book exists in how she allows the data points, both scientific and textual, to speak for themselves. To facilitate this, she employs a hermeneutical lens described as a “worldview approach.” While she struggles in the opening chapter to effectively articulate what this approach means, she ultimately does enough throughout the presentation to paint a picture of what she is utilizing. She describes an interpretive posture that adopts, to the extent that it can, an overarching conceptual framework born out of the authoring culture. Essentially, the claims of the biblical text need to be considered in light of an Iron Age, ancient Near Eastern society. Therefore, using the biblical text to answer specific questions forged out of modern scientific discussions is ultimately asking the text to bear a weight that it is not designed to bear. Rather, ancient Near Eastern texts, of which the Bible is one, are concerned with questions of function and order when speaking to fundamental realities of the cosmos, not questions of precise mechanisms and timelines. This allows Hill to responsibly summarize the Bible’s foundation that in turn informs specific convergences between science and scripture.

God/Christ is the creator of the universe and all that is in it, and by him all things consist (hold together). According to the Bible, the universe and life did not happen by chance, but was created, directed, and sustained by God. (p. 159)

This is an important premise. On the one hand, Hill’s work acknowledges a fundamental reality about scripture. It is a text that is ancient; therefore, it is influenced by conventions and assumptions very foreign to modern people on this side of the industrial and scientific revolutions. On the other hand, it frames discussions that may produce irenic debate between science and faith. Or, to put it another way, a worldview approach or anything similar, allows the text, along with its intentions, to define the boundaries of the conversation, and it is within these boundaries that scientific musings may flourish and inform the larger dialogue. If this sounds like a push to allow the text to take the lead in debates of science and faith, that is the suggestion. Christians believe that ancient Israel, with its experiences and authoritative texts (i.e., the Old and New Testaments), is a chief mechanism for communicating God’s cosmic intentions for humanity. Science has something to say, but it just doesn’t enjoy the level of sanction that the text does.

Nevertheless, Hill gets boxed in occasionally by her worldview approach. For example, “The basic premise of a Worldview Approach is that the Bible in its *original context* records historical events *if* considered from the worldview of the biblical authors who wrote it” (pp. 12–13, *emphasis original*). The implications of this statement unnecessarily complicate things. If one is committed to considering an author’s worldview,

cognitive framework, and ancient literary conventions when attempting to understand the claims of scripture, then one should allow ancient canons to dictate. This inevitably raises a question. To what extent are these literary accounts making claims about real people, space, and time? There is reason to believe, based largely on comparative analyses that pit ancient Near Eastern texts against the biblical texts of the same or similar genre, that Genesis 1–11 may be making nonhistorical (e.g., polemical) claims. Thus, is the pursuit of Eden’s location, or of a chronological context for Adam and Eve, or of the dynamics of a regional flood, really a moot point? Certainly, not all texts of Genesis are of the same ilk, for Genesis 12–50 is a different type than Genesis 1–11. But Hill stymies the possibilities of her own approach by a commitment to discussing everything historically.

I am a biblical scholar who is convinced that God sanctioned ancient Israel, with its Messiah and text, to be the authoritative channel for revealing his divine intentions. And so, I write this review with these confessions. Ultimately, I applaud Hill for her work. It embodies a balance that respects the Bible for what it is—a text given by an ancient society that enjoys divine sanction as God’s authoritative revelation while not being capable of precisely informing highly technical and nuanced issues illuminated by the developments of modern scientific research. I suspect that if both Nye and Ham had recognized this, the infamous debate of 2014 would not be another example of fruitless endeavors tarnished by entrenched rigidity, but rather it would stand as a watershed moment in irenic debate between traditional antagonists.

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**GOD’S GOOD EARTH: The Case for an Unfallen Creation** by Jon Garvey. Eugene, OR: Cascade Books, 2019. 209 pages. Paperback; \$30.00. ISBN: 9781532652011.

**THE GENERATIONS OF HEAVEN AND EARTH: Adam, the Ancient World, and Biblical Theology** by Jon Garvey. Eugene, OR: Cascade Books, 2020. 264 pages. Paperback; \$36.00. ISBN: 9781532681653.

Together, these two books endeavor to provide an interpretation to the Genesis creation accounts that sees them not only as historical but also coherent with modern scientific theories. The result is a proposal that initially appears coherent, drawing on Garvey’s extensive reading in many areas.

*The Generations of Heaven and Earth* (GHE) complements Joshua Swamidass’s *The Genealogical Adam and Eve*. Garvey explains that Swamidass’s premise is “that a historical couple living in the Ancient Near East, amongst an existing human population, at any time plausibly matching the biblical account, would *almost certainly* be common ancestors of everyone living in the world today” (xiii, *italics original*). At the same time,

GHE builds on *God's Good Earth* (GGE) which argues that “what happened to humankind in the garden did *not* spread to the rest of the world” (GGE, 4, italics original).

The two volumes contain a number of positives. Garvey displays a high view of the sovereignty of God and his relationship to the world. He argues strongly that God's creation is good and that humankind has a responsibility to take care of it. He highlights the need to accept the supernatural, including noting how the question of consciousness is more metaphysical than scientific, thus denying naturalism. He calls out science for its significant role in the abuse of the earth. He places Adam firmly in history. He distinguishes sin from evolution. He bases his high view of scripture on divine authorship, and notes how “the old critical consensus on the supposed literary disunity of the Old Testament” has failed. But, a closer reading of the books revealed several inconsistencies and raised several concerns, both biblical and scientific.

The basic premise of GGE is that the fall event in Genesis 3 affected only humankind and not the rest of creation. He divides the book into four sections. The first three use, respectively, biblical passages, Christian theologians throughout history, and science to show that creation not only was created good, but is still good. The fourth is application. Garvey's focus on substantiating that the current natural order is good (in a functional sense) seems overstated. While one would readily agree that there is much good about nature today, he explains away any passages that indicate otherwise, such as Romans 8. His view of science is complicated. He critiques the founders of the evolutionary hypothesis for not seeing anything wrong with nature (GGE, 72), but then blames all of the problems of nature on humans, beginning with the Mesopotamians; he places special onus on the scientific community for the “massive problems” it has created (GGE, 171-79).

While he strongly critiques evolutionary theory for its “hyperbolic expressions of the depravity and savagery of nature that have been with us since Darwin and tend to be taken as axiomatically valid” (GGE, xviii), he argues that God used the evolutionary process to develop the “natural order” spreading the development of life over 3.8 billion years. That he sees everything under the sovereign control of God who serves to bless or judge, suggests that God is behind all that we call evil, although Garvey tries to evade that by claiming nature “must surely be regard[ed] as ‘good,’ for it is utterly obedient to the will of its maker” (GGE, 8). He validates this several ways. First, he defines good not as a moral term, but functional (GGE, 34-35). Second, he cites Peter who was told not to “call anything impure that God has made clean” from Acts 10:13-15 (although Peter called the animals “impure” because God had declared them “impure” in Leviticus 11). Third, and most provocative, he argues that most living organisms

do not experience pain or suffering—this is something limited to humans. As such, carnivores do not cause suffering when they kill their prey, so this system can be viewed as good (GGE, 147-67).

Garvey argues that the early chapters of Genesis are “essentially historical” (GHE, 9), seemingly conflicting with his acceptance of the evolutionary hypothesis. His solution is a genealogical Adam (per Swamidass) which, he claims, “works with the usual scientific dating of the earth, and posits ‘natural humans’ living alongside, and long before Adam and Even (sic) in the Garden of Eden” (GHE, 52). In other words, mankind evolved per the standard paradigm, and after several hundred thousand years of development God selected one couple out of all who existed at that time and placed them in a garden called Eden. Given Swamidass, he suggests 4004 BCE. Taking Abraham as an example, Garvey labels Adam the “first father” of the human race solely on the basis of a covenant with God. Specifically, he says, “Adam was called to be the first instance of such a personal relationship with God, from an existing human race which might well have had all the features of a culture, and even of religious worship, though based on nature rather than revelation” (GHE, 123-27). Adam “sinned” as the representative head of that already-created human race (GHE, 110). Here Garvey seems self-contradictory. He argues that all of “mankind” who lived “before and alongside of Adam” was a “human race created in the image and likeness of God” (GHE, 116). Then he asserts that Adam differed from “non-Adamic” humanity outside the garden primarily because of the *imago dei*” (GHE, 132).

Noting Paul's theological argument that “it was necessary for all men to be ‘in Adam,’ before they could be ‘in Christ,’” Garvey maintains that a genealogical Adam and Eve would be ancestors of everyone who existed on the earth at Paul's time. So, he asserts, “Christ's coming for all humanity was, on that time scale, almost immediately after the time when all humanity became children of Adam” (GHE, 50-52). Given that genealogical conclusion, however, multiple generations between Adam and Paul, as well as multiple generations of “humans” asserted to exist prior to Adam, would *not* be descendants. He implies that, although in the image of God, they were not fully human since they did not have a personal relationship with God, although the original monotheism reported by Schmidt, Lang, and others could have applied to them (GHE, 133-46). Or, “in some way the blessings promised to Adam were intended to act retrospectively to those outside of the garden” (GHE, 145).

Given a long period of evolutionary preparation for Adam, Garvey concludes that Genesis 1 and 2 are sequential, producing a “second creation,” a matter of several concerns. First, this contradicts God's rest in Genesis 2:3. Second, Genesis 2:4 is not a sequential indicator. The Hebrew phrase *elle toledot* connects the

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two accounts. Although translated as “these are the generations” or “account” or something similar, recent scholarship concludes a better translation is “this is what became of.” Used throughout Genesis, this phrase organizes Genesis into eleven sections, each explaining what happened to the previous account. Thus Genesis 2:4–4:26 tells what happened to the earth that God had declared as very good in the preface to the book. Third, in Genesis 2:18–20, Adam does not name all the animals of creation. Rather, Adam named “helpers” that God formed for him after putting him in the garden (probably domesticable animals). When no helper was “suitable” (NASB) or “fit” (ESV) for Adam, God created Eve. Fourth, while Garvey wants to avoid an allegorical understanding of scripture, he is driven to it here as he presupposes a race of humans who long preceded Adam, and who co-existed with Adam.

Contrary to Garvey, God did not rescind the curse on the ground after the flood (GGE, 28). “Never again” does not mean “no longer.” Garvey downplays this major portion of the pre-Abraham material (one third) and does not show how it was good. To support his theory, he characterizes the flood as regional, allegorizing the entire account (GHE, 39–49). He alludes to archaeological evidence for support, but he ignores both textual and scientific material suggesting otherwise. If the flood were truly global as presented in scripture, the evidence likely would be geological, not archaeological, a matter of scientific *interpretation* of data beyond this review.

Much more could and should be said, but space disallows. I found these two books challenging, forcing me to think through a number of issues, both scientifically and theologically. I appreciated how Garvey critiqued aspects of evolution as well as “traditional” interpretations of scripture. As an Old Testament scholar, I appreciated his observation on how “the old critical consensus on the supposed literary disunity of the Old Testament has failed” (the so-called JEDP theory – GHE, 188). As an engineer schooled in the sciences, I appreciated his *scientific* challenges to the philosophy of naturalism, recognizing that the physical realm is not total reality. He noted several times that scientific assumptions needed to be rethought in the light of new evidences and cited cases such as consciousness, or the nature of Satan. I was especially intrigued by his observation about “enculturated ‘soft scientism,’” which he defined as saying “that theological statements must be subjected to scientific scrutiny in order to have any intellectual credibility” (GHE, 12). He correctly describes the early parts of Genesis as historical, as noted by even critical biblical scholars such as Gerhard von Rad. And, yet, when the text conflicted with current secular scientific interpretation, he reverted to allegorizing, exhibiting that same soft scientism he critiqued.

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**FAITH AND EVOLUTION: A Grace Filled Naturalism** by Roger Haight. Maryknoll, NY: Orbis Books, 2019. 241 pages. Paperback; \$30.00. ISBN: 9781626983410.

Roger Haight is a Jesuit priest, theologian, and former president of the Catholic Theological Society of America. He is the author of numerous books and has taught at Jesuit graduate schools of theology in several locations around the world. In 2004, the Vatican’s Congregation for the Doctrine of the Faith (CDF) barred Haight from teaching at the Jesuit Weston School of Theology in response to concerns about his book *Jesus Symbol of God* (1999). In 2009, the CDF barred him from writing on theology and forbade him to teach anywhere, including at non-Catholic institutions. In 2015, Haight was somewhat reinstated and when *Faith and Evolution* was published, he was Scholar in Residence at Union Theological Seminary in New York City. He is regarded as a pioneering theologian who insists that theology must be done in dialogue with the postmodern world. His experiences with censorship have led to widespread debate over how to handle controversial ideas within the Roman Catholic church.

The main presupposition of this book is that Christian theology must be developed from the findings of contemporary science in general and from the process of evolution in particular. In chapter one, Haight briefly summarizes five principles about our world that can be drawn from science. These principles include the following: (1) our universe is unimaginably large; (2) everything exists as constantly dynamic motion and change; (3) everything in motion is governed by layers of law and systems conditioned by randomness; (4) life is marked by conflict, predatory violence, suffering, and death; and (5) science is constantly revealing new dimensions of the universe.

Haight seeks to explain how the disciplines of science and theology relate to each other in chapter two. He begins by summarizing the four positions proposed by Ian Barbour which include conflict, independence, intersection (dialogue), and integration. After presenting several differences between scientific knowledge and faith knowledge, he concludes by suggesting that the independence model is the one that best describes the practices of most scientists and theologians. Any integration between the two disciplines can occur only within the mind of a person who is able to see things from different points of view, and entertain them together.

The next two chapters deal with creation theology: chapter three focuses on what we can “know” about God, and chapter four describes how God acts in an evolutionary world. Several theological conceptions of God are summarized in chapter four. These include the following: God is pure act of being (Thomas Aquinas), God is ground of being (Paul Tillich), God is serendipitous creativity (Gordon Kaufman), God is incomprehensible mystery (Karl Rahner), and God is

transcendent presence (Thomas O'Meara). This last definition of God is the one that Haight latches on to, and he mainly refers to God as "creative Presence" throughout the rest of the book. While acknowledging that God is personal, he emphasizes that God is not a "big person in the sky," but a mysterious and loving presence within all material reality. He insists that all anthropomorphic language about God needs to be discarded as it not only misrepresents scientific knowledge but also offends religious sensibility. God is the "within" of all that exists which emphasizes God's immanence, but God is also "totally other than" created reality, which allows for God's transcendence. Haight's understanding of God is basically a form of panentheism, a term that he introduces in chapter three and then revisits in later chapters of the book.

Chapter four, entitled "Creation as Grace," attempts to answer the question of how God acts in an evolutionary world. Haight states that "one can preserve all the assertions of tradition without the mystifying notions of a supernatural order or interventions into the natural order by following the path laid out by creation theology" (p. xi). His answer to the question of how God acts in history is to be found in the classic notion of *creatio continua*, God's ongoing dynamic presence within all finite reality. God does not act as a secondary cause but works as the primary agent present to and sustaining the created world. This concept of God as creative Presence is then compared to the scriptural understanding of God as "Spirit," which Haight concedes is the most applicable way of talking about how God works in history. A third way that God acts in the world is then developed from a brief history of the theology of grace. These three sets of theological languages that include God's ongoing creation, the working of the Holy Spirit, and the operation of God's grace in people's lives are, according to Haight, different ways of referring to the same entity.

Chapter five examines the doctrine of original sin in light of evolution. Haight argues that this doctrine in its classic form contains serious problems and therefore needs to be discarded. The Genesis account of Adam and Eve is nothing more than an etiological myth which has no historical basis. Consequently, "when original sin becomes unsteady, the whole doctrine of salvation in terms of redemption begins to wobble" (p. 121). Human beings have not "fallen" and, even though they retain the influences of past stages of evolution, they cannot be born sinful. While Haight admits that humans are sinners, the sins that we commit are nothing more than social sins derived from our participation in sinful institutions that are a part of our evolutionary heritage. It is these sinful social structures that are primarily responsible for corrupting our moral sensibility, rather than some innate propensity to sin.

The person of Jesus Christ and the doctrine of Christology are the subjects of chapters six and seven

respectively. Haight introduces chapter six by contrasting the different ways of interpreting Jesus of Nazareth that are presented by Marcus Borg and N. T. Wright. He obviously sides with Borg's perspective as he suggests that one should think about Jesus as simply a "parable of God." Jesus was not an intervention of God in history, but a human representative of God who was "sustained from within by the Presence of the creator God in a way analogous to all creatures and especially human beings" (p. 202). While Haight admits that God was present within Jesus in a unique and more intense way, this same God can also be more powerfully present in others, making them in some measure true revelations of the divine Presence. Jesus provides salvation by "revealing God" and, although this particular revelation of God is meant for all humankind, it does not exclude the likelihood of similar kinds of revelation within other religious traditions.

The last chapter of the book, chapter eight, is a response to the question of what we can hope for in an evolutionary worldview. Haight discusses the following possibilities: faith in a creator-finisher God who injects purpose into the process of the universe, hope for a cosmic preservation of the value and integrity of being, hope for a restoration of meaning relative to innocent suffering, and hope for the preservation of the human person and personal resurrection. He describes resurrection as a passing out of materiality into the sphere of God that transcends the finite world, or in other words, eternal union with God. The resurrection of Jesus was not a historical event, but a spiritual conviction developed by his followers after his death. It was this "Easter experience" which became the basis for the written witness to the resurrection of Jesus that is recorded in the New Testament. In death, Jesus was "received into God's power of life; he did not cease to exist as a person, but lives within the sphere of God" (p. 179). Our hope for an analogous form of personal resurrection ultimately comes down to faith in a creator God who is the "lover and finisher of finite existence."

For whom then is this book written? As stated in the preface to the book, it is not written for scientists, as one will learn very little actual science from its pages. Haight writes that he is mainly addressing Christians who are affected by our present scientific culture and who do not know how to either process their Christian faith in this context or call it into question. However, most of those who fall into this category will likely have difficulty understanding the ideas that are presented in the book without some type of graduate-level training in theology. The book appears to be written primarily for like-minded theologians who are associated with the more liberal wing of the Roman Catholic church. (Many of the footnotes in the book cite publications written by fellow Catholic priests such as Teilhard de Chardin, John Haught, Hans Jung, Karl Rahner, Edward Schillebeeckx, and William Stoeger.)

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While Haight's main purpose for writing this book is admirable, it is doubtful that many outside of academia will take the time and put in the effort that is needed to read it and actually understand it. Christians with more conservative, biblically based faith commitments should probably bypass it altogether, as there is very little, if any, orthodox Christianity that is upheld within its pages.

*Reviewed by J. David Holland, Clinical Instructor, Department of Biology, University of Illinois at Springfield, Springfield, IL 62703.*



## TECHNOLOGY

**ATOMIC DOCTORS: Conscience and Complicity at the Dawn of the Nuclear Age** by James L. Nolan Jr. Cambridge, MA: The Belknap Press of Harvard University Press, 2020. 294 pages, plus index. Hardcover; \$29.95. ISBN: 9780674248632.

This book ends with a tragic photograph. The reader will see a young boy carrying a sleeping infant on his back. However, the infant is not asleep but instead is dead as his brother waits his turn to have his brother's body thrown into a giant pyre at Nagasaki in the days following the atomic bomb blast. This picture is symbolic of the tragedy of war and provides a provocative statement regarding the involvement of US physicians in the development of the atomic weapons program toward the end of World War II. The author, James L. Nolan Jr., PhD (Professor of Sociology, Williams College), provides an excellent historical vignette of this period through a written biography of his grandfather, James F. Nolan, MD.

Dr. Nolan, as well as Louis Hempelmann, MD and Stafford Warren, MD, were intricately involved with the Trinity testing in New Mexico as well as with the development of the atomic bomb as part of the Manhattan Project. Dr. Nolan met and collaborated with such famous people associated with the Manhattan Project, including J. Robert Oppenheimer, Edward Teller, and General Leslie Groves. The entire group of physicians oversaw determining radiation risks during atomic bomb development and testing. This placed them in a difficult situation which "linked the arts of healing and war in ways that had little precedent" (p. 166) especially regarding the Hippocratic Oath.<sup>1</sup>

Dr. Nolan was involved with setting up the hospital at Los Alamos as well as providing medical care for the Los Alamos staff and families. However, the job of these clinicians also had other aspects. Radiation exposure to workers was observed and recorded at Los Alamos leading to some of the initial descriptions of radiation poisoning. Additionally, the physicians were involved in determining radiation hazards associated with Los Alamos and in the setting of Trinity with most of their findings either being ignored or hidden from the public, sometimes with the complicity of these individuals.

It is fascinating to consider that Dr. Nolan was one of the military personnel chosen to accompany Little Boy (the bomb that exploded over Hiroshima) to the Pacific Front at Tinian Island on the famous and later tragic *USS Indianapolis*. I cannot imagine, in our present time, that a physician would be charged with transporting and reporting the safety of a technologically advanced weapons system.

The book contains many fascinating stories, including how military physicians as well as other personnel were told to assert there was no significant radiation after the bombing in Japan (despite obvious radiation injury being noted in thousands of individuals), how the military allowed reporters at the Trinity test site after the bomb test with no protection except for "protective" booties, how US military physicians were told to not treat Japanese civilians after the bombing in order to circumvent moral responsibility of the bombing (this was ignored), how the inhabitants of the Bikini Atoll and Enewetak Atoll were forced to abandon their ancestral homes so that further atomic bomb testing could occur (with subsequent deleterious effects in their sociologic and health outcomes), and how patients in the United States (many who were already terminally ill) were secretly injected with plutonium to determine the effects of radiation injury.

Besides being a biography and history of a physician and his colleagues, this book also goes in some philosophical directions, including considering what is the goal of technology. Oppenheimer himself stated that "It's amazing ... how the technology tools trap one" (p. 33). The "trap" leads to a myriad of issues. Dr. Nolan believed radiation should be considered under the paradigm of an "instrumentalist view of technology" in which new technology could be used for the advancement or decline of our species. In his case, he began experimenting with radiation to treat gynecologic cancer in his patients. The book then explores "technological determinism," both optimistic and pessimistic, which is still an issue permeating our culture today. The author states that humans appear to always choose technologic advances even before fully knowing downstream economic, political, or cultural effects. Such examples cited by the author include the internet, social media, and genetic engineering.

A Christian will find this book unsettling when one considers what one prioritizes in his (her) faith. For example, one of the physicists who worked at Los Alamos was a Quaker. The Trinity test was named after the Christian Trinity (based on a John Donne sonnet). These facts are sobering when the author provides reports of "downwinders" who suffered catastrophic disease after the Trinity test as well as going into detail about the thousands of Japanese who suffered radiation poisoning after the nuclear bombing. In addition, the bombing of Nagasaki was close to the Christian part of the city resulting in the killing of most of the Christians



living there. Indeed, the pursuit of science is a fascinating human endeavor, but the point of science is to objectively determine facts. Science does not necessarily provide subjectivity by itself which allows it to be influenced by meaning, moral values, and responsibility.<sup>2</sup> In the moral arena, people with religious beliefs, including Christians, are required to influence the idea of technologic determinism in a positive direction. I highly recommend this book not only to learn about an interesting part of world history but also to appreciate the tragedy of the human condition in the setting of war.

## Notes

<sup>1</sup>Michael North, translator, "Greek Medicine," History of Medicine Division, National Library of Medicine, National Institutes of Health, last updated February 7, 2012, [https://www.nlm.nih.gov/hmd/greek/greek\\_oath.html](https://www.nlm.nih.gov/hmd/greek/greek_oath.html).

<sup>2</sup>Mehdi Golshani, "Science Needs a Comprehensive World-view," *Theology and Science* 18, no. 3 (2020): 438–47.

Reviewed by John F. Pohl, MD, Professor of Pediatrics, Department of Pediatrics, University of Utah, Salt Lake City, UT 84113.

**THE ETHICAL ALGORITHM: The Science of Socially Aware Algorithm Design** by Michael Kearns and Aaron Roth. New York: Oxford University Press, 2019. 232 pages. Hardcover; \$24.95. ISBN: 9780190948207.

Can an algorithm be ethical? That question appears to be similar to asking if a hammer can be ethical. Isn't the ethics solely related to how the hammer is used? Using it to build a house seems ethical; using it to harm another person would be immoral.

That line of thinking would be appropriate if the algorithm were something as simple as a sorting routine. If we sort the list of names in a wedding guest book so that the thank-you cards can be sent more systematically, its use would be acceptable; sorting a list of email addresses by education level in order to target people with a scam would be immoral.

The algorithms under consideration in *The Ethical Algorithm* are of a different nature, and the ethical issues are more complex. These algorithms are of fairly recent origin. They arise as we try to make use of vast collections of data to make more-accurate decisions: for example, using income, credit history, current debt level, and education level to approve or disapprove a loan application. A second example would be the use of high school GPA, ACT or SAT scores, and extra-curricular activities to determine college admissions.

The algorithms under consideration use machine-learning techniques (a branch of artificial intelligence) to look at the success rates of past student admissions and instruct the machine-learning algorithm to determine a set of criteria that successfully distinguish (with minimal errors) between those past students who graduated and those who didn't. That set of criteria (called a "model") can then be used to predict the success of future applicants.

The ethical component is important because such machine-learning algorithms optimize with particular goals as targets. And there tend to be unintended consequences—such as higher rates of rejection of applicants of color who would actually have succeeded. The solution to this problem requires more than just adding social equity goals as part of what is to be optimized—although that is an important step.

The authors advocate the development of precise definitions of the social goals we seek, and then the development of algorithmic techniques that help produce those goals. One important example is the social goal of privacy. What follows leaves out many important ideas found in the book, but illustrates the key points. Kearns and Roth cite the release in the mid-1990s of a dataset containing medical records for all state employees of Massachusetts. The dataset was intended for the use of medical researchers. The governor assured the employees that identifying information had been removed—names, social security numbers, and addresses. Two weeks later, Latanya Sweeney, a PhD student at MIT, sent the governor his medical records from that dataset. It cost her \$20 to legally purchase the voter rolls for the city of Cambridge, MA. She then correlated that with other publicly available information to eliminate every other person from the medical dataset other than the governor himself.

Achieving data privacy is not as simple as was originally thought. To make progress, a good definition of privacy is needed. One useful definition is the notion of *differential privacy*: "nothing about an individual should be learnable from a dataset that cannot be learned from the same dataset but with the individual's data removed" (p. 36). This needs to also prevent identification by merging multiple datasets (for example, the medical records from several hospitals from which we might be able to identify an individual by looking for intersections on a few key attributes such as age, gender, and illness). One way to achieve this goal is to add randomness to the data. This can be done in a manner in which the probability of determining an individual changes very little by adding or removing that person's data to/from the dataset.

A very clever technique for adding this random noise can be found in a *randomized response*, an idea introduced in the 1960s to get accurate information in polls about sensitive topics (such as, "have you cheated on your taxes?"). The respondent is told to flip a coin. If it is a head, answer truthfully. If it is a tail, flip a second time and answer "yes" if it is a head and "no" if it is a tail. Suppose the true proportion of people who cheat on their taxes is  $p$ . Some pretty simple math shows that with a sufficiently large sample size (larger than needed for surveys that are less sensitive), the measured proportion,  $m$ , of "yes" responses will be close to  $m = \frac{1}{4} + \frac{1}{2}p$ . We can then approximate  $p$  as  $2m - \frac{1}{2}$ , and still give individuals reasonable deniability. If I answer "yes"

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and a hacker finds my record, there is still a 25% chance that my true answer is “no.” My privacy has been effectively protected. So we can achieve reasonable privacy at the cost of needing a larger dataset.

This short book discusses privacy, fairness, multiplayer games (such as using apps to direct your morning commute), pitfalls in scientific research, accountability, the singularity (a future time where machines might become “smarter” than humans), and more. Sufficient detail is given so that the reader can understand the ideas and the fundamental aspects of the algorithms without requiring a degree in mathematics or computer science.

One of the fundamental issues driving the need for ethical algorithms is the unintended consequences that result from well-intended choices. This is not a new phenomenon—Lot made a choice based on the data he had available: “Lot looked about him, and saw that the plain of the Jordan was well watered everywhere like the garden of the LORD, like the land of Egypt ...” Genesis 13:10 (NRSV). But by choosing that apparently desirable location, Lot brought harm to his family.

I have often pondered the command of Jesus in Matthew 10:16 where he instructs us to “be wise as serpents and innocent as doves.” Perhaps one way to apply this command is to be wise as we are devising algorithms to make sure that they do no harm. We should be willing to give up some efficiency in order to achieve more equitable results.

*Reviewed by Eric Gossett, Department of Mathematics and Computer Science, Bethel University, St. Paul, MN 55112.*

**A WORLD WITHOUT WORK** by Daniel Susskind. New York: Metropolitan Books, 2020. 305 pages. Hardcover; \$28.00. ISBN: 9781250173522.

Will AI systems inevitably displace humans from employment? While computer and AI technology continue to advance at astronomical rates, the popular concern is often of an apocalyptic future where highly intelligent robots have taken over (e.g., *Terminator*, *Matrix*, etc.). In his book, *A World without Work*, Daniel Susskind predicts the current capabilities of technology will lead to a future in which powerful AI systems can do many of the jobs held by humans. Susskind therefore believes that the proliferation of AI systems will lead to a future “world without enough work for everyone to do” (p. 5). With his expertise in economics, Susskind explores how the continued advanced of technology will have profound effects on future employment, growing inequality, and the methods whereby humans find meaning and purpose.

The book is divided into three sections. In the first section, Susskind sets out the historical context of technological advancements and their effects on employment and economics. He highlights how the

early advancements of computer technology were often met with disappointment as creators found it exceedingly difficult to create a machine that could replicate human intelligence. However, this early disappointment led humans to underestimate the efficiency of AI systems in performing tasks that are easy to automate (or what Susskind refers to as “routines”).

In the second section, the discussion shifts to exploring how the increased power and affordability of machines enable them to perform more human roles. The fear of increasing unemployment due to technological advancement is a real fear. Susskind differentiates between two types of technological unemployment: frictional and structural. While frictional unemployment (humans not having the skills to perform a job) is certainly an issue, structural unemployment (there actually being too few jobs for everyone) is the more pressing problem. The threat of rising unemployment leads Susskind to predict that economic inequality will grow since only certain people will be able to acquire well-paying jobs.

In the third and final section, Susskind tries to provide a solution to the growing unemployment problem. He claims the attempted solution of technology education fails as a long-term response since not all people have the disposition to learn about technology, nor will there be enough jobs. A potential solution is to provide a UBI (universal basic income) for all people so that the economic inequality will not be so severe. However, Susskind rejects the UBI solution in favor of his proposed CBI (conditional basic income) which still provides income but with requirements that must be met. Susskind believes his proposed CBI solution has the added benefits of solving the inequality problem and providing meaning and purpose that a job once held.

Computer and AI technology are certainly advancing at a rapid rate. Susskind is not alone in his warnings regarding the potential dangers of technological advancements. However, Susskind helpfully points out that the danger does not come from machines gaining sentience and oppressing humans but, rather, the danger is one of machines gradually replacing us in our employment due to their overwhelming speed and efficiency. While there is relief that such an apocalyptic future is unlikely, the prediction of a future without enough work to go around ought to be a significant concern.

While Susskind’s prediction of a future with significantly reduced employment is well founded, his potential solution of implementing a CBI to provide the meaning and purpose lost from unemployment seems incomplete. With jobs no longer providing the sense of meaning and purpose, it is difficult for Susskind to find a solution to fulfilling these existential longings can be fulfilled. Unfortunately, he is unwilling to seriously consider a religious answer to these existential

questions, which could help provide a more satisfying response.

What applications can Christians consider from this book? There are at least two. First, if Susskind's prediction of machines performing many jobs traditionally done by humans is accurate and unavoidable, then Christians need to reconsider what work means and how our concept of work may need to evolve. Due to a lack of available positions and the difficulties of acquiring the skills needed, not everyone will be able to enter the field of technology work. While the existence of much traditional work may disappear due to automation, we still need to understand what it means to pursue a calling.

Second, Christians should be part of the philosophical and ethical discussions surrounding computer and AI progress. As the technological field continues to progress at a rapid rate, questions regarding the moral status of machines and their ethical implications for humanity will naturally rise to the forefront. The worldview that shapes these important discussions will have a profound impact on how future technology is designed and created.

Overall, Susskind's book is a welcome addition to the growing literature on AI technology concerns. He helpfully points out the potential future consequences of AI technology from an economic standpoint. I would recommend this book as a resource for thinking through the potential future ramifications of an increasingly automated world.

*Reviewed by Eddy Wu, IT Operations Manager and PhD student at Southeastern Baptist Theological Seminary, Wake Forest, NC 27587.*

**DIGITAL LIFE TOGETHER: The Challenge of Technology for Christian Schools** by David I. Smith, Kara Sevensma, Marjorie Terpstra, and Steven McMullen. Grand Rapids, MI: Eerdmans, 2020. 377 pages. Paperback; \$29.99. ISBN: 9780802877031.

All of us who are invested in Christian education, parents, administrators, building committees, boards, and especially teachers, have struggled with the role that digital devices should play in our schools and in the lives of our children. For this reason, *Digital Life Together* is a gift to the Christian education community in North America. This book is a careful, detailed, and comprehensive look at how a couple of Christian schools chose a 1-1 device-to-student strategy and lived with the technology in this intensive way. Regardless of where one falls on the spectrum, from full adoption to complete rejection of digital technology in schools, this book will broaden and deepen your discussions.

The authors chose a Protestant Christian school system with approximately 1,500 students (labeled "Modern Christian Schools" for purposes of anonymity) across several campuses that had a mature 1-1 device-to-

student approach to technology as the primary focus of their study. For comparison, they also looked at another Midwestern Protestant Christian school system from the same tradition and also surveyed graduates of Christian schools at a nearby Christian liberal arts college. Classroom observations, surveys, focus groups, case studies, and document analysis were used to "shed light on lived experience and changing beliefs and practices of members of a Christian school community embracing new technologies" (p. 26). An appendix on the research methods is included for those interested.

In order to get specific, the bulk of the book is divided into five sections: mission, teaching and learning, discernment, formation, and community. More detailed questions are raised to broaden and deepen the observations of how technology affected students at these schools. These questions are the anchors for the relatively short chapters that comprise the book.

As is befitting such an exploration, the authors are appropriately agnostic about both the wisdom and the efficacy of the intense use of technology in education. They highlight where there are successes from the school's perspective. For instance, they relay an example in which the mission-driven rationale for adopting the technology has made its way into the mind of a student (p. 46). Likewise, graduates from the focus schools indicate that the "technology program at Modern Christian Schools may be having some positive impact in terms of helping students manage their screen time" (pp. 166-67). Failures are also observed and noted. Most surveyed students acknowledged that the technology allowed them to find answers without really understanding them and led them to look for easy answers to problems. More than one third of them agreed that the technology encouraged them to skim over material rather than reading deeply (p. 128). The technology was also observed to promote unhealthy practices of task completion. Students were inclined to get work done quickly and then shop online, or use class time to shop in the anticipation that they would complete the work later (p. 132). Many other examples of positive and negative outcomes could be cited.

Perhaps one of the most intriguing lines of questions for administrators was how overtly Christian mission statements that were central in the adoption of technology could be co-opted by non-Christian aspirations as one moves out from the administration to the broader school community. "The way the mission was understood in the wider community was also shaped by broader social aspirations and implied stories about success" (p. 53). In reference to literature sent to the alumni community, the authors note that, "Appealing to existing community desires and values, including those focused on material advantage, was a way to build support for the program ... The focus group data suggest that this strategic communication choice left its mark" (p. 59). In the case of Modern Christian Schools,

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this uncomfortable mission slippage had to do with technology, but the same phenomena could occur with other program launches.

*Digital Life Together* is impressive in many ways. It is a careful, detailed account that remains highly readable and intriguing. Its structure, including the questions at the end of each chapter, makes it amenable to individual pondering and to group reading. Although there are detailed endnotes with citations, it would be helpful to have an appendix summarizing further readings on the general topic of technology, and of technology in education more specifically. As an educator, the book leaves me with many more questions—a real accomplishment in my estimation.

Reviewed by Paul Triemstra, Principal of Ottawa Christian School, Ottawa, ON K2J 3T1.



**HISTORY AND ESCHATOLOGY: Jesus and the Promise of Natural Theology** by N.T. Wright. Waco, TX: Baylor University Press, 2019. xxi + 343 pages, including notes, bibliography, and indices. Hardcover; \$34.95. ISBN: 9781481309622.

*History and Eschatology* is the published version of the Gifford Lectures delivered in 2018 at the University of Aberdeen by the prominent New Testament scholar and former Anglican bishop N. T. Wright. Lord Adam Gifford's will stipulated that the lectures bearing his name should treat theology "as a strictly natural science ... without reference to or reliance upon any supposed special exceptional or so-called miraculous revelation." This is one classic and influential way to describe the project of "natural theology." Wright, however, devotes eight chapters (corresponding to his public lectures), over almost 300 pages, first, to questioning the assumptions on which that project—so construed—rests, and, second, to laying the foundations of an alternative.

In chapters 1–2, Wright finds hidden in the background of Enlightenment-inspired natural theology—conceived as independent of the particulars of Jesus as attested in the Bible—as well as in the modern scholarly suspicion of the integrity and historicity of the biblical Gospels, a revived, arbitrarily deist, anti-historical Epicureanism:

European thought, from the mid-eighteenth century onwards, was increasingly shaped by the Epicurean mood ... So the split between heaven and earth, between God and the world, continued to dominate the discussion. (pp. 68–69)

In chapters 3–4, Wright puts forward his own field of expertise, history, as a kind of "missing link" in the study of the "natural" world. In particular, a rigorous, contextually attentive, historical investigation of Jesus—its methods and conclusions resisting the distortions of

chronological snobbery and materialistic metaphysics—deserves a place in the discussion:

Jesus himself was a figure of the real world. The Gospels are real documents from the real world. To refuse to treat them as 'natural' evidence ... looks like the sceptic bribing the judges before the trial. (p. 74)

In chapters 5–6, Wright summarizes some of the results of such an investigation, which naturally build on the conclusions reached in his sprawling published oeuvre on the historical Jesus:

Eschatology has come to life, say the first Christians, in the person of Jesus, and we know it because when we look at him we discern the dawning of the new day in a way which makes sense of the old, and of the questions it raised. (p. 184)

In particular, Jesus's being raised from death to new life gives not only new knowledge but a new way of knowing, what Wright calls an epistemology of love:

The resurrection ... assures us that all that we have known in the present creation ... will indeed be rescued from corruption and decay and transformed ... [L]ove revealed gives birth to an answering love. (p. 212)

In chapters 7–8, Wright seeks to synthesize the threads of his argument into a reconceived "natural" theology: one that takes Jesus' resurrection, in its full historical context and depth of meaning, as determinative (1) of how "nature"—the created world, teleological history, humanity fallen and redeemed—points, brokenly but truly, toward God's kingdom; and (2) of the mission of the Christian church in a world perhaps not bereft but still largely unaware of God's glory:

a celebration of the coming eschaton ... in faith, sacramental life, wise readings of scripture, and mission, will constitute the outworking of ... divine love, the highest mode of knowing ... in and for the world. (p. 277)

As always, Wright's vocabulary and style are refreshingly accessible, almost chatty (although he is not beyond the occasional arcane scholarly or cultural allusion), at times repetitious. His argument—that the modern divisions (not just distinctions) between "natural" and "supernatural," between "rational" empirical knowledge and "non-rational" special revelation, between "accidental truths of history" and "necessary truths of reason," are nothing more than a warmed-over, still-moldy Epicureanism from the third century BC, and that these are brought radically into question by Jesus's resurrection, thought through precisely in light of its ancient Jewish background—is less new than trenchantly and winsomely laid out. And he does not so much interact with the modern traditions of natural theology as suggest that there are more important and interesting fish for theology, running on an epistemology of love, to fry. Indeed, Wright's implication is that natural theology in Lord Gifford's sense suffers from a case of misguided methods and unambitious goals. But it is really an implication, for *History and*

*Eschatology* is more like a manifesto, proposing a monumental agenda, than a parsimonious demonstration of the inadequacy of “old-style” natural theology’s ways and means. (Wright’s disposal of three classic strategies of apologetics in a “natural theology” mode—the cosmological, teleological, and moral arguments—takes barely three pages in chapter 7.)

As someone who is theologically sympathetic to Wright’s overall project, both in its design and in many of its details (others are decidedly not so sympathetic), I consider there to be room for debate over the role of such strategies in the contemporary exposition and defense of Christian faith. That debate is not to be found in *History and Eschatology*. The possibility of dialogue with more “traditional” natural theology seems far away by the time we get to the end of a book subtitled *Jesus and the Promise of Natural Theology*. And Wright, who, in most respects, is the paradigm of a careful, objective reader and historian, is still prone to annoyingly and unhelpfully broad generalizations on matters unconnected to his expertise (e.g., Adam Smith’s economic thought “has become highly influential ... ending up with the greed-is-good philosophy of Ronald Reagan and Margaret Thatcher” [p. 19]; Karl Barth could “launch a much fiercer protest” than Rudolf Bultmann against Nazism “partly because he was a Calvinist not a Lutheran” [p. 62]). These are real criticisms, but, I must admit, relatively minor ones in comparison with the impressive intellectual and spiritual vision on offer in *History and Eschatology*. More than many of its kind, this is a readable, preachable, shareable book.

*Reviewed by Maurice Lee, North American Lutheran Seminary, Ambridge, PA 15003.*

**SCIENCE AND RELIGION: A New Introduction**, 3rd edition by Alister E. McGrath. Hoboken, NJ: John Wiley and Sons, 2020. 272 pages. Paperback; \$28.99. ISBN: 9781119599876.

Alister McGrath is a major international scholar who is prolific in his output. He has produced many popular books and academic tomes, and as a theological educator his output also includes many textbooks for students. *Science and Religion: A New Introduction* is now into its third edition and is an excellent introduction to the whole field of science and religion. The restructuring and inclusion of new material is designed to be helpful to the student, and reflects comments on the previous editions. The book introduces most of the areas of interaction between these bodies of thought, and I myself have used earlier editions in my own teaching, giving students a chapter of McGrath to start with for an essay, followed by more detailed material from elsewhere.

McGrath notes that science and religion are wide categories and serious study entails narrowing them down. He describes Ian Barbour’s four models for interaction followed by what he calls four ways of imagining the relationship between them. The conflict model is rightly

dismissed as a late nineteenth-century myth, and areas where conflict has been perceived, notably with Galileo and Darwin, are given the more nuanced treatment they deserve, thus dispelling the myths surrounding them. McGrath also gives a broader historical overview, refuting the further myth that the scientific revolution owed nothing to the medieval period. He describes the development of the Newtonian mechanistic model of the universe and brings us to the twentieth century with the development of the Big Bang theory. Regarding this last, it would have been good to note the pioneering work of Roman Catholic priest Georges Lemaître, often dubbed the “Father of the Big Bang,” who, in contrast to Alexander Friedman, regarded solutions of Einstein’s equations as physically realistic and not just mathematical curiosities.

McGrath moves on to a helpful chapter on religion and the philosophy of science. Some form of realism seems predominant and, indeed, the most rational position to take. It is interesting to note the adoption of “critical realism,” including not only by science-religion scholars such as John Polkinghorne and others, but also such as the biblical scholar N.T. Wright and James Dunn. McGrath moves on to the role of explanation in science, noting how in science there are different methods for different sciences, and thus different levels of explanation across the different subdisciplines. Theology too has its own methods appropriate to its own object but there are differing views on the role of explanation. He discusses an important case study, that of “non-reductive physicalism” associated with Nancey Murphy and others. He also gives criteria for drawing an “inference to the best explanation.” Various perspectives on the philosophy of science—logical positivism and the criteria of verification, falsificationism, and Kuhn’s paradigm shifts—are discussed. Worthy of mention here would have been Imre Lakatos whose “methodology of scientific research programmes” has been applied to theology by Philip Hefner and Nancey Murphy.

Complementing the above there follows a useful chapter on science and the philosophy of religion. McGrath describes arguments for the existence of God, beginning with Aquinas’s five ways. A section on the Kalām cosmological argument notes how this has been given a new lease on life by the Big Bang theory’s postulation of a temporal origin to the universe, although it would have been good to note that the existence of the universe would demand an explanation even if it were to lack a temporal origin. He gives a careful analysis of Paley’s natural theology, noting neglected aspects of Paley’s work such as his responses to arguments of David Hume. He examines ways in which God may act in the world given the laws of nature uncovered by science, including through miracles, where he notes Hume’s critique. However, as McGrath rightly says, Hume’s critique needs to be qualified, since, on the one hand, he defines miracles as violations of laws of nature and yet, on the other, has a problem with

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inductive generalizations from past experience – which is just what laws of nature are. McGrath rightly sees evolutionary arguments debunking religion as committing the genetic fallacy and self-defeating if human rationality is flawed, since that could equally well affect judgments in areas other than religion, notably science. There is a good section on natural theology and the role of explanation.

In the next chapter, McGrath turns to models and analogies: first, as found within the natural sciences and then, within religion. After considering what the terms mean more generally, he gives specific examples for the sciences, including the kinetic theory of gases, wave-particle duality, Galileo's analogical reasoning which led him to postulate mountains on the moon, and Darwin's metaphor of "natural selection." In the theological sphere, he considers Aquinas's notion of *analogia entis* whereby the creation bears a likeness to its creator, and Ian Ramsey's model of the "divine economy" utilizing the Greek concept of *oikonomia*. He looks at Arthur Peacocke's theological application of models as linked to "critical realism," and Sally McFague's metaphors in theology – though he could perhaps have allowed more than one sentence on Janet Soskice. He then examines specific theological examples: creation and theories of the atonement. He has a helpful section on the notion of "mystery" in science and religion before returning to Ian Barbour on models.

McGrath's final chapter considers a number of contemporary debates. Noting Hume's distinction between "ought" and "is" he critiques the idea that science, say, evolutionary biology or neuroscience, can determine ethics and moral values. That leads to a more general critique of the imperialist stance that science can answer all interesting questions or that the only reality is that disclosed by science. An interesting example is mathematics, which discovers truths that do not belong to the natural sciences. It is also utterly astonishing that mathematics is effective in describing nature and very hard to explain on an atheistic view.

An important area considered is theodicy, which is arguably made more difficult by the long process of evolution, preceding the existence of humans by hundreds of millions of years. McGrath provides an overview of the helpful contributions of Christopher Southgate and his former student Bethany Sollereder. For these scholars, there is "no other way" for God to create such a rich diversity of creatures, with whom God suffers, and for whom God will bring eschatological fulfilment. On transhumanism, McGrath describes the approaches of Philip Hefner and Ted Peters who, while recognizing the creativity of technological enhancement, are also aware that, given fallen human nature, this can also be abused.

McGrath returns to the anthropic principle and fine-tuning. He says that fine-tuning is strongly consistent with a theistic perspective, but the debate about a

multiverse as a possible explanation continues. He also considers the legitimacy of teleological language and directionality in biology. Simon Conway Morris's notion of convergent evolution may be the "best explanation" of what is observed and is resonant with a religious perspective but, like cosmological fine-tuning, does not prove that God exists.

McGrath concludes with two sections on the psychology of religion, considering whether this field can "explain away" religion. Religion may be "natural," but it is debatable as to whether that has any implication at all about the existence of God. Moreover, it is a long way from primitive apprehension of some vague supernatural agent to the systematic theology of, say, Thomas Aquinas or Karl Barth. To my mind, this is not unlike the difference – to give a scientific analogy – between the discovery of fire by early humans and the modern scientific understanding of combustion.

This is an excellent introduction to the field and very well suited to its pedagogic purpose. There are a few typographical errors (e.g., "magisterial" for "magisteria"). I also noticed that British cosmologist Paul Davies is mistakenly described as American. But these and my earlier minor points should not detract from a volume that provides a vital resource to educators and their students.

*Reviewed by Rodney Holder, Emeritus Course Director, The Faraday Institute for Science and Religion, Cambridge, UK CB3 0UB.*

**ANIMAL SUFFERING AND THE DARWINIAN PROBLEM OF EVIL** by John R. Schneider. Cambridge, UK: Cambridge University Press, 2020. xii + 287 pages. Hardcover; \$99.99. ISBN: 9781108487603. Kindle; \$60.49. ISBN: 9781108767439.

In *Animal Suffering and the Darwinian Problem of Evil*, John Schneider seeks to tackle four interconnected difficulties of reconciling evolution with a Christian understanding of God's creation: (1) deep evolutionary time and the startling reality that there have been hundreds of millions of years of violence; (2) the "plurality of worlds," the masses of now-extinct life that once inhabited our planet; (3) the discovery of "anti-cosmic micro-monsters," the realization that microbial life shares the violent and competitive world that macro scale life experiences; and (4) "evil inscribed," the discovery that natural selection is the very driving mechanism of creation, if evolution is to be believed.

Schneider does not set out to create a theodicy, in the technical jargon of the field, but follows Michael Murray's lead in his 2008 *Nature Red in Tooth and Claw* and seeks a "*causa Dei*": a possible reason for God to allow animal suffering that is more plausible than not. Schneider does not claim to know the actual reasons for natural evil, but only suggests probable reasons. The central suggestion is that, in line with Marilyn McCord Adams's work, evil must be defeated for God to be

justified. Evil is defeated when it is “a constitutive part of a valuable composite whole that not only outweighs the evil but could not be as valuable as it is without the evil” (p. 7).

Schneider spends the first six chapters setting out his space in the existing literature. He gives convincing reasons for avoiding animal theodicies that depend on a human or Satanic fall, which he finds “implausible in the extreme” (p. 100) for philosophical, scientific, and biblical reasons. He also rejects the “only way” approach developed by Christopher Southgate. Rather, he sees chaos (symbolized by the figure of the serpent in Genesis 2) as “incorporated into the original, ‘very good’ cosmic design” (p. 107). To defend this thesis, he develops an aesthetic approach to the problem of evil. God should be viewed as an artist, in which natural good and evil “create an overall picture of evolution as something like a larger story” (p. 155). Both the beauty and ugliness of nature call us to recognize a tragic sublime that helps us “see” a sense of divinity in the world. Schneider draws on biblical texts—in particular, the book of Job—as a source of theodical insight. Surprisingly, Schneider makes no use of Southgate’s 2018 *Theology in a Suffering World* or Joel C. Daniels’s 2016 *Theology, Tragedy, and Suffering in Nature* which might have been helpful dialogue partners for this approach because they offer aesthetic explorations of seeing God in the tragic side of creation.

Schneider presents two last interesting thoughts. First, that Jesus’s death takes the place of the sacrificial animals in Hebrew tradition, not as a symbolic gesture, but so that in the purification rites of Yom Kippur, the one animal is not slaughtered, and the scapegoat does not have to be exiled and die in the wild. “On the cross, Jesus assumes both these animal roles—for the sake of the animals *themselves*” (p. 240, italics original). In so doing, Jesus enters “symbolically into the place of non-human and human alike, and thereby ‘declaring’ that responsibility for the suffering of animals inscribed into the design of nature finally falls on God” (p. 240). While not dissimilar to Southgate’s suggestion that, in the Cross, God takes responsibility for all suffering, human and nonhuman, this more literal exchange brings a particularity to the instances of animal suffering that is directly linked to Jesus’s death.

Second, Schneider takes seriously the idea of animal resurrection, but holds that the usual solutions for that do not do enough to defeat the evil that animals experience. Schneider suggests instead that animals should be elevated “to a high heavenly standing analogous to the venerated position enjoyed by human martyrs” (p. 264). They are honored for the part their suffering played on Earth and enjoy the admiration of others for their sacrifice.

As with any good book, there are things to quibble with. Schneider follows the work of Carol Newsom and Samuel Balentine closely in his reading of the book of

Job. Newsom’s assesses Job’s gain in the all-important divine speeches as “tragic insight,” a view that points to the limits of dialogue and the end of anything left to be said (Carol Newsom, *The Book of Job* [Oxford, UK: Oxford University Press, 2009], 253). Yet Schneider says, “I must depart from her conclusion on what Job ‘saw,’” instead forwarding a view that offers a “*transfiguration of tragedy into faith*” (p. 191, italics original). Schneider maintains that if one is to create a *causa Dei*, or a defense, one must meet a “seeing condition”: that is, must “provide a perspective in which one can at least begin to ‘see’ that God is engaged in the defeat of evil now” (p. 195). Schneider’s insights on the book of Job as meeting that condition depend on his departure from Newsom’s interpretation. Yet he defends the strength of his larger theodical argument because it is based on an interpretation of Job that is “grounded ... in the scholarship of specialists on the historical and literary character of the book” (p. 199). Schneider’s appeal to authority here is questionable given that he differs from those authorities on the key hermeneutical issue of the book.

I also was glad for Schneider’s extended treatment on my own work, *God, Evolution and Animal Suffering*, which overall, was fair (he is right, for example, on p. 257, that my proposals do not meet the seeing condition). However, his assessment of the moral-justificatory concerns on pp. 259–60 caused me to raise an eyebrow of surprise, as my example of how the death of dinosaurs could be seen as a meaningful part of the beauty of Bach’s music was taken in a direction I never anticipated. Schneider took me to mean that “if God’s aim all along was to bring forth mammalian and distinctly human life, then the dinosaurs had to be exterminated by some means” (p. 260). So, the death of the dinosaurs, and indeed of all prehuman life, was an engineered steppingstone to humans. This could not be farther from what I intended, as I hoped my engagement with Ruth Page’s concept of “teleology-now” would show. Instead, I meant that God could link two seemingly unrelated historical events in a way that each created meaning for the other. If dinosaurs had not died in an asteroid strike, perhaps God might have created creatures in God’s image among the descendants of the velociraptors. By no means do I think that God engineered animal death for particular historical ends, but rather that God creates ways of redeeming all suffering by an act of creation of meaning.

Regarding Schneider’s thought that animals should be thought of as martyrs, the odd thing about this proposal is that martyrs are honored, not for dying, but for dying willingly for the sake of Christ. Schneider writes, “martyrs do not have to pass tests for entry into Heaven” (p. 266), but this overlooks that the very imagery he is drawing on in the book of Revelation assumes that they have already passed tests in what they suffered by refusing to recant Christ (Rev. 2:10, 6:9). This puts martyrs in quite a different place from the suffering experienced by animals, which is always unwilling even if equally

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innocent. Martyrs are honored for their choice to suffer when the option of being spared was presented to them—just like Jesus did. Animals are given no such choice, so it is difficult to see how being honored for an unwilling death undoes the injustice of putting them through suffering in the first place.

Yet, despite the ongoing quibbles, this is a concise and insightful book. It sets out a valid set of criteria and goes a long way toward achieving arguments that meet those criteria. I think it will become a staple of animal theodicy courses and is appropriate for upper-level undergraduate reading. It engages well with the other books in the field, and while it takes a more analytical and philosophical approach to this question compared to Christopher Southgate's *The Groaning of Creation* or my own *God, Evolution and Animal Suffering*, it does so with rich engagement with biblical texts and theological tradition.

A comment on the physical copy of the book I received: the printing was done with extremely rough pixilation, which has resulted in rather crude lettering. The book uses a serif font, but these were not printed in their totality and many letters have small gaps in them. While reading, this makes the letters look blurry and out of focus, or as if the printer ran out of ink. It is disappointing that the printing quality is so poor in a book that costs so much. Readers who will be bothered by this should opt for the digital edition where the letters are fully present.

*Reviewed by Bethany Sollereider, a Research Fellow at the Laudato Si' Research Institute at Campion Hall, University of Oxford, and a lecturer in Science and Religion at Oxford's faculty of Theology and Religion.*

**ANALOG CHURCH: Why We Need Real People, Places and Things in the Digital Age** by Jay Y. Kim. Downers Grove, IL: InterVarsity Press, 2020. 192 pages. Paperback; \$18.00. ISBN: 9780830841585.

There is a thought-provoking irony about this book. *Analog Church: Why We Need Real People, Places and Things in the Digital Age* by Jay Y. Kim was written prior to the 2020 pandemic, and published at its first peak around March of that year. The book serves as a creative warning about the church "over-embracing" modern technology and all that the digital age offers, at the cost of stifling its original purpose, a purpose steeped in analog principles of empathetic relationship. Fair enough! But along come the COVID-19 restrictions, and the church (and every other part of our institutionalized life) jumps full steam ahead as digital technology becomes essential. My own perspective is from Canadian Presbyterianism. It, with some exception, has been slow to embrace many technological advances when it comes to "doing church." Nonetheless, it and many other churches have been dragged into the twenty-first century with near abandon. The number of churches doing meetings and Sunday worship via YouTube, Zoom, Facebook, and other platforms has skyrocketed.

The prophetic voice inherent in *Analog Church* is speaking to the church community at a time when it is relying on digital technology to continue functioning. The introductory section of the book focuses on how technology, in and of itself, is not adequate to reach those who are searching for a transcendent meaning and purpose in life, and may, in fact, steer people away from such a relationship. In an introductory section entitled "When Values Turn Vicious," the author notes that "the digital age's technological advancements boast three major contributions to the improvement of human experience ..." (p. 15). These are speed, choices, and individualism. He notes that when such values unduly influence the church and aren't held accountable, "they turn vicious." Speed has made us impatient, choices have made us shallow, individualism has made us isolated.

It is on this premise that the author uses the remainder of the book to detail his warnings and his reasons for hope. The chapter titles are provided here, as they are descriptive of the content. Part 1 has two chapters which examine worship: "Cameras, Copycats and Caricatures: Worship in the Digital Age"; and "To Engage and to Witness: Analog Worship." Part 2 considers community: "Rebuilding Babel: Community in the Digital Age"; and "A Tax Collector and a Zealot Walk into A Crossfit: Analog Community." Part 3 looks at scripture: "Jackpot: Scripture in the Digital Age"; "HowToReadABook: Analog Scripture"; and "The Meal at the Center of History: Communion."

An example of the author's approach can be taken from the section on worship. He has the reader consider "how the digital age and technology's influence have subverted much of what worship life of the gathered people of God is meant to be" (p. 35), in part in the church's effort to reach new generations. Here he invokes the wisdom of Canadian philosopher and media guru Marshall McLuhan. He notes how McLuhan's 1960's prophetic voice is making a return due to the precise nature of his pronouncements, and how they match current circumstances. He summarizes McLuhan's "Four Laws of Media" (media in a very broad sense), as applicable to our use of technology today in the church, and, in this case, worship. The laws are summarized as follows: what does it enhance, what does it push aside, what does it retrieve that was previously pushed aside, and, what does it turn into when pushed to an extreme? As Kim moves into the value of analog worship, he notes that "digital informs," but "analog transforms," and similarly, "digital entertains, analog engages."

The author works into his narrative a number of stories based on his own life experiences, and pastors and speakers will find these worthy of using in their own teaching. While there are biblical references scattered throughout, this reviewer particularly appreciates the detailed way some scriptural passages are handled.



For example, in the section regarding analog community, the author takes an extended look at the list of the first disciples in Matthew 10:2-4. He pays particular attention to the unique descriptors for two of them: Matthew, a tax collector; and Simon, a zealot. These two would have been bitter enemies, yet we read nothing of the animosity that would have existed between them. There was something, a force, contained in their leader that was much stronger than their own histories and opinions of one another. Kim later notes that there is the need for this kind of communal relationship, as

The digital age has disconnected and detached us from one another in ways completely unique to our current moment in history. True analog community is what the world is hungry for, whether they know it or not. (p.113)

The author is certainly no luddite. He applauds the use of digital technology when properly focused. He himself lives in the heart of Silicon Valley, and, in many ways, he has been at the cutting edge of digital technology and its use in the church. He is the lead pastor of teaching at WestGate Church in the same area, and until recently was teacher-in-residence at Vintage Faith Church in Santa Cruz. He cohosts *The Regeneration Podcast*. He has a very useful website (jaykimthinks.com), and he makes himself readily available via Twitter, Instagram, and Facebook. All this is to say that Jay Kim has considerable credibility concerning the subject matter of this book. In fact, on the March 22, 2020, version of Regeneration Podcast, there is a specific commentary about the book, with some pandemic perspective as well. One of the book's phrases which is featured in the podcast discussion is "the temptation to pursue relevance at any cost." The podcast is a good resource for those considering getting the book.

ASA/CSCA members might well be wondering if the book is primarily for pastors and church leaders (which group, of course, includes a number of our members). As for those involved with the scientific endeavor, there are also some worthy considerations. This reviewer has long considered scientific activity as a form of worship, and the work of the ASA as an important ministry in itself. Many of the warnings that Jay Kim provides in his book can be easily transferred to those who share the importance of a vital science and faith relationship. In fact, it is about relationship. Digital "spectacle" may be a useful and inspiring aspect of short-term events and conferences, but the purpose of both church and our individual witness is quite different. It requires an analog approach, enhanced by a subtle and reflective use of technology which builds upon the purpose of churches and congregations, but does not replace it. In conclusion, I would recommend this book to ASA members interested in how digital technology shapes the church.

*Reviewed by Bob Geddes, a geologist and minister (retired) in the Presbyterian Church in Canada, Hamilton, ON L9A 4Y2.*

**DIVINE ACTION AND THE HUMAN MIND** by Sarah Lane Ritchie. Cambridge, UK: Cambridge University Press, 2019. 373 pages. Hardcover; \$120.00. ISBN: 9781108476515.

Imagine a medieval castle within which rests not one but two keeps. One keep is tall and strong, seemingly impenetrable. The other, short, rather shabby, and in some disrepair. For years, the inhabitants of the shabby keep have tried to communicate with the strong tower. They have built bridges, thrown ropes, shot arrows with messages, all to no avail. One day, it is discovered that both keeps rest on the same foundation, and that foundation has passageways from one tower to the other. The possibility of communication is free and open, always has been, but the blueprints were lost, so no one knew. In the discussion of science and theology, much has been made of the power and regularity of the laws of nature and the belief that the laws stand free of theological influence. The laws are the tall keep, protecting the august authority of the scientific method. Theologians often lose heart before the keep's thick walls, retreating to their rather shabby tower. Sarah Lane Ritchie argues that we are just discovering the shared foundation between the two keeps and that theology need not quake at the foot of the tall tower. There have been, all along, the resources in theology to show how the two keeps are related.

Ritchie's work focuses on the recent past, and argues for a "theological turn" in divine action theorizing. She notes the influence of the Divine Action Project (held over the course of 15 years, ending in 2003), most of whose publications found themselves searching for a "causal joint" where the power of God to act could touch the created world without interfering with the laws of nature. Theologians have been wary to question the power and correctness of the metaphysical foundations of those laws. The result manifests itself in three key beliefs: (1) noninterventionism (God doesn't or can't intervene in the working of the laws of nature); (2) incompatibilism (God and nature cannot both cause the same events); and (3) prescriptive accounts of the laws of nature. These key beliefs summarize the "standard model." Ritchie takes on the standard model through considering the work of Philip Clayton as well as the "hard problem" (of consciousness) theorists who reject the notion that mind can be reduced to nature (or at least to the material or the physical). Ultimately, she ferrets out the areas in which those in the science and religion field appeal to a nonphysical account of the human mind, where God can work without interfering with the laws of nature. Ritchie's approach is both historical and philosophical; her exegetical work is solid, showing where various theorists stand in the midst of the standard model, and how their views sometimes make unwarranted assumptions or have unwanted implications.

Her thesis is that the "theological turn" in recent accounts of God/world interaction can overcome the

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standard model, giving theology something closer to equal footing with science. There is a shared foundation. Ritchie defends the possibility of interactionism, compatibilism, and a more descriptive account of natural laws. She even proposes that the mind could be entirely natural, perhaps even purely physical, and yet fully rooted in divinity. God can interact with the natural world, not through some nonnatural causal joint but, first, because it is infused with the divine via God's immanence; second, divine and natural causation of the same events are compatible because the two sorts of events are not truly separable; and third, the laws of nature should be understood as describing what happens rather than telling us what must happen. She approaches the theological turn through contemporary Thomistic "double agent" theory, an Orthodox "incarnationalism," (Ritchie calls it a "naturalistic panentheism,") and a new emphasis on the work of the Holy Spirit in charismatic theology. In each case, but especially the latter two, Ritchie finds evidence of a broadening of the notion of what counts as natural that allows the human mind to be entirely part of the natural world, falling under natural law, and noting that the natural law is not separable (in a variety of ways, depending on which divine action theorists are considering) from divine activity.

As such, Ritchie traces out the theological turn in recent work on divine action, placing her essay in the Current Issues in Theology series, part of whose goal is to present state-of-the-art work with original insights for upper-level undergraduates and graduate students, as well as for Christian teachers and church professionals. The book certainly fulfills those goals. Ritchie deals with a mountain of research from the last 50 years, and does so with pluck, generosity of mind, and honesty. Her presentation of complex and difficult theories is clear and understandable without talking down to the audience or skimming over details.

Few books are without some problems, however. I will note what seem to me two weaknesses in an otherwise fine book. The first is Ritchie's seeming confusion of historical developments and philosophical arguments. I wondered why the mere fact that certain theories have come from the theological turn is a reason to think those theories true. While Ritchie does present a good deal of critical assessment of both the standard model and the work coming out of the theological turn (and those assessments are both balanced and fair), it was not clear to me why a person should accept the theological turn as moving us toward truth. That a proposal comes to the table in history is not a reason to believe it. That one should reject the standard model, yes. But that the alternative is right? Not so much. To be fair, Ritchie doesn't claim the latter to be true (but something closer akin to "possible"). However, there is the subtle (and sometimes not so subtle) claim that there has been this historical shift and, therefore, the new models are superior. Perhaps, however, this sort of confusion

between historical and philosophical viewpoints is difficult to avoid in a book in this series. It is a tall order to give account of new, and fairly recent, major shifts in thought, no matter how original the new paradigms may be.

The second question (and I admit to having no good solution myself) is the account of what is "natural." Ritchie is aware of the slippery nature of the term, along with its sister "supernatural." Perhaps the terms have outlived their usefulness. If there is a shared foundation between theology and science, why the separation of natural and supernatural? I was reminded of Irenaeus's work *On the Incarnation* as well as the following quotation from G. K. Chesterton:

Because children have abounding vitality, because they are in spirit fierce and free, therefore they want things repeated and unchanged. They always say, "Do it again"; and the grown-up person does it again until he is nearly dead. For grown-up people are not strong enough to exult in monotony. But perhaps God is strong enough to exult in monotony. It is possible that God says every morning, "Do it again" to the sun; and every evening, "Do it again" to the moon. It may not be automatic necessity that makes all daisies alike; it may be that God makes every daisy separately, but has never got tired of making them. It may be that He has the eternal appetite of infancy; for we have sinned and grown old, and our Father is younger than we.

Concerning Irenaeus's take on the incarnation along with Chesterton's reflection: both point to the theological turn in the science and religion field. Perhaps natural laws don't exist at all in the ways scientists and philosophers of science have generally thought of them. It is just that we have grown older than God's love of monotony. When, to spice things up, I throw a curve at my youngest child when re-reading, for the hundredth time, his favorite book, and replace a monotonous word with an alternative, laughter breaks out. The joy is present on his six-year old face. So, perhaps, with God. Perhaps the divinity reads new words into the story now and again, just to keep a smile on our faces. Perhaps the laws are not fixed "in nature" but in God's intention, and the divine is surely free to throw us a curve. The theological turn, it seems, begins to redeem the role of theology in science and religion discussions by recognizing that science is not itself divine, any more than is theology. Both are human constructs out of our experience of the natural and the mystical, and they should have something closer to an equal footing in the human intellectual project. Perhaps, indeed, the keep of theology is not merely on the same footing as the keep of science but is just as tall and strong. It may, however, take time to convince the inhabitants of both keeps to move toward a more inclusive view.

*Reviewed by Mark S. McLeod-Harrison, Emeritus Professor of Philosophy, George Fox University, Newberg, OR 97132.* ⇔

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## American Scientific Affiliation

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The American Scientific Affiliation (ASA) is a fellowship of Christians in science and related disciplines, who share a common fidelity to the Word of God and a commitment to integrity in the practice of science. Founded in 1941, the purpose of the ASA is to explore any and every area relating Christian faith and science. *Perspectives on Science and Christian Faith* is one of the means by which the results of such exploration are made known for the benefit and criticism of the Christian community and of the scientific community. The ASA Statement of Faith is at [www.asa3.org](http://www.asa3.org) → ABOUT → Statement of Faith.

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