



FiRST Principles

Journal of the Institute for Theological Encounter with Science and Technology

Faith
Reason
Science
Technology

ITEST

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Opening Message

It's a glorious June! I hope you have plenty of time to rest this Summer and read through the articles and other content we are sharing in this *FiRST Principles* issue.

I'm pleased to announce that this issue is dedicated to our long-standing ITEST member and board member Sister Carla Mae Streeter, OP, ThD. You'll have an opportunity to learn about her in the "member spotlight" section where, in a different format than recent member profiles, I had the great pleasure of interviewing her and sharing much of our discussion. Following Sister Carla Mae's great interest in the methodological and theological insights of Bernard Lonergan, we have included a piece authored by the eminent Fr. John P. Cush, who you may know from his chief editorial role at the *Homiletic and Pastoral Review* and his several books, including a forthcoming volume about Lonergan.

In this issue, we also have a book review of *The Code Breaker: Jennifer Doudna, Gene Editing, and the Future of the Human Race*. Reviewed by Mark Gatschet, JD, PhD and Ralph Olliges, MBA, PhD, this is an important biography of a Nobel Prize winner and Pontifical Academy of Sciences member whose career has touched on many of the morally debated issues associated with genetic engineering and in vitro fertilization (IVF). Gatschet and Olliges guide us through not only the book but also references and commentary about the associated moral considerations.

Then, Sebastian Mahfood, OP, PhD offers a celebratory essay anticipating our new Pope Leo XIV's wisdom regarding artificial intelligence technology (AI) and its moral and anthropological influences.

It seems to me that most of the crucial moral and scientific topics in the 21st century – including gene editing, existential angst and fascination over alien life, new ventures into the oceanic and cosmic frontiers, artificial intelligence technology, and AI-accelerated research – can be tied in some way to the fundamental question of the dignity and ethical value of human nature. Here, we will need to strain even harder to exercise capabilities of discerning fact from fiction while digging deeper and more wisely into the insights of theology and philosophy. The success of our society and of humanity as a whole may very well depend on how well technicians, researchers, theorists, philosophers, and theologians learn to generate an interdisciplinary Renaissance of human nature – this time, driven by hope more than skepticism!

Such an enterprise requires wide participation in initiatives to integrate faith and science. If you're not yet a member of ITEST, now is a great time to join us as we look to a crucial future. If you are a member already, consider becoming more involved. Reach out to ITEST Director, Dr. Sebastian Mahfood, OP at ITEST@archstl.org, and I'm sure we can find a fulfilling opportunity for you.

With great hope for our joint efforts,

Christopher Reilly, ThD, Editor, *FiRST Principles*

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Announcements

ITEST Webinars

Watch our most recent ITEST webinars on demand.

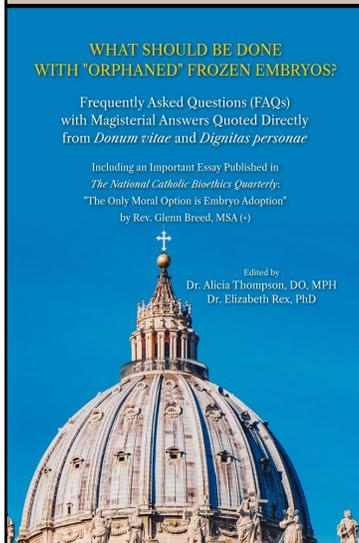
Date	Title	Presenters	Watch/Register link
02/22/25	The Anthropic Principle, “Are We Special?” Did God Make Our “Goldilocks Universe” for Man?	Robert Kurland, PhD William M. Briggs, PhD	https://faithscience.org/anthropic-principle/
04/05/25	AI and Sin: Medieval Robots and the Theology of Technology	Christopher M. Reilly, ThD Jordan Joseph Wales, PhD	https://faithscience.org/ai-and-sin/

Register now for these webinars.

06/14/25	Bioethics and AI as Human Flourishing: Where Catholic and Orthodox Social Teaching Meet in One Christian Social Ethos	Constantine Psimopoulos, PhD Fr. Michael Baggot, LC	https://faithscience.org/bioethics-and-ai/
08/30/25	The Holy See and the United Nations: The International Conference on Population and Development (Cairo, 1994) as a Case Study	Jane F. Adolphe, LLB/BCL/JCL/JCD John M. Klink, MA	https://faithscience.org/holy-see-and-un/

Watch all previously recorded ITEST webinars at www.faimscience.org/news-and-events/.

Book Recommendation



What Should Be Done with “Orphaned” Frozen Embryos? Frequently Asked Questions (FAQs) with Magisterial Answers Quoted Directly from *Donum Vitae* and *Dignitas Personae*

By Dr. Alicia Thompson and Dr. Elizabeth B. Rex

Written in clear language, this book meets an urgent need for an easy-to-understand guide that reflects the Catholic Church’s ethical principles as detailed in *Donum vitae* (1987) and *Dignitas personae* (2008), answering frequently asked questions and demystifying bioethical complexities for those affected by infertility. By offering practical answers and thoughtful insights, this book empowers families to navigate the ethical challenges of assisted reproduction with faith and hope.

Learn more at <https://enroutebooksandmedia.com/orphanedfrozenembryos/>.

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Member Spotlight

Sister Carla Mae Streeter, OP, ThD

Interview by Chris Reilly

“The story is utterly ludicrous, Chris. If you don’t think God has a sense of humor, that will change your mind.” So began a fascinating and wide-ranging conversation on March 18, 2025, with recently retired ITEST board member Sister Carla Mae Streeter. She was referring in this comment to her unexpected decision to join the Dominican order when a young woman.



Order of Preachers and “could not speak.”

Anyone who has known Sister Carla Mae over her time as a religious education professional, her 38 years as an Aquinas Institute professor, and her public teaching as an author of several books is aware that she has great proficiency in communicating. How did this happen? She explained that one day, a priest visited Racine and pleaded for sisters to assist in

That decision was not an obvious one. As a child, Sister Carla Mae had developed a strong introversion and fear of speaking publicly, instigated by her experience with convulsions and their remedy – a shocking immersion in cold water. She explained that “I could not even stand up in class, in grade school, and give a report on geography. I would be panic-stricken because I was so fearful of anything.” This, of course, suppressed any desire to become a teacher like the Notre Dame sisters she interacted with.

Nevertheless, Sister Carla Mae “knew from Confirmation that I wanted to seek God in a very exclusive way in my life.” It became clear in our conversation that the Holy Spirit was working through her. For example, she would stop in church to pray, “to learn what this meant, to try and give my life to God.” She found a pamphlet in the Lost and Found area, “and the pamphlet had all curly edges. It was obviously pretty old. And it had sisters dressed in white.” Those sisters turned out to be Dominicans, and Sister Carla Mae found herself joining the Racine Dominicans following a wonder-driven visit and her parents’ serendipitous reunion with sisters who had taught them in school.

But there’s more to the story. “When I went to the pamphlet, Chris, there was a picture of a sister in the chicken coop. And I took one look at that, and I said, that’s what I can do. I can take care of those chickens, and I don’t have to talk to anybody.” Sister Carla Mae is well aware of the irony. “I joined the Dominicans to take care of chickens.” She had joined the

educating students at a new school in East Troy, Wisconsin. Sister Carla Mae was too young to assist but distressed by the need. “Anger doesn’t exist well with fear, right? The energy converts.” The next day, her English teacher instructed her class to prepare a mock interview with a famous person over the weekend. Sister Carla Mae paired with a friend, “and we cooked up a slapstick routine that sent the entire class just about rolling in the aisle. I think most of it was because they had never heard me say peep.” In her later years, she has developed a freedom from her “constriction,” and she is often “bursting to say something if someone would just ask me.”

She added, “We could use more teachers who are bursting to share what they know.” We also need preachers for whom, unlike teachers, the emphasis isn’t on ordered information but conversion. “And so, you give just enough information to trigger that, but you are really after a relationship to be fostered. You’re a matchmaker.” The mind and the heart need to work together. “Rational intelligence and emotional intelligence, when they are married, when you’ve got the two hands clapping, that forms a good preacher.”

This topic led naturally to a discussion about philosopher and theologian Bernard Lonergan, who has a special place in Sister Carla Mae’s scholarship and interests. “I would call Lonergan an Aquinas scholar in a new key. What Lonergan does through consciousness analysis, through interiority analysis of the

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human consciousness, is to give Thomas a psychological methodology that speaks to today's science." Originally an economist by trade, Lonergan applies the scientific method to the study of theology. He is fascinated by St. Thomas Aquinas' assertion that intelligence can be known only in its act (*Summa Theologica* I, Q.85). "What Lonergan is interested in is dynamism, in flow," the process of moving through understanding into judgment to arrive at knowledge. "And so, the elements of the phantasm come together, and they keep questioning and questioning until the weaving goes on and finally the light bulb goes on." But then the thinker/researcher needs to ask even more questions. "When the *questio* is quiet, probably because of limited data, then you reach a tentative judgment and it's always tentative. Why? For us, because we're not God, and we always can get more data."

There's more to Lonergan's process. "You have to ask a question of value. In other words, not what is it [the thing or alternative you are evaluating], but what's it worth to you? And it's only when you ask a question of value that you get off your fanny and do something." Religious love is also essential to cognition, "and when it's permeated by religious love, it's like a room fills with lavender. It's like the whole cognitional process just absolutely glows." This applies especially to the goal of preaching: "You have a person be absolutely captivated by Christ, you know, who's the bridegroom." The theological virtues of faith, hope, and charity are like an electrical socket. "Like when you plug something in a three-pronged socket, you're grounded, and the current is special," for faith is a gift of the Word, and hope is a gift of the Father. "Charity is the Spirit's flooding," and when connected with the human consciousness, "it's electrified. The person is electrified by the Divine."

It is this sensibility that led Sister Carla Mae to ITEST. With an educational background in music, "what led me to ITEST is really education. The conviction that we have to bridge." Persons absorbed in

fascination with scientific discoveries often "fall off the bike," losing their religious belief out of a kind of "shock" that indicates a supposed divide between the worlds of science and faith. She said, "I sensed that Teilhard de Chardin was a bridge between what I had been taught in the novitiate and what was exploding in the media, that we had to have a discernment process." Sister Carla Mae often discussed with ITEST founder, Fr. Robert Brungs, SJ, the need for leading people through that process, "how they could just have their faith open like a peony, open like a flower from a bud, where they would be delighted in their faith, and what possibility it brought them, rather than fear, a fear-laden Catholicity."

Sister Carla Mae advised the members of ITEST to keep questioning positions on difficult topics like artificial intelligence or LGBTQ concerns. "What's your foundation for that position or that opinion? Have you checked the data on both sides? What's going on?"

To that end, she is hoping to tackle, in the near future, some emotionally charged questions about the role of women in the Church. The answer is not for women to strive to be the same as men. "The unaddressed elephant in the room is what is the unique gift of the feminine consciousness to both culture and the church?" She is looking forward to writing about the wisdom of Teilhard de Chardin and Edith Stein on this question.

We at ITEST are very grateful to Sister Carla Mae Streeter for her decades of Board service and companionship as a member of ITEST. (She will continue to be a member.) We are grateful for that moment when she embraced the urging of the Holy Spirit to join the Order of Preachers and share her talents and scholarship with us.

As she told me, "It was my coming out party, Chris. And nobody has been able to shut me up."

We hope they never do. ■

In Memoriam

We ask your prayers for the following ITEST member who recently died and entered Eternal Life.

Peter Redpath, PhD April 13, 2025

We also ask your prayers for ITEST members who are ill. May they feel the restoring hand of the Lord.

We welcome your feedback regarding this issue of *FiRST Principles* or any ITEST activity. Write a letter to the editor at ITEST@archstl.org or mail to:

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Novum Organon

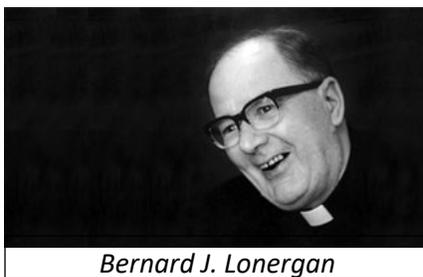
by Reverend John P. Cush, STD

An abridged version of the essay published on November 28, 2018

University of Notre Dame, *Church Life Journal*

<https://churchlifejournal.nd.edu/articles/lonergans-communal-novum-organon/>

For a certain generation of those who studied theology, Bernard Lonergan's *Method in Theology* (1972) was a book that was constantly referenced. Yet for some, Lonergan is not sufficiently radical enough, considered too indebted to Tradition. To others, his thought is considered not sufficiently Thomistic, far too eclectic. And still, there are others who point to him as the one providing the blueprint for the philosophy behind a relativistic theology of pluralism with his development of the concept of historical consciousness. I have been questioned continually, in some circles, if Lonergan has really anything to offer in an all-too-fractured theological world. My response to those who want to know specifically what Lonergan can offer theology today is to examine *Method in Theology*. For me, it is his most significant work.



Bernard J. Lonergan

Method in Theology

Lonergan's *Method in Theology* (1972) grows out of his previous accomplishment in *Insight: A Study in Human Understanding*. It is a work, according to Charles C. Hefling, Jr., that "...is a lifetime's patient reflection on what theologians do, can do, and ought to do." *Method in Theology* is described, along with *Insight*, by Frederick Crowe as Lonergan's *novum organon*. What Crowe means by the term, *organon* comes from Greek antecedents, and, in his lectures on the importance of Lonergan's contribution, he builds on the importance of *organon* according to both Aristotle and Francis Bacon. Crowe describes *organon* in the following manner:

At certain momentous points in history, the term "organon" has been used to designate an instrument of mind: not an instrument of the hand, like a hammer or nutmeg grater, or even so precious an instrument as a Stradivarius violin, but rather a developed talent of an incarnate subject a way of structuring our conscious activities, that has been of immense importance for the human race.

Francis Bacon develops the Aristotelian concept of *organon* further as "a new set of philosophical tools." Above all, this *novum organon* is not just conceptual for Lonergan and has an absolutely practical role in the future of theology. Crowe writes:

[W]hatever else his lifework may be, however penetrating his analyses and however impressive his ideas, his thought is ultimately orientated to the practical and is programmatic for the future. He has provided us with the instrument that is to be used, not just contemplated, and the real Lonergan of history is not so much the Lonergan studied and analyzed, discussed and debated, located and evaluated, but the Lonergan whose achievement is still to be applied to the urgent tasks of the new age that we are facing.

In the creation of an *organon* for the study of theology in his age, Crowe posits that "...Lonergan, like Bacon, has very clearly seen that the need of the times is not so much for a new set of answers to the problems of the day, as it is or a whole new beginning."

Method in Theology: Key Advances over Insight

Without a doubt, *Method in Theology* is not a beginner's guide to theology. Acknowledging the limited appeal of such a book for non-specialists in theology, Crowe explains: "To make the point by negation, *Method in Theology* is not a record of Christian living, or a manual of Christian piety, or a set of instructions on Christian doctrine and practise, or a book of poetry, songs, and praises celebrating the Christian experience. It is a specialized contribution and deals with theological specialization."

The structure of the book itself is rather simple. Divided into two parts, Lonergan entitles Part 1 as "Background," and it consists of five chapters. Each of these chapters is devoted to questions of theological foundations, including "Method," "The Human Good," "Meaning," "Religion," and "Functional Specialties." Part 2 is entitled "Foreground" and directly discusses each of Lonergan's eight functional specialties.

Functional Specialties

In order to grasp the concept of the functional specialties, it is necessary to understand exactly how Lonergan came to the full realization of the functional specialties. Frederick Crowe describes the year 1957 as a key moment in Lonergan's theological development. While a professor of dogmatic theology at the Pontifical Gregorian University, Lonergan for his

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Class on the Trinity began to supplement his notes with a section on theological method. In his study on the development of doctrine, Lonergan, aware of the oft-times “awkward” nature of this analysis, began to use modern historical research methods. Describing the situation in which Lonergan found himself, Crowe writes: “The fit is awkward...without full recognition of the role of history as a factor prior to analysis.” The areas to which Lonergan specifically applied historical research included both Christology and Trinity, namely the developing understanding of the Person and natures of Christ from Sacred Scripture and within Sacred Tradition and the development of systematic theology in medieval scholasticism.

Using ideas coming to him from his study of Wilhelm Dilthey, Lonergan made a shift in his class presentation from the predominance of analysis and synthesis to a growing appreciation of the historical. Coming from Dilthey’s notion that one who interprets history has the desire to influence the present, Lonergan realized that, for the historian (and in his own thought), self-authenticity is essential.

Coming from Dilthey’s notion that one who interprets history has the desire to influence the present, Lonergan realized that, for the historian (and in his own thought), self-authenticity is essential.

No less than the individual interpreter does the community in which the interpreter lives have to be authentic. With reference to Lonergan’s “transcendental precepts,” Gregson notes: “It is very difficult, if not close to impossible, to personally Be attentive, Be intelligent, Be reasonable, Be responsible, when the community that one is a part of consistently violates any or all of them...The achievement of truth and value, then, is not only a personal but a communal achievement.”

The Need for Functional Specialties

The need to have functional specialization is due to the fact that theology today is far too complex, too extensive, for one theologian to perform all the needed tasks well. A collaborative effort is needed. Lonergan, in *Method in Theology*, explains his idea of the functional specialties by clarifying that it is not what is meant by modern academia’s field and subject specialization. He uses Husserl’s thought, describing field specialization as a way in which experts are constantly “dividing and subdividing the field of data to

be studied,” and department and subject specialization as that which “classifies the result of the investigation.” Crowe defines field specialization as that “... which marks off an area by using a kind of material principle of division.”

Lonergan writes: “...functional specialization distinguishes and separates successive stages in the process of data to results.” In subject specialization, however, areas are delineated by a more formal principle. Crowe notes that: “This kind of specialization is more open in principle to some conceptual unity, though that very phrase suggests that any unity achieved would be rather abstract.” Crowe warns, however: “Besides, such a unifying principle is not apt to be widely accepted. For in subject specialization especially, the theological empires emerge, take shape, grow to power, and set forth on their imperial march to manifest destiny: hegemony over all lesser kingdoms.”

These two types of specialization are distinct in the fact that the former looks to the data collected and the latter looks to the results of that data. Breaking this distinction down further, Crowe explains Lonergan’s third option: examining the process itself from the data result and from there further distinguishes the functions which one moves from data to result. Noting that these functions are grounded in the dynamic operations of a consciously operating subject, one can then “anchor it (the functions) on firm ground and allow it to develop spontaneously from a naturally given base.”

With this in mind, Crowe notes that, for *Method in Theology*, “(T)he focus is on the *functions* of theology, rather than divisions in the material object or the formal object.” There is a two-phase reality in this project for Lonergan: a mediated phase and a mediating phase. The mediated phase focuses on *retrieving* on what past theologians have formulated within their own theological disciplines; the mediating phase is focused on *communicating* and *articulating* the data results from the past in a current cultural context. Thus, Lonergan’s definition of theology is concretely manifested in these two phases of theology: “A theology mediates between a cultural matrix and the significance and role of a religion in that matrix.”

It is essential to realize that, with these distinctions, Lonergan is calling for a tremendous interdisciplinary effort. It is also essential to recall that the theologian is not a neutral observer in this effort. He or she must be an involved participant who bears the weight of a tremendous responsibility.

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Explanation of the Functional Specialties

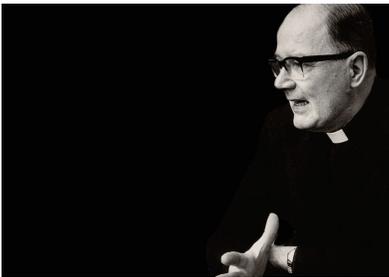
Each of the two phases of theology has four, distinct functional specialties. This is related to the act that intentional consciousness has four distinct levels.

Lonergan writes:

The proper achievement and end of the first level, experiencing, is the apprehension of data; that of the second level, understanding is insight into the apprehended data; that of the third level, judgment, is the acceptance or rejection of the hypothesis and theories out forward by understanding to account for the data; that of the fourth level, decision, the acknowledgment of values and the selection of the methods or other means that lead to their realization.

Lonergan acknowledges that each of the first four functional specialties is analogous to a level of consciousness. They are a specific implementation of each level of consciousness and build upon one another. Describing the first phase of theology and relating each phase to a level of consciousness, Lonergan writes:

In assimilating the past, first, there is research that uncovers and makes available the data, secondly, there is interpretation that understands their meaning, thirdly there is history that judges and narrates what occurred and, fourthly, there is a dialectic that endeavors to unravel the conflicts concerning values, facts, meanings, and experiences.



Also in correspondence to each functional specialty is one of the four levels of conscious intentionality.

Thus, one may say research (the first functional specialty) is related to experi-

ence (the first level of consciousness) and the precept: “Be attentive!”; interpretation (the second functional specialty) is related to understanding (the second level of consciousness) and the precept: “Be intelligent!”; history (the third functional specialty) is related to judging (the third level of consciousness) and the precept “Be reasonable!”; and dialectic (the fourth functional specialty) is related to deciding (the fourth level of consciousness) and the precept “Be responsible”. These four tasks, as mentioned, ultimately are all about retrieving the data of the past. Gregson, in his interpretation, gives a masterful, practical application of this analogous relationship:

The first four tasks principally concern the retrieval of the past: gathering ancient artifacts and texts

(Research); discovering the meaning of what one has gathered (Interpretation); constructing a history of the time (History); and evaluating the significance of what one has arrived at in the first three levels (Dialectic). The relationship of these four operations to the levels of consciousness should be relatively clear. The goal of Research is data gathering or Experiencing. The goal of Interpretation is Understanding. The goal of History is arriving at what really happened in the past, which is an exercise in Judging. And the goal of Dialectic is considering the significance of what the past had to offer and determining when there are conflicting views of the significance of the past, which is the most accurate and valuable; this is an exercise of Deciding. Although the goal of each of the specialties is one of the levels of consciousness, in fact, all of the levels are used in each specialty. For instance, the researcher must use his or her understanding, judgment, and decision to arrive at the goal of Research, establishing accurate data.

In the second phase of theology, each functional specialty is also in analogy to a level of consciousness, albeit in a reversed order. Foundations (the fifth functional specialty) corresponds to deciding (the fourth level of consciousness) and the precept: “Be responsible!”; doctrines (the sixth functional specialty) corresponds to judging (the third level of consciousness) and the precept: “Be reasonable!”; systematics (the seventh functional specialty) corresponds to understanding (the second level of consciousness) and the precept: “Be intelligent!”; and finally, communications (the eighth functional specialty) corresponds to experience (the first level of consciousness) and the precept: “Be attentive!”.

Vernon Gregson gives his interpretation of the second four functional specialties by stating:

The second four specialties principally concern the present and the future. They involve reaping the fruits from the study of the past to create the present and the future. “Foundations” is articulating the change that has taken place in oneself or in one’s community as a result of seriously confronting the values of the past. “Doctrines” is affirming the values one has discovered. “Systematics” is relating and integrating (making systematic) the values one is now affirming with one another and with the other values and meanings in one’s life. “Communications” is passing on what one has arrived at, and what one values, to others.

Lonergan himself offers a synthetic statement of explanation for his functional specialties. He states:

...experience, insights, judgments of fact, and judgment of value: (i) So research is concerned to make the data available. (ii) Interpretation to determine their meaning. (iii) History to proceed from meaning to what was going forward. (iv) Dialectic to go to the roots of conflict-

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ing histories, interpretations, researches. (v) Foundations to distinguish positions from counter-positions. (vi) Doctrines to use foundations as a criterion for deciding between the alternatives offered by dialectic, (vii) Systematics to seek an understanding of the realities affirmed in doctrines.

The Functional Specialties and the Task of Theology

These eight functional specialties are not separated and unrelated, but are in fact, intrinsically and functionally interdependent. In the estimation of Raymond Lafontaine, “This helps to preserve a necessary *unity* to the theological task, which is often compromised by the endless divisions of field and subject specialization. It also helps to ground authentic theological collaboration; the unique contribution of each specialty is vitally important, if one is to grasp the full import of a theological question.”

The division of each of the tasks of theology into the functional specialties is key for four reasons. First, it is more than a matter of simply saying that the matter is too broad and extensive for a single “professor” to teach. Lonergan states “...functional specialization is essentially not a distinction of specialists but a distinction of specialties. It is done so as to “distinguish different tasks and to prevent them from being confused.” He further writes: “Different ends are pursued by employing different means, different means are used in different manners different manners are ruled by different methodical precepts.”

Second, each of the eight tasks has eight different ends and thus possesses eight different sets of methodological tasks to be distinguished. It allows the theologian to have clear and realistic goals for each step in his or her study. Third, Lonergan states “...the distinction and division are needed to curb one-sided totalitarian ambitions.” Each of the eight functional specialties is needed and each has its own “proper excellence.” He reminds theologians that theology suffers when one of the functional specialties is neglected in favor of another, citing the Middle Ages as an example of this one-sidedness in theological studies. Fourth, the functional specialties are divided and distinguished so as to resist “excessive demands.” No one thinker, no one text, can address every single demand and answer every single question exhaustively.

Lonergan feels that the distinctions of the functional specialties can serve two purposes. The first, a major part, is “to produce the type of evidence proper to the specialty.” He gives the example of the biblical exegete doing exegesis; the historian doing historical research based on historical principles, and so on. The second, a minor part, is that each of the specialties is

related to one another functionally.

As important as it is to understand the divisions implied in the functional specialties, it is also important to understand the unity and the fact that “none can stand without the other seven.” In order to establish a sure and certain base, each of the steps must be attended to and none can be bypassed. Lafontaine puts it well when he states that “(T)he ultimate goal of the functional specialties is not to divide and conquer, but to celebrate unity in an interdependent diversity, for the sake of the coherent development of the Church’s tradition and for the credibility of the Church’s mission in the world...”

Vernon Gregson points out that the eight functional specialties are basically answers to eight basic questions. For research, the question is “What are the relevant data?” For interpretation, “What is the meaning of the data?” For history, “What does it tell us (verify) about its time? For dialectic, “What value(s) does it reveal? For foundations, “Where do I stand with regard to its value(s)? For doctrines, “What will I affirm about its value(s)? For systematics, “How does this relate to my own or my community’s other values?” For communication, “What and how will I communicate this to others?”

The Challenge of the Functional Specialties for the Theologian

These functional specialties of Lonergan present a challenge to the theologian. It is a call that Lonergan first issued in *Insight*: “Knowing is not mere looking – it is a carefully experiencing, understanding and judging.” The true task for the theologian is not to simply retrieve the past theological tradition. He or she must then also be certain to be open to using that data retrieved for present challenges and for future possibilities.

It is a call that Lonergan first issued in *Insight*: “Knowing is not mere looking – it is a carefully experiencing, understanding and judging.”

Another challenge for the theologian is “to disregard the first five functional specialties and to begin with Doctrines and to pass on the Doctrines of the Church (es) from generation to generation without the challenge that comes from renewing again, in each generation of laity and clergy, direct contact with the original sources which gave rise to the Doctrines.” It is

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noted that this is a particular challenge for those who serve as religious leaders within a particular community. “[I]n the present state of historical awareness, the attempt to pass on the tradition without the critical study of the originating texts of the traditions cannot help but give rise to the suspicion of defensiveness, or of laziness, or even of bad faith.”

The theologian cannot be merely the mouthpiece of an established set of doctrines of a particular denomination of faith. The challenge is always present to broaden one’s horizon, to go deeper, to ultimately move from the first theological specialty, Research, through all the functional specialties, to the final theological specialty, Communications, the end point of all evangelization.

In scholastic theology, “methodical questions were raised and methodological discoveries made, still their properly methodological aspect was not explicated.” Theology and theological method develops in historical circumstances – the Fathers of the Church were attempting to address individual theological questions that arose when the Church had the leisure (more or less) to actually ponder issues like the hypostatic union. The Scholastic doctors were trying to create a worldview to handle all possible theological questions. Manualism, in its conceptualistic manner, developed out of an overuse of a deductive method, a “one size fits all” approach to theology. Therefore, in order to deal with this particular issue in the theology of grace, Lonergan studies what Aquinas actually wrote, rather than what others have written about what he wrote or what others have interpreted what he wrote. Aquinas moves from data to theory to resolution of the theological question. Lonergan writes:

There is a disinterestedness and an objectivity that comes only from aiming excessively high and far, that leaves one free to take each issue on its merits, to proceed by intrinsic analysis instead of piling up a debater’s points, to seek no greater achievement than the inspiration of the moment warrants, to wait with serenity for the coherence of truth itself to bring to light the underlying harmony of the manifold whose parts successively engage one’s attention. Spontaneously such thought moves towards synthesis, not so much by any single master stroke as by the unnumbered succession of the adaptations that spring continuously from intellectual vitality...

Therefore, it is essential to understand the cognitive theory, which ultimately informs the theological method used to investigate the issue of particular issue of the theology of grace, both in Aquinas and in Lonergan.

Lonergan’s functional specialty of research into the issue led him to the second functional specialty of interpretation. In many ways, Lonergan’s approach to the questions of *Gratia operans*, moves from each function specialty, in the sense that he is attempting to retrieve the past while simultaneously moving into the future. Ultimately, it is more essential for this study to retrieve a proper theological method before tackling the specific question itself. “(T)he content of speculative theology is the content of pure form. It is not something by itself but the intelligible arrangement of something else. It is not systematic theology but the system in theology.”

Lafontaine writes: “Theology invites - indeed, it demands of the theologian- personal engagement, an explicit decision to “take sides”, to commit to a personal journey of faith, and (within Christian theology) to ecclesial belonging, to association with a specific religious tradition.” Lonergan describes the decision of the theologian in the following manner:

It is a decision about whom and what you are for, and again, whom and what you are against. It is a decision illuminated by the manifold possibilities exhibited in dialectic. It is a fully conscious decision about one’s horizon, one’s outlook, and one’s worldview. It deliberately selects the framework in which doctrines have their meaning, in which systematics reconciles, in which communications are effective.

The theologian’s objectivity comes from his authentic subjectivity, and it entails “a total surrender to the demands of the human spirit: be attentive, be intelligent, be reasonable, be responsible, *be in love*.”

For the theologian, it is “not a set of propositions that a theologian utters, but a fundamental and momentous change in the human reality that a theologian is.” The theologian’s objectivity comes from his authentic subjectivity, and it entails “a total surrender to the demands of the human spirit: be attentive, be intelligent, be reasonable, be responsible, *be in love*. (emphasis mine)” It is precisely this aspect, of being in love, that is the role of the theologian. Theology comes out of religious experience and, from the reflection on that experience, the theologian’s understanding, judgments, and decisions follow. The functional specialties assist the theologian to articulate religious experience for himself or herself and for his or her ecclesial community. ■

Endnotes

1. Charles C. Hefling, Jr., "Introduction," in Frederick E. Crowe's *The Lonergan Enterprise* (USA: Cowley Publications, 1980), xiii.
2. Frederick E. Crowe, "An Organon for our Time," in *The Lonergan Enterprise* (USA: Cowley Publication, 1980), 6.
3. *Ibid.*, 7.
4. Gerard Whelan, *Redeeming History: Social Concern in Bernard Lonergan and Robert Doran*, (Rome: Gregorian and Biblical Press, 2013), 9. Whelan notes in his footnote 3, page 9 that "...Lonergan more or less accepts the categorization of *Insight and Method in Theology* as a *novum organum* in an interview he gave, *Caring About Meaning: Patterns in the Life of Bernard Lonergan* (Montreal: Thomas More Institute, 1982), 119-120."
5. Crowe, 6.
6. *Ibid.*, 14.
7. *Ibid.*, 24.
8. Whelan, *Redeeming History*, 143.
9. This is found present in Lonergan's notes and is titled "*Divinarum personarum conceptionem analogicam evolvit Bernardus Lonergan SJ.*" (See Whelan, *Redeeming History*, 134 and Frederick Crowe, *Lonergan* (Collegeville, MN: The Liturgical Press, 1992), 86.
10. Whelan, *Redeeming History*, 134.
11. Crowe, *Lonergan*, 84.
12. *Ibid.*, 87-88.
13. Gerard Whelan notes the growing influence of Dilthey on Lonergan's methodological thinking. He states: "Like Dilthey, Lonergan's study of concrete historical developments begin to help him think more widely on questions of how what Crowe calls 'history as written' must be related to an interest in influencing ones (sic) own, current society, i.e., 'history as written about.'" (Whelan, *RH*, 135, footnote 15)
14. This shift in Lonergan's teaching in 1959 is apparent in his notes for his graduate class, *De intellectu et methodo*, which was later published as "Method in Catholic theology," collected in Lonergan, *Philosophical and Theological Papers*, 1958-1964, CWL 6 (Toronto: University of Toronto Press, 1996): 29-53. See Whelan, *RH*, 135 and Crowe, *Lonergan*, 90-91.
15. Whelan notes that, during this time period when Lonergan is also developing his concept of religious conversion, which fulfills his already established thought on intellectual conversion and moral conversion. (See Whelan, *RH*, 136.)
16. Vernon Gregson, "Theological Method and Theological Collaboration I," in *The Desires of the Human Heart: An Introduction to the Theology of Bernard Lonergan*, edited by Vernon Gregson, (Mahwah, NY: Paulist Press, 1988), 74.
17. Bernard Lonergan, *Method in Theology* (New York: Seabury Press, 1972), 125-126.
18. Crowe, "An Organon for our Time," 24.
19. Lonergan, 126.
20. Crowe, "An Organon for our Time," 24.
21. *Ibid.*, 24.
22. *Ibid.*, 25.
23. *Ibid.*
24. Lonergan, ix.
25. Lonergan, 133.
26. Gregson, 75.
27. Lonergan, 134.
28. Gregson, 76.
29. *Ibid.*, 77.
30. Lonergan, 349.
31. Raymond LaFontaine, *The Development of a Moral Doctrine: Religious Liberty and Doctrinal Development in the Works of John Henry Newman and John Courtney Murray*, Excerpta ex Dissertatione ad Doctoratum in Facultate Theologiae Pontificae Universitatis Gregorianae, Romae (2001), 44-45.
32. Lonergan, 136.
33. *Ibid.*, 136-137.
34. *Ibid.*, 137.
35. *Ibid.*
36. *Ibid.*
37. Gregson, 77. Gregson continues, giving a practical example: "To build one's Foundations on what one would like the past to have been, or on what the past at first sight might seem to have been, is to build on a shaky foundation indeed. One of the reasons for the development of Scripture studies in the last hundred years is the recognition that a first reading of a text written almost two thousand years ago in a very different culture and in another language and with a community facing far-different problems is not going to reveal its meaning without careful and thorough study. The last four functional specialties depend on the first, therefore, for the integrity and richness. But the first four specialties are barren for the present and the future unless the further questions of the last four specialties are also attended to. *To know the past but not to bring its values into the future is a great waste of one's time and effort.* (emphasis mine)"
38. Lafontaine, 48.
39. Gregson, 80.
40. Gregson, 79.
41. *Ibid.*
42. *Ibid.*
43. David Tracy, *The Achievement of Bernard Lonergan* (New York: Herder and Herder, 1970), 37.
44. Lonergan, "Gratias Operans IV," *Theological Studies* 3 (1942): 573-574, quoted in Tracy, 39.
45. Lonergan, as quoted in Tracy, 42.
46. Lafontaine, 49.
47. Lonergan, *Method in Theology*, 268.
48. *Ibid.*, 270.
49. *Ibid.*, 269.
50. Lafontaine, 49.

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A book review by Mark Gatschet, JD, PhD and Ralph Olliges, MBA, PhD

The Code Breaker: Jennifer Doudna, Gene Editing, and the Future of the Human Race

by Walter Isaacson

In this 2021 biography of Nobel-Prize recipient Jennifer Doudna, author Walter Isaacson creatively uses the initial public anxiety prevalent during the COVID-19 pandemic as a backdrop to highlight the development by Doudna and her colleagues of CRISPR/Cas9 (“clustered regularly interspaced short palindromic repeats”/“CRISPR-associated protein 9”) gene editing tools – particularly in view of the promising usefulness of these tools for understanding and combatting the spread of the SARS-CoV-2 virus. While Isaacson’s use of the pandemic as a literary stagecraft piece likely would no longer be effective in spurring readership for the book, his biography of Doudna remains a largely well-researched and engaging one.

Isaacson also helpfully emphasizes the pressing need for developing a consensus among professionals (and, ostensibly, also among biohackers) on parameters for the ethical use of gene editing tools.¹ Of relevance to our review of Isaacson’s book is that he only briefly presents moral qualms in society about the use of *in vitro* fertilization (IVF), and then presents these concerns as being concerns of simply years past (*e.g.*, of the years surrounding 1978, when Louise Brown, the world’s first “test tube baby” was born).² But the use of CRISPR-based systems for heritable human genome editing can be considered, at least for all practical purposes at this time, as requiring the use of IVF techniques, and these techniques are unacceptable in the view of faithful Catholic bioethics.³ In addition, data of the *Saint Pope Paul VI Institute* support the position that IVF techniques are, on average, often both more expensive and less effective than morally acceptable alternatives, such as NaProTechnology® treatments.⁴ Unfortunately, the lack of a thorough discussion in *The Code Breaker* of IVF techniques as at least potentially being morally problematic likely does not reflect an oversight in the book, but rather simply reflects the current status of our culture, *i.e.*, one that has apparently embraced IVF without appreciating its many detrimental aspects.

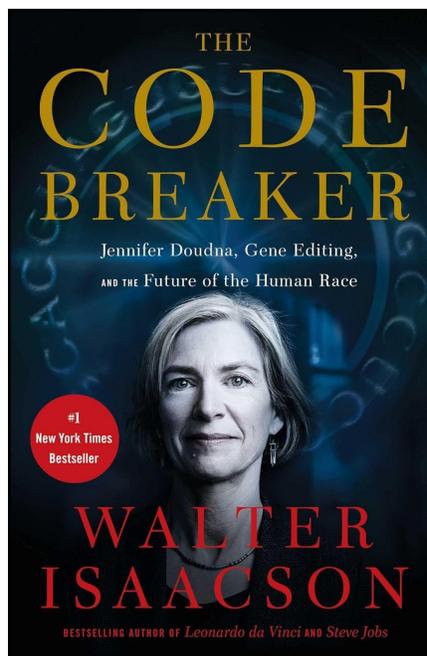
Breaking the Code of the Chemistry of Life

In 1962, James Watson, Francis Crick, and Maurice Wilkins were awarded the Nobel Prize in Physiology or Medicine for their discovery of the double-helix structure of DNA. A crucial feature of the DNA double-helix structure is that the two strands of the helix are held together not by covalent bonds (the stronger bonds formed by atoms sharing electrons), but by weaker hydrogen bonds formed just by electric charge attraction between atoms. This arrangement permits the DNA strands to be unzipped, copied, and then zipped together again in sequence-specific pairing arrangements. That is, the hydrogen-bond-facilitated unzipping, and the subsequent annealing, of the two strands allows for nucleotide sequence-preserved copying and permits DNA to function, across the biosphere, as the principal molecule for conveying hereditary information – both at a cell-division level within an organism and at the level of organismal propagation across generations. Or, as Watson and Crick modestly write in a single-sentence paragraph in their landmark 1953 paper on the double-helix structure of DNA: “*It has not escaped our notice that the specific pairing we*

have postulated immediately suggests a possible copying mechanism for the genetic material.”⁵

Watson’s subsequent autobiographical book, *The Double Helix: A Personal Account of the Discovery of the Structure of DNA* (1968), proved to be extremely popular. While Jennifer Doudna was in the sixth grade, her father gently prompted her to read Watson’s book. The book profoundly influenced Doudna in her decision as a young woman to pursue a career studying the chemistry of life.

The molecule at the center of Doudna’s outstanding career in life-science research eventually came to be not DNA (deoxyribonucleic acid), but its close relative, RNA (ribonucleic acid). It was through studying



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the properties of RNA molecules and their hydrogen-bond-mediated interactions with each other and with DNA molecules that Doudna and her colleagues – as well as competitor scientists, aptly described by Isaacson as being inclined to be affable, or more distant, toward Doudna – developed breakthrough molecular tools to cleave or to modify, with precision, the nucleotide base sequence (*i.e.*, the genetic information) of DNA molecules. Using these tools, it was now possible to bring about, with much greater ease than had been possible before, precise modifications to genetic material in not only multi-well plates containing solutions devoid of living cells, but also to genetic material *in vivo*, *i.e.*, within living cells. That is, these tools now could be used to edit with precision the code of life within intact living cells.

In 2020, Jennifer Doudna and Emmanuelle Charpentier were awarded the Nobel Prize in Chemistry “for the development of a method for genome editing.” In *The Code Breaker*, Isaacson crafts a fascinating biography of Doudna, from her upbringing in Hilo, Hawaii, to her undergraduate studies in biochemistry at Pomona College, to her graduate studies in RNA molecular biology at Harvard Medical School, to her postdoctoral work in RNA crystallography at the University of Colorado, through to her stellar career as a professor, first at Yale and later in the Department of Molecular and Cell Biology at the University of California - Berkeley.

Isaacson also crafts insightful and largely laudatory expositions or vignettes of many other key players in the development of CRISPR-based gene editing, including of Doudna’s colleague and fellow Nobel-Prize laureate Emmanuelle Charpentier of the University of Vienna (Austria) and Umeå University (Sweden), as well as Doudna’s competitors, including George Church of Harvard and Feng Zhang of the Broad Institute of MIT. Isaacson is possibly at his best in presenting sketches of the personalities of colleagues and competitors of Doudna, as well as of the idiosyncratic characteristics of various foundational contributors associated with this breakthrough technology, such as, in a somewhat conflicted light, the elderly Watson.

Given Isaacson’s record for crafting generally well-researched and engaging biographies on major contributors to science and technology – such as the biographies *Benjamin Franklin: An American Life* (2003), *Einstein: His Life and Universe* (2007), *Steve Jobs* (2011), *Leonardo da Vinci* (2017), and, most

recently, *Elon Musk* (2023), it is not surprising that Isaacson continues largely to exhibit these writing characteristics in *The Code Breaker*. The SIMON & SCHUSTER hardback edition further provides readers with a thoroughly detailed index, as well as with on-point photos and diagrams that helpfully supplement Isaacson’s skillfully written text, especially for those readers not familiar with molecular aspects of the life sciences.

Gene Editing

While at Yale, Doudna addressed a television crew eager to report on a newly published paper by her team that detailed the three-dimensional structure of a ribozyme (in this case, a self-splicing RNA molecule). Doudna presciently told the television crew “*We hope our discovery will provide some clues as to how we might be able to modify the ribozyme so that it can repair defective genes.*” Isaacson then comments, “*It was a momentous statement [...] the beginning of a quest to translate basic science about RNA into a tool that could edit genes.*”⁶

“It was a momentous statement
[...] the beginning of a quest to
translate basic science about RNA
into a tool that could edit genes.”

— Jennifer Doudna

Gene editing may be viewed as a multi-step advance from the recombinant DNA technologies that Paul Berg, Herbert W. Boyer, and Stanley N. Cohen developed in the early 1970s. Early in this current millennium, methods of gene editing (or genome editing more generally) were developed that made use of DNA-binding protein nucleases, such as zinc finger nucleases (ZFNs; early 2000s), or TALN nucleases (or TALENs “transcription activator-like effector nucleases”; around 2010). In 2012, Doudna, Charpentier, and their colleagues developed techniques for using RNA-based CRISPR/Cas9 tools for simpler and cheaper gene editing.⁷ For gene editing projects, preparing specific RNA segments for use in CRISPR constructs proved to be much less time-consuming and much more precision-enhancing than engineering specific DNA-binding domains in nuclease proteins *e.g.*, for use in ZFN- or TALN-type methods of gene editing).

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The CRISPR/Cas9 tools that Doudna, Charpentier, and their colleagues developed opened many opportunities for beneficial gene editing. As the Royal Swedish Academy of Sciences appropriately announced on Oct. 7, 2020, in awarding the Nobel Prize in Chemistry to Doudna and Charpentier:

“[They have] discover[ed] one of gene technology’s sharpest tools: the CRISPR/Cas9 genetic scissors. Researchers can use these to change the DNA of animals, plants and microorganisms with extremely high precision. This technology has revolutionised [sic] the molecular life sciences, brought new opportunities for plant breeding, is contributing to innovative cancer therapies and may make the dream of curing inherited diseases come true.”

Confirming these accolades, CRISPR/Cas9-based gene editing is being steadily used for making incremental enhancements to major crop species, including, for example, rice (*Oryza sativa*) and soybean (*Glycine max*).⁸ In addition, the United Kingdom Medicines and Healthcare products Regulatory Agency (MHRA) in November 2023 approved CRISPR/Cas9-based CASGEVY® gene therapies for treating patients with sickle-cell disease, as well as for treating those with transfusion-dependent β -thalassemia,⁹ and the U.S. Food and Drug Administration (FDA) in December 2023 also approved CRISPR/Cas9-based CASGEVY® gene therapies for treating patients with sickle-cell disease.¹⁰ Many other cellular and gene therapy (CGT) products, although not all principally CRISPR/Cas9-based, have also received FDA approval.¹¹

Applications for CRISPR-based gene editing are expected to continue to expand particularly in view of continued improvements in CRISPR-based gene editing tools. For example, CRISPR-based “prime editing” procedures, first published by researchers in David Liu’s lab at the Broad Institute, have capacities to much more extensively modify genomes than the simpler gene-editing techniques that Doudna and her colleagues disclosed in 2012.¹² As another example, using “dead Cas9” (or dCas9, *i.e.*, a version of the Cas9 protein that lacks the ability to cleave DNA) in a modified CRISPR/dCas9 molecular tool allows epigenetic alterations to be made (*e.g.*, to DNA methylation patterns or DNA-associated histone

structures that change how a gene is expressed) at specific locations without cleaving the DNA or altering the DNA base sequence.¹³

The Future of the Human Race

Isaacson devotes most of Part Six “*CRISPR Babies*” and much of Part Seven “*Moral Questions*” of *The Code Breaker* to detailing (a) gene editing experiments of He Jiankui – experiments that reportedly resulted in the germline modification of two girls for HIV resistance – and (b) the international uproar that followed. In discussing He Jiankui’s experiments, Isaacson sets the table for introducing chapter-length summaries of ongoing discussions on gene editing issues, such as for example, discussions of potential “*Red Lines*” (Chapter 40), “*Thought Experiments*” (Chapter 41), and issues of “*Who Should Decide?*” (Chapter 42) – apparently with a view, as is appropriate for a biographer, for then highlighting “*Doudna’s Ethical Journey*” (Chapter 43).

Concerning germline gene editing, Isaacson presents Doudna as at first viewing the heritable editing of a child’s genes as being something unnatural, so that she initially instinctively recoiled from such use of CRISPR technologies; but Doudna’s views began to change at a January 2015 conference on gene editing in Napa Valley that she organized.¹⁴ Eventually, after listening to stories of those who had been diagnosed with debilitating genetic conditions such Huntington’s disease, Doudna became “*more sympathetic to*

the view that many gene-editing decisions should be left to individual choice rather than to bureaucrats and ethics panels” although she maintained that CRISPR should be used only when “*medically necessary*” and when there are no good alternatives.¹⁵

Isaacson further emphasizes

an inequality concern of Doudna, *i.e.*, that access to gene editing technologies could splinter society into genetic tiers based on financial resources. According to Doudna, “*We could create a gene gap that would get wider with each new generation,*” and “*If you think we face inequalities now, imagine what it would be like if society became genetically tiered along economic lines and we transcribed our financial inequality into our genetic code.*”¹⁶

“If you think we face inequalities now, imagine what it would be like if society became genetically tiered along economic lines and we transcribed our financial inequality into our genetic code.”
— Jennifer Doudna

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Final Thoughts

Isaacson's biography of Jennifer Doudna is an easy-to-read overview of her life and of her contributions to the development of CRISPR-based gene editing. Of particular significance are the book's chapters that focus on the last phrase of the book's title "... the Future of the Human Race." These chapters helpfully raise ethical issues concerning the development of gene modification technologies, and these chapters may further spur those of us who are affiliated with ITEST to engage more frequently in informed discussions of such ethical issues, all while presenting the often under-appreciated beauty of the Church's teachings on the human person, family, and society, particularly as many in our day appear to be moving toward developing, though with some caution, a future that includes heritable human genome editing.¹⁷

Of particular significance are the book's chapters that focus on the last phrase of the book's title "... the Future of the Human Race."

With regard to final thoughts relating more specifically to faithful Catholic bioethics, one must consider that the application of CRISPR-based heritable human genome editing typically depends upon the use of IVF techniques. Accordingly, until at least an acceptable work-around to IVF is developed (and discounting other considerations, e.g., such as the morality of making heritable changes to the human genome independent of the use of IVF), CRISPR-based herit-

able human genome editing would be foreclosed as an acceptable moral choice from a faithful Catholic perspective.¹⁸

Consider, for example, that IVF possibly has a more destructive impact on unborn human life than abortion.¹⁹ Consider, in addition, that currently more than one million "excess" human embryos, products of IVF, are likely now stored frozen in liquid nitrogen.²⁰ Those who hold to the Catholic faith (and its defense of human life, and particularly of vulnerable lives), and people of good will of other faiths (or no faith affiliation), cannot view these realities as heartening. Accordingly, the lack of a thorough discussion in *The Code Breaker* of the morally problematic nature of IVF techniques might be considered to be a lacuna in a book that otherwise can be characterized as presenting a good overview of ethical issues associated with CRISPR-based technologies. Alternatively and unfortunately, the lack of such a thorough discussion in *The Code Breaker* might simply reflect the current status of our culture – again one that has apparently embraced IVF without appreciating its many detrimental aspects.²¹

Acknowledgements

The first author of this book review would like to thank Fr. Robert Brungs, S.J. (1931-2006) for his founding and leadership of ITEST. In addition, the second author of this book review would like to acknowledge and thank members of the Webster [University] Book Club for various enlightening comments provided during a discussion on Nov. 11, 2024 of the book reviewed herein. The comments came from the perspectives of different medical and ethical backgrounds, and they are particularly appreciated. ■

Mark Gatschet, JD, PhD

Dr. Mark John Gatschet is an intellectual property attorney from Austin, Texas. His LINKEDIN profile details his work in law, genetics, and artificial intelligence. As a longtime member of ITEST, he wishes to express gratitude in particular to several Jesuit priests: Fathers Robert Brungs, Paul Quay, Joseph Koterski, Kevin Fitzgerald, and Robert Spitzer. Each has made beautiful contributions to advancing the vision and mission of ITEST.

Ralph Olliges, MBA, PhD

After spending 44 years in higher education, the last 23 at Webster University, Ralph Olliges retired from full-time teaching and research. Dr. Olliges is faculty emeritus at Webster University. His area of expertise was educational technology. He has been an ITEST member for 14 years and still serves as treasurer. He was *ITEST Bulletin* editor for five years, and he looks forward to promoting ITEST. Dr. Olliges' personal hobbies include gardening where he is active in five local clubs as well as following his favorite baseball team, the St. Louis Cardinals. He is also active in his local parish.

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Endnotes

¹ In light of this pressing need, the authors of this review are hopeful that a collection of various insightful faith-science writings by ITEST members, including in particular ITEST co-founder Fr. Robert Brungs, SJ, on a future that includes the genetic modification of humans, may be forthcoming. The first author of this review understands that: (a) Fr. Brungs often asked, and also provided some guidelines for answering, the question “To what degree could such genetic modification proceed before the humanity of the modified entity was lost (while also appreciating the soteriological implications that answers to this question might entail)?”; and (b) without being an alarmist, Fr. Brungs viewed the editorial “*Engineering a molecular nightmare* [i.e., more specifically, engineering a ‘*molecular Auschwitz*’]” by Nobel-Prize-worthy biochemist Erwin Chargaff {*Nature*, Vol. 327 (6119), pp. 199–200 (1987)} as an editorial needing to be considered more seriously.

² Isaacson, Walter. “*The code breaker: Jennifer Doudna, gene editing and the future of the human race*,” Simon and Schuster (2021), p. 328.

³ Congregation for the Doctrine of the Faith, *Donum Vitae* “Instruction on Respect for Human Life in Its Origin and on the Dignity of Procreation: Replies to Certain Questions of the Day” (February 22, 1987); see also: Breckenridge, Katie, “*On Cryptic Choice and Human Dignity*,” *First Principles*, Vol. 56 (2), pp. 11-13 (April 2025).

⁴ See *NaProTechnology v. IVF* comparison data within table at < <https://saintpaulvi.com/PDF/NaPro-vs-ART.pdf> >. Of course, the moral inadmissibility of IVF does not derive from the superiority, on average, in both cost savings and effectiveness of *NaProTechnology*-type alternatives, but rather from IVF’s incompatibility with a culture of life and authentic human flourishing – see, for example, Stacy A. Trasancos, “*IVF Is Not the Way – The False Promises of Artificial Procreation*,” Sophia Institute Press (2025).

⁵ Watson, JD, FHC Crick. “*A structure for deoxyribose nucleic acids*,” *Nature*, Vol. 171(4356), pp. 737-738 (April 25, 1953), p. 737.

⁶ Isaacson, Walter. “*The code breaker: Jennifer Doudna, gene editing and the future of the human race*,” Simon and Schuster (2021), p. 60.

⁷ See, for example, claim 1 of U.S. Pat. No. 10,227,611 “Methods and compositions for RNA-directed target DNA modification and for RNA-directed modulation of transcription,” which issued March 12, 2019 and claims priority to four U.S. provisional patent applications, including two applications filed in 2012; claim 1 reads:

1. A method of modifying a target DNA molecule in a cell, the method comprising contacting a target DNA molecule inside of a cell with:
 - (a) a Cas9 protein; and
 - (b) a single molecule DNA-targeting RNA comprising, in 5’ to 3’ order:
 - (i) a targeter-RNA that hybridizes with a target sequence of the target DNA molecule,
 - (ii) a nucleotide linker; and
 - (iii) an activator-RNA that hybridizes with the targeter-RNA to form a double-stranded RNA duplex, wherein (a) forms a complex with (b) and the target DNA molecule is modified.

See also < <https://vcresearch.berkeley.edu/news/university-california-awarded-15th-us-crispr-cas9-patent> >.

⁸ Wang, L. et al., “CRISPR/Cas9-based editing of NF-YC4 promoters yields high-protein rice and soybean,” *New Phytologist* < <https://nph.onlinelibrary.wiley.com/doi/10.1111/nph.20141> > (Sept. 22, 2024); see also, Freitas-Alves, N.S. et al., “CRISPR/Cas genome editing in soybean: challenges and new insights to overcome existing bottlenecks,” *J. Advanced Research* < <https://doi.org/10.1016/j.jare.2024.08.024> > (online August 18, 2024).

⁹ See “Vertex and CRISPR Therapeutics Announce Authorization of the First CRISPR/Cas9 Gene-Edited Therapy CASGEVY... (November 16, 2023) at < <https://investors.vrtx.com/news-releases/news-release-details/vertex-and-crispr-therapeutics-announce-authorization-first> >.

¹⁰ See Chamberlain, J.S., “U.S.–First Gene Therapies for Sickle Cell Disease Approved by FDA,” American Society of Gene & Cell Therapy (December 8, 2023) at < <https://www.asgct.org/publications/news/>

[december-2023/fda-approves-u-s-first-crispr-edited-gene-therapy](https://www.asgct.org/publications/news/december-2023/fda-approves-u-s-first-crispr-edited-gene-therapy) >.

¹¹ See video “*Gene Editing: A 2024 Update with Dr. Ilya Finkelstein and Dr. Stephen C. Ekker*,” a presentation to the Austin Forum on Technology & Society (October 1, 2024) at < <https://www.youtube.com/watch?v=dbUpjiRaXH8> >; among 27 FDA-approved cellular and gene therapy (CGT) products, as of Dec. 16, 2022, are a number of CAR-T cell (chimeric antigen receptor T cell) therapies.

¹² Anzalone AV, et al., “*Search-and-replace genome editing without double-strand breaks or donor DNA*,” *Nature*. (online October 21, 2019). An analogy for the superiority of CRISPR prime editing to CRISPR base editing can be made in the superiority of word processing programs in their sentence-replacing capabilities vs tedious white-out-and-retype procedures previously in widespread use for correcting misspellings in typewriter-prepared texts.

¹³ “*Dissecting the epigenome using CRISPR-based engineering technologies*,” Canadian Epigenetics, Environment and Health Research Consortium; see < <https://thisisepigenetics.ca/about-epigenetics/dissecting-epigenome-using-crispr-based-engineering-technologies> >.

¹⁴ In particular, a participant’s statement that “*Someday we may consider it unethical not to use germline editing to alleviate human suffering*” influenced Doudna. Isaacson, Walter. “*The code breaker: Jennifer Doudna, gene editing and the future of the human race*,” Simon and Schuster (2021), p. 367.

¹⁵ *Id.* at p. 369.

¹⁶ *Id.*; see also Emma Waters, “*The Pronatalism of Silicon Valley*,” *The Public Discourse* (August 13, 2024) < <https://www.thepublicdiscourse.com/2024/08/95623/> >.

¹⁷ See Davies, Kevin, “*Experts discuss guardrails for heritable genome editing*,” *Genetic Engineering & Biotechnology News* (Mar 27, 2025) < <https://www.genengnews.com/topics/genome-editing/experts-discuss-guardrails-for-heritable-human-genome-editing/> > (“In June 2015, the bipartisan Aderholt Amendment was passed in the House of Representatives to preclude the FDA from reviewing any investigational new drug application related to intentional germline editing. It was signed into law by President Obama in December 2015.” By 2020, about 70 countries had some form of genome editing prohibition. Considering simply safety concerns, remaining safety issues for CRISPR-associated gene-editing include editing efficiencies (or lacks thereof), genetic mosaicism, off-target editing, germline transmission, and the unavailability of non-destructive processes for genome scanning of single cells. A major international conference on heritable human genome editing (HHGE) is to be held in Cambridge, MA under the auspices of the Global Observatory for Genome Editing in late May 2025. Prudent guardrails for heritable genome editing may be facilitated [see also <https://global-observatory.org/>]).

¹⁸ See, for example, ITEST webinar presentation of Nov. 19, 2022 by Dr. Craig Turczynski, “*Assisted reproductive technology violates natural law and causes harm*” < <https://faithscience.org/ivf/> >; see also, Craig Turczynski et al. “*Assisted Reproductive Technology and Natural Law: How Seven Years as an Embryologist Revealed IVF’s Disordered Approach to Patient Care*,” *Linacre Quarterly*, Vol. 89 (4), pp. 388-403 (2022) < <https://pmc.ncbi.nlm.nih.gov/articles/PMC9743042/> >. The lived experience of Dr. Turczynski is moving, as is his well-informed detailing of IVF-related health risks to both mother and child.

¹⁹ Stephen W. Austin, “*IVF: A Second Front in the Cause of Life*,” *Public Discourse* (July 17, 2022) < <https://www.thepublicdiscourse.com/2022/07/83359/> >.

²⁰ James McTavish, “*Why the Church Says ‘Yes’ to Life and ‘No’ to IVF*,” *Linacre Quarterly*, Vol. 89(4), pp. 450-454 (2022) < <https://pmc.ncbi.nlm.nih.gov/articles/PMC9743043/#fn2-00243639221101838> >.

²¹ See again, for example, Stacy A. Trasancos, “*IVF Is Not the Way – The False Promises of Artificial Procreation*,” Sophia Institute Press (2025); see also, Stephanie Gray Connors, “*Conceived by Science: Thinking Carefully and Compassionately about Infertility and IVF*,” Wongeese Publishing: Florida (2021).

Pope Leo XIV on Artificial Intelligence and Catholic Social Teaching

by Dr. Sebastian Mahfood, OP

On May 10, 2025, Cardinal Robert Prevost addressed the College of Cardinals for the first time as Pope Leo XIV, concluding his remarks by explaining his selection of his name was, in part, in response to the rise of artificial intelligence.

He stated,

“I chose to take the name Leo XIV. There are different reasons for this, but mainly because Pope Leo XIII in his historic Encyclical *Rerum Novarum* addressed the social question in the context of the first great industrial revolution. *In our own day, the Church offers to everyone the treasury of her social teaching in response to another industrial revolution and to developments in the field of artificial intelligence that pose new challenges for the defence of human dignity, justice and labour.*” (emphasis added)

With this powerful statement, Pope Leo XIV established a direct connection between two moments in history: the disruptive transformation of human labor during the 19th-century industrial revolution and today’s technological upheaval driven by artificial intelligence (AI). Just as Pope Leo XIII laid the foundation of modern Catholic social thought by insisting that human dignity must not be sacrificed to economic efficiency, Pope Leo XIV draws on this tradition to address the ethical dilemmas posed by machines that now challenge the unique value of human work, autonomy, and even consciousness.

At the heart of Leo XIV’s reflection is the Church’s enduring commitment to integral human development—a cornerstone of Catholic social teaching. He recognizes that AI is not merely a technological development or a passing fad; it is a cultural force reshaping how people live, work, communicate, and define themselves. Therefore, the Church cannot remain silent or passive. Like *Rerum Novarum* responded to exploitative working conditions and labor alienation in the age of factories, the Church today must defend the rights of persons in an age of self-replicating algorithms and robot-driven automation.

The Pope’s emphasis on human dignity echoes the

central principle of Catholic social thought: that every person is created in the image and likeness of God and must never be reduced to a means of production or consumption. As AI systems increasingly make decisions in employment, education, healthcare, and

policing, Pope Leo XIV’s one-sentence clarion call warns of the dehumanization that can result when efficiency or data-driven logic replaces moral discernment and relational responsibility. The Church, he insists, must act as both guardian and guide, applying the “treasury” of her moral wisdom to these uncharted terrains.

Furthermore, Pope Leo XIV demonstrates in his message that he embraces the complementarity between faith and reason, an understanding so long held by the Church that it has become a hallmark of our Catholic intellectual tradition. Rather than rejecting

science and technology, he embraces them as gifts that must be ordered toward the common good. His call may be understood not as a retreat from innovation but one that seeks renewed dialogue between the stewards of our theological and philosophical disciplines and those engaged in advancing our knowledge of science and technological capacity. The Church’s voice, grounded in faith and reason, is uniquely positioned to guide the development of AI for the purpose of authentic human development.

As humanity stands on the threshold of a new industrial revolution, the Church must once again stand with the poor, the worker, and the vulnerable, ensuring that no technological advance ever comes at the cost of the human soul. As Marshall McLuhan once wrote, our technologies first ape us, then shape us. He added, every technological amplification of the human person brings about a corollary natural amputation. It’s the parts of our humanity that could be amputated that bear our consideration as we continue to advance into a world depicted by so many science fiction writers as slouching toward dystopia. ■

