

No. 19-1392

IN THE
Supreme Court of the United States

THOMAS E. DOBBS, STATE HEALTH OFFICER OF
THE MISSISSIPPI DEPARTMENT OF HEALTH, *et al.*,

Petitioners,

v.

JACKSON WOMEN'S HEALTH ORGANIZATION, *et al.*,

Respondents.

ON WRIT OF CERTIORARI TO THE UNITED STATES
COURT OF APPEALS FOR THE FIFTH CIRCUIT

**BRIEF OF BIOLOGISTS AS *AMICI CURIAE*
IN SUPPORT OF NEITHER PARTY**

LYNN D. DOWD
Counsel of Record
LAW OFFICES OF LYNN D. DOWD
29 West Benton Avenue
Naperville, IL 60540
(630) 665-7851
ldowd@msn.com

Counsel for Amici Curiae

306214



COUNSEL PRESS

(800) 274-3321 • (800) 359-6859

TABLE OF CONTENTS

	<i>Page</i>
TABLE OF CONTENTS.....	i
TABLE OF CITED AUTHORITIES	iv
STATEMENT OF INTEREST OF <i>AMICI</i> <i>CURIAE</i>	1
SUMMARY OF ARGUMENT.....	2
ARGUMENT.....	6
I. “WHEN DOES A HUMAN’S LIFE BEGIN?” IS WIDELY RECOGNIZED AS A BIOLOGICAL QUESTION.....	6
II. ANALYZING VIEWS ON WHEN A HUMAN’S LIFE BEGINS REVEALS THAT FERTILIZATION IS THE LEADING BIOLOGICAL VIEW	8
A. Some biologists believe that a human’s life begins at some point during the human life cycle.....	8
1. Some support the view that a human’s life begins at birth or first breath	8
2. Some support the view that a human’s life begins at fetal viability	9

Table of Contents

	<i>Page</i>
3. Some support the view that a human's life begins at the first heartbeat, brainwave, or moment of pain capability	11
B. Most biologists affirm that a human's life begins at the start of the human life cycle	12
C. The fertilization view on when a human's life begins is the leading biological view	15
III. THE FERTILIZATION VIEW IS THE LEADING BIOLOGICAL VIEW ON WHEN A HUMAN'S LIFE BEGINS AND HAS BEEN SINCE THE 19 TH CENTURY...	16
A. The discovery of fertilization took place over a century ago.....	16
B. Peer-reviewed journals present the fertilization view on when a human's life begins as a fact that requires no explanation or citation.....	18
C. Scientists' legislative testimony affirms the consensus on the fertilization view.....	22

Table of Contents

	<i>Page</i>
D. 96% of 5,577 biologists from 1,058 academic institutions affirmed that a human’s life begins at fertilization.....	24
1. The survey questions solely focused on the biological perspective on when a human’s life begins	24
2. The results showed that biologists affirm the fertilization view	27
E. Abortion advocates and abortion doctors affirm that a human’s life begins at fertilization.....	28
CONCLUSION	29
APPENDIX.....	1a

TABLE OF CITED AUTHORITIES

	<i>Page</i>
CASES	
<i>Akron v. Akron Ctr. for Reprod. Health</i> , 462 U.S. 416 (1983)	10
<i>Gonzales v. Carhart</i> , 550 U.S. 124 (2007)	14
<i>Roe v. Wade</i> , 410 U.S. 113 (1973)	<i>passim</i>
STATUTES AND OTHER AUTHORITIES	
<i>A New Ethic for Medicine and Society</i> , Editorial, CALIFORNIA MEDICINE 113, Sep. 1970	19
Alan Guttmacher, <i>Life in the Making: the Story of Human Procreation</i> , VIKING PRESS, 1933	29
Alberto Darszon, Takuya Nishigaki, Carmen Beltran, & Claudia L. Treviño, <i>Calcium channels in the development, maturation, and function of spermatozoa</i> , PHYSIOL REV, 2011	20
<i>Americans' Opinions on Abortion</i> , KNIGHTS OF COLUMBUS MARIST POLL, Jan. 2018	24
Andie L. Knutson, <i>When does a human life begin? Viewpoints of public health professionals</i> , Vol. 57, No. 12, AMERICAN JOURNAL OF PUBLIC HEALTH, Dec. 1967	24

Cited Authorities

	<i>Page</i>
Bikem Soygur & Leyla Sati, <i>The role of syncytins in human reproduction and reproductive organ cancers</i> , REPRODUCTION, 2016	19
Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, & Peter Walter, <i>Molecular Biology of the Cell</i> , 4 th edition, New York: GARLAND SCIENCE, 2002, Chapter on Fertilization	13
C.R. Austin, <i>The mammalian egg</i> , 1961, BLACKWELL SCIENTIFIC PUBLICATIONS OXFORD	17
Cheun Yan Leung & Magdalena Zernicka-Goetz, <i>Mapping the journey from totipotency to lineage specification in the mouse embryo</i> , CURR OPIN GENET DEV, 2015	21
Clarke Forsythe, <i>Why the States Did Not Prosecute Women for Abortion Before Roe v. Wade</i> , AMERICANS UNITED FOR LIFE, Apr. 23, 2010.	15
Dean Clift & Melina Schuh, <i>Restarting life: Fertilization and the transition from meiosis to mitosis</i> , NAT REV MOL CELL BIOL., 2013	21
Donna Dowling-Lacey, Jacob F. Mayer, Estella Jones, Silvina Bocca, Laurel Stadtmauer, & Sergio Oehninger, <i>Live birth from a frozen-thawed pronuclear stage embryo almost 20 years after its cryopreservation</i> , FERTILITY AND STERILITY, Mar. 2011, Vol. 95, Iss. 3	15

Cited Authorities

	<i>Page</i>
Enrica Bianchi, Brendan Doe, David Goulding, & Gavin J. Wright, <i>Juno is the egg Izumo receptor and is essential for mammalian fertilization</i> , NATURE, 2014	25
<i>Fetal Surgery</i> , MAYO CLINIC.	9
H.B. 1233, 2005 Leg. Assemb., 80th Sess. (S.D. 2005).	24
<i>Harper Collins Illustrated Medical Dictionary</i> , New York: HARPER PERENNIAL, 1993.	22
Isha Raj, Hamed Sadat Al Hosseini, Elisa Dioguardi, Kaoru Nishimura, Ling Han, Alessandra Villa, Daniele de Sanctis, & Luca Jovine, <i>Structural Basis of Egg Coat-Sperm Recognition at Fertilization</i> , CELL, 2017	20
Jan Tesarik & Ermanno Greco, <i>A Zygote is not an Embryo: Ethical and Legal Considerations</i> , MOLECULAR ASSISTED REP. AND GENETICS Jul. 2004.	13
Jane Maienschein, <i>The first century of cell theory: From structural units to complex living systems</i> , 2017, In: Friedrich Stadler (eds.), <i>Integrated History and Philosophy of Science</i> , Vienna Circle Institute Yearbook. Institute Vienna Circle, University of Vienna, Vienna Circle Society, Society for the Advancement of Scientific World Conceptions, vol 20. SPRINGER, Cham	17

Cited Authorities

	<i>Page</i>
Janetti Signorelli, Emilce S. Diaz, & Patricio Morales, <i>Kinases, phosphatases and proteases during sperm capacitation</i> , CELL TISSUE RES, 2012	21
Keith L. Moore., <i>The Developing Human: Clinically Oriented Embryology</i> , 8th ed., Philadelphia: SAUNDERS, 2007.....	22
Landrum Shettles & David Rorvik, <i>Rites of Life: The Scientific Evidence of Life Before Birth</i> , Grand Rapids, MI: ZONDERVAN PUBLISHING HOUSE, 1983	24
M. Elizabeth Barnes, <i>Karl Ernst von Baer's Laws of Embryology</i> , EMBRYO PROJECT ENCYC. (Apr. 15, 2014, 4:15 PM)	17
Margaret Sanger, <i>The Pope's Position on Birth Control</i> , 1932.....	29
María Jiménez-Movilla, Julieta G. Hamze, & Raquel Romar, <i>Oolemma Receptors in Mammalian Molecular Fertilization: Function and New Methods of Study</i> , FRONT CELL DEV BIOL, 2021 May 19	18

Cited Authorities

	<i>Page</i>
Mariko Kouduka, Daisuke Sato, Manabu Komori, Motohiro Kikuchi, Kiyoshi Miyamoto, Akinori Kosaku, Mohammed Naimuddin, Atsushi Matsuoka, & Koichi Nishigaki, <i>A Solution for Universal Classification of Species Based on Genomic DNA</i> , INT'L J. PLANT GENOMICS, 2007	9
Marta N. Shahbazi, Agnieszka Jedrusik, Sanna Vuoristo, Gaelle Recher, Anna Hupalowska, Virginia Bolton, Norah M. E. Fogarty, Alison Campbell, Liani G. Devito, Dusko Ilic, Yakoub Khalaf, Kathy K. Niakan, Simon Fishel & Magdalena Zernicka-Goetz, <i>Self-organization of the human embryo in the absence of maternal tissues</i> . NAT CELL BIOL, 2016.	13
Martin Wilding, Gianfranco Coppola, Francesco De Icco, Laura Arenare, Loredana Di Matteo, & Brian Dale, <i>Maternal non-Mendelian inheritance of a reduced lifespan? A hypothesis</i> , J ASSIST REPROD GENET, 2014.	20
Maureen L. Condic, <i>The Origin of Human Life at Fertilization: Quotes Compiled</i> , BIOETHICS DEFENSE FUND, Nov. 2017	18
Maureen L. Condic, <i>Untangling Twinning: What Science Tells Us about the Nature of Human Embryos</i> , UNIVERSITY OF NOTRE DAME PRESS, Indiana, USA, 2020	16

Cited Authorities

	<i>Page</i>
Maureen L. Condic, <i>When Does Human Life Begin? A Scientific Perspective</i> , THE WESTCHESTER INSTITUTE, Oct. 2008, Vol. 1, No. 1,	13
Maureen L. Condic, <i>When Does Human Life Begin? The Scientific Evidence and Terminology Revisited</i> , 8 U. ST. THOMAS J.L. & PUB. POL'Y 44 (2013)	13
Meital Oren-Suissa & Benjamin Podbilewicz, <i>Cell fusion during development</i> , TRENDS CELL BIOL, 2007	19
Naokazu Inoue & Masaru Okabe, <i>Sperm-egg fusion assay in mammals</i> , METHODS MOL BIOL, 2008	21
Naokazu Inoue, Masahito Ikawa, Ayako Isotani, & Masaru Okabe, <i>The immunoglobulin superfamily protein Izumo is required for sperm to fuse with eggs</i> , NATURE, 2005	25
<i>National Tracking Poll #190555 by Morning Consult</i> , May 28-30, 2019	24
Paul Primakoff & Diana G. Myles, <i>Penetration, adhesion, and fusion in mammalian sperm-egg interaction</i> , SCIENCE, 2002	21
Peter Singer, <i>Practical Ethics</i> , 2nd ed., CAMBRIDGE UNIVERSITY PRESS, 1993	28

Cited Authorities

	<i>Page</i>
Robert J. Norman, <i>2015 RANZCOG Arthur Wilson Memorial Oration 'From little things, big things grow: The importance of periconception medicine'</i> , AUST N Z J OBSTET GYNAECOL., 2015	19
Ross Douthat, <i>160 Million and Counting</i> , NEW YORK TIMES, Jun. 26, 2011	11
Samuel B. Condic & Maureen L. Condic, <i>Human Embryos, Human Beings: A Scientific and Philosophical Approach</i> , CATHOLIC UNIVERSITY OF AMERICA PRESS, 2018	18
<i>Scientific Sources on When a Human's Life Begins</i> , WHENDOESLIFEBEGIN.ORG	18
<i>S.D. Abortion Task Force, Report of The South Dakota Task Force to Study Abortion</i> , 25 (2005)	24
Simon Denyer & Annie Gowen, <i>Too Many Men</i> , WASHINGTON POST, Apr. 18, 2018	11
STAFF OF THE SUBCOMM. ON SEPARATION OF POWERS OF THE COMM. ON THE JUDICIARY, 97TH CONG., REP. ON THE HUMAN LIFE BILL 7 (1981)	22
<i>State Laws on Fetal Homicide and Penalty-Enhancement for Crimes Against Pregnant Women</i> , NATIONAL CONFERENCE OF STATE LEGISLATURES, May 1, 2018	9

Cited Authorities

	<i>Page</i>
Stephen McDonnell, <i>China allows three children in major policy shift</i> , BBC NEWS, May 31, 2021	12
Steven A. Jacobs, <i>Balancing Abortion Rights and Fetal Rights: A Mixed Methods Mediation of the U.S. Abortion Debate</i> , KNOWLEDGE@UCHICAGO, 2019.....	7
Sup. Ct. R. 37.3	1
T.A. Elliott, J.A. Friedman, E.T. Siegel, H.I. Kort, & Z.P. Nagy, ‘ <i>When does life begin?</i> ’ <i>Results of an online survey</i> , FERTILITY AND STERILITY, Vol. 90.....	25
<i>The Human Life Bill: Hearing on S. 158 Before the Subcomm. on Separation of Powers of the Comm. on the Judiciary</i> , 97th Cong. 45 (1981).....	14
<i>The Human Life Bill: Hearing on S. 158 Before the Subcomm. on Separation of Powers of the S. Comm. on the Judiciary</i> , 97th Cong. 8 (1981)	23
Tim R. Birkhead & Robert Montgomerie, <i>Three centuries of sperm research</i> , 2009, pp 1-42 in: Tim R. Birkhead, Dave J. Hosken, & Scott S. Pitnick, <i>Sperm Biology: An Evolutionary Perspective</i> , ELSEVIER/ACADEMIC PRESS, Amsterdam	17

Cited Authorities

	<i>Page</i>
Umeharu Ohto, Hanako Ishida, Elena Krayukhina, Susumu Uchiyama, Naokazu Inoue, & Toshiyuki Shimizu, <i>Structure of IZUMO1-JUNO reveals sperm-oocyte recognition during mammalian fertilization</i> , NATURE, 2016 Jun	20
Yuki Okada, Kazuo Yamagata, Kwonho Hong, Teruhiko Wakayama, & Yi Zhang, <i>A role for the elongator complex in zygotic paternal genome demethylation</i> , NATURE, 2010	25
Yves Ménézo, Brian Dale, & Marc Cohen, <i>DNA damage and repair in human oocytes and embryos: a review</i> , ZYGOTE, 2010 Nov	19

STATEMENT OF INTEREST OF *AMICI CURIAE*¹

Amici curiae are biologists who work at colleges, universities, and other institutions in 15 countries around the world. On average, they have 10 years of undergraduate and graduate training, they have 27 years of experience working in academia, and overall they have dedicated 37 years to the study of life and to promoting science awareness.

Their expertise bears directly on the question presented in this case. The Court will assess the constitutionality of *Roe v. Wade*'s viability standard, which was used as a proxy by the Court, in 1973, after it could not determine when a human's life begins because it could not find a consensus view among experts. Today, *amici* provide the Court with evidence that shows most biologists affirm fertilization as the leading biological view.

As scientists, the *amici curiae* are solely committed to providing the Court with the best available science in service of promoting science awareness and combatting science miscommunication on both the fertilization view and the broader discussion on when a human's life begins. Thus, the *amici curiae* take no position on the present case and merely offer this brief in hopes that it will be of assistance to the Court as it analyzes the relevant facts of the present case.

1. All parties have consented to the filing of this amicus brief. In accordance with Rule 37.3, counsel affirms that no counsel for any party authored this brief in whole or in part and that no person or entity other than *amici* made a monetary contribution to fund the preparation and submission of this brief.

A full list of *amici* is attached as an appendix to this brief.

SUMMARY OF ARGUMENT

In granting Mississippi’s Petition For a Writ Of *Certiorari* in *Dobbs v. Jackson Women’s Health*, the Court agreed to consider “[w]hether all pre-viability prohibitions on elective abortions are unconstitutional”². The question addresses *Roe*’s viability standard, which held that fetal viability is the point at which a state’s “important and legitimate”³ interest in protecting life is compelling and thus constitutionally adequate to overcome a woman’s constitutional right to have an abortion. This viability standard, which the Court ultimately claimed had biological justifications⁴, was established after the Court could not find a consensus of relevant experts who agreed on when a human’s life begins⁵. The Court considered Texas’s fertilization standard, but after Texas’s assistant attorneys general created doubt on the fertilization view—in both the oral argument⁶ and the oral

2. Grant of *Certiorari*, <https://www.supremecourt.gov/qp/19-01392qp.pdf>.

3. *Roe v. Wade*, 410 U.S. 113, 163 (1973).

4. *Id.* at 163.

5. *Id.* at 159.

6. After Justice Thurgood Marshall questioned Floyd about the scientific basis for Texas’s stance on when a human’s life begins, Floyd eventually relented: “Mr. Justice, there are un-answerable questions in this field.” Transcript of Oral Argument, *Roe v. Wade*, 1971, at 45.

reargument⁷ sessions—the Court rejected the standard by claiming that the fertilization view was merely “one theory of life”⁸. The Court also claimed that the fertilization view had “[s]ubstantial problems”⁹ because embryological data had raised questions on whether fertilization was a process or event.

Despite the Court’s use of fetal viability as a proxy for when a human’s life begins, which it described as the point that a fetus “has the capability of meaningful life outside the mother’s womb”¹⁰, the majority opinion stated that the Court was “not in a position to speculate” on the “difficult question of when life begins... at [that] point in the development of man’s knowledge.”¹¹ However, no current member of the Court would have to speculate, today. The fertilization view is widely recognized—in the literature and by biologists—as the leading biological view on when a human’s life begins.

7. Justice Blackmun also questioned Floyd’s replacement, Texas Assistant Attorney General Robert C. Flowers, on when a human’s life begins during the *Roe* reargument session, but he also cast doubt on the fertilization view: “QUESTION:... Is it not true, or is it true that the medical profession itself is not in agreement as to when life begins?... MR. FLOWERS: I think that’s true, sir. But from a layman’s standpoint, medically speaking, we would say that at the moment of conception from the chromosomes, every potential that anybody in this room has is present, from the moment of conception.... QUESTION: But then you’re speaking of potential of life... MR. FLOWERS: Yes, sir.” Transcript of Oral Reargument of *Roe v. Wade*, 1972, at 23.

8. *Roe*, 410 U.S. at 162.

9. *Id.* at 161.

10. *Id.* at 163.

11. *Id.* at 159.

The fertilization view was first discovered in the early 1800s. (See *infra* at Argument III.A). However, it was such a self-evident fact that little work was done to study or communicate that consensus since it was difficult for scientists to imagine that it could ever be challenged or if there would ever be a time the view would not be common knowledge.¹² Since the *Roe* Court issued its decision in 1973, the scientific consensus¹³ on the fertilization view has been established.

Recent surveys have shown that biologists are viewed as objective experts in the study of life and as the experts most qualified to determine when a human's life begins (See *infra* at Argument I). The fertilization view on when a human's life begins has been shown to be the leading biological view, and it can only be supplanted by an alternative view if there are paradigmatic shifts to axiomatic concepts within biology (See *infra* at Argument II). This is made clear by a review of: (1) the biological and life sciences literature, as peer-reviewed articles represent the fertilization view as a fact of biology that requires no explanation or citation (See *infra* at Argument III.B), (2) legislative testimony from scientists that suggests there is no alternative view in the scientific literature (See *infra* at Argument III.C), (3) an international survey of academic biologists' views on when a human's life begins that reported 96% of 5,577 participants affirmed the fertilization view (See *infra* at Argument III.D), and (4) statements by prominent abortion doctors and abortion advocates who affirm the fertilization view (See *infra* at Argument III.E).

12. See *infra* n.91.

13. *Amici* represent there is general, yet overwhelming, agreement, not that it is a unanimous view.

Thus, *amici* respectfully offer the Court this brief to provide information on the biological perspective on when a human’s life begins: fertilization, generally, marks the beginning of a sexually reproducing organism’s life and, specifically, marks the beginning of a human’s life, as it is the point at which a human first comes into physical existence as an organism that is biologically classified as a member of the *Homo sapiens* species.

This brief is not offered in support of either party. It takes no position on how the question being considered in this case should be answered by the Court, no position on whether the lower court’s ruling should be upheld or overturned, and no position on whether *Roe* should be upheld, revised, or overturned. It takes no position on the morality, legality, or constitutionality of abortion access.¹⁴ It takes no position on whether a single-celled human zygote is a person¹⁵ within the meaning of the U.S. Constitution, or if a human zygote, embryo, or fetus deserves legal protections or constitutional rights.

14. If *amici* were accused of taking a stance on abortion since they affirm that human zygotes are biological humans—as that classification could be used to argue that human zygotes are humans who deserve legal protections—*amici* would explain that this fact alone is not determinative. Without legal precedents, legal principles, or legal arguments, the fact that a human zygote is biologically classified as a human does not necessitate any position on the legality of abortion access; affirming the biological reality does not preclude one from taking any position on related legal issues.

15. If “person” is fungible with “human,” or if all members of the *Homo sapiens* species are recognized as persons, then the genetics-based classification method dictates that a human zygote is a person. If that is not the case, and some living humans are not deemed persons, then *amici* state no opinion on whether a human zygote is a person.

It is simply offered to provide the members of the U.S. Supreme Court with an analysis of the fertilization view in hopes that they will correct the *Roe* Court's outmoded factual record on the fertilization view and the question of whether there is a consensus on when a human's life begins. *Amici* encourage the Court to discuss the relevant science and consider whether the best science available in 2021 affirms that fertilization is the ontogenetic starting point of a human's life.

ARGUMENT

I. "WHEN DOES A HUMAN'S LIFE BEGIN?" IS WIDELY RECOGNIZED AS A BIOLOGICAL QUESTION.

In the oral reargument session for *Roe*, Justice Potter Stewart signaled the importance of resolving who should determine when a human's life begins: "Now, how should that question be decided, is it a legal question, a constitutional question, a medical question, a philosophical question, or a religious question, or what is it?"¹⁶ The majority opinion in *Roe* similarly suggested there are multiple dimensions to the question: "When those trained in the respective disciplines of medicine, philosophy, and theology are unable to arrive at any consensus, the judiciary, at this point in the development of man's knowledge, is not in a position to speculate as to the answer."¹⁷

16. Transcript of Oral Reargument, *Roe v. Wade*, 1972, at 23.

17. *Roe*, 410 U.S. at 159.

Americans were recently surveyed on how they interpret the question “When does a human’s life begin?”¹⁸ Based on the Court’s discussion of relevant disciplines, a list of five groups of arbiters was developed and presented to participants: biologists, philosophers, religious leaders, Supreme Court Justices, and voters.¹⁹

80% of the 4,107 Americans²⁰ surveyed “selected biologists as the group most qualified to determine when a human’s life begins.”²¹ In response to a follow-up essay question on why they made their selection, 91% of those who selected biologists wrote that they viewed biologists as “objective experts in the study of life.”²²

When biologists were asked who is most qualified to determine when a human’s life begins, a majority selected biologists (64%); when asked to assess Americans’ selection of biologists as the most qualified group, 68% of biologists agreed.²³ Given this agreement between the American public and its chosen experts, it is clear that most view the question as biological in nature.

18. Steven A. Jacobs, *Balancing Abortion Rights and Fetal Rights: A Mixed Methods Mediation of the U.S. Abortion Debate*, KNOWLEDGE@UCHICAGO, 2019, at 206, <https://perma.cc/GZT2-8JDN>.

19. *Id.* at 207–08.

20. *Id.* at 164. “[T]he sample was predominantly pro-choice (62%), liberal (63%), socialist (54%), and Democratic (66%). The sample was well-educated (63% graduated from college) and had more females (57%) than males (43%).”

21. *Id.* at 208.

22. *Id.*

23. *Id.* at 243.

While it can be argued that philosophical or theological beliefs bear on the moral worth of a human's life, they have no relevance on the biological view of the ontogenetic starting point of a human's life—the duration of one's physical existence as a living human organism with genes from a human mother and a human father. To make that determination, and to assess whether a human zygote is a human, biological concepts can be considered.

II. ANALYZING VIEWS ON WHEN A HUMAN'S LIFE BEGINS REVEALS THAT FERTILIZATION IS THE LEADING BIOLOGICAL VIEW.

- A. Some biologists believe that a human's life begins at some point during the human life cycle.**
 - 1. Some support the view that a human's life begins at birth or first breath.**

12% of biologists (343 out of 2794) represented the birth view in response to an essay question on when a human's life begins.²⁴ For this view to gain widespread acceptance, there would need to be a rejection of the human life cycle²⁵ and the genetics-based method²⁶ of

24. *See supra* n.17 at 252.

25. The “human life cycle” is another phrase for the human life span—both describe the series of events that occur throughout the duration of each human's physical existence as a living human organism.

26. With recent technological advancements, biologists are now able to use observable genomic DNA to biologically classify a single-celled organism as a member of a species. *See generally, e.g.,*

classifying organisms. The practical consequences could be that it would make obsolete any biological basis for providing independent care to a fetus, as a patient, or performing fetal surgery²⁷; it would also remove the biological basis of fetal homicide laws²⁸, as a state could not rightfully convict someone for the homicide of a fetus since one would no longer be properly classified as a human.²⁹

2. Some support the view that a human's life begins at fetal viability.

10% of biologists (284 out of 2794) represented the viability view in response to an essay question on when a human's life begins.³⁰ For this theory to take hold, biologists would have to replace the objective genetics-based method of biologically classifying humans with a

Mariko Kouduka, Daisuke Sato, Manabu Komori, Motohiro Kikuchi, Kiyoshi Miyamoto, Akinori Kosaku, Mohammed Naimuddin, Atsushi Matsuoka, & Koichi Nishigaki, *A Solution for Universal Classification of Species Based on Genomic DNA*, INT'L J. PLANT GENOMICS, 2007, <https://perma.cc/X3YT-W4X6>.

27. *Fetal Surgery*, MAYO CLINIC, <https://perma.cc/JS4Z-XTKX>.

28. A listing of the states with fetal homicide laws can be found at: *State Laws on Fetal Homicide and Penalty-Enhancement for Crimes Against Pregnant Women*, NATIONAL CONFERENCE OF STATE LEGISLATURES, May 1, 2018, <https://perma.cc/5M47-4Y3Y>.

29. This could also create a case in which a 9-ounce, 21-week premature infant, who cannot survive outside of the womb without machines, would be biologically classified as a human while a more developed 9-pound, 40-week fetus, who can survive outside of the womb without machines, would not be biologically classified as a human since he or she has not yet been born.

30. *See supra* n.17 at 252.

subjective determination based on the changing state of technology. Consider the practical consequences. A human's life could be biologically determined to begin at a different point for a fetus in Mt. Sinai Hospital in New York than in a medical clinic in a rural area, as the leading physicians of the former might be able to help a 22-week premature infant survive while physicians at the latter might not be able to. Further, one would have to say that a 27-week-old fetus in 1973 was not a human—as 28 weeks was the viability line at the time since that was when technology was capable of supporting life outside of the womb—but that a younger 24-week-old fetus, today, is a human. This standard could even one day be set at fertilization if an artificial womb is developed.³¹ Finally, it is important to note that, today, human embryos survive outside of the womb for years³² before being transferred and implanted. In fact, a human zygote is viable for a short period after fertilization, then loses the ability to survive outside of the womb and regains it sometime soon after the 20th week of his or her life.³³

31. Justice O'Connor has said that “[t]he *Roe* framework . . . is clearly on a collision course with itself,” *Akron v. Akron Ctr. for Reprod. Health*, 462 U.S. 416, 458–61 (1983) (O'Connor, J., dissenting).

32. *See infra* n.45.

33. If this is used as an ability-based standard, by which human organisms without this ability are not classified as humans, it could also create a case in which a human who is temporarily on life support would cease to be biologically classified as a human since he or she is not then capable of meaningful life. Similarly, when it is framed as physiological independence, this standard could be used to preclude conjoined twins—who cannot be safely separated—from being classified as humans.

3. Some support the view that a human's life begins at the first heartbeat, brainwave, or moment of pain capability.

10% of biologists (268 out of 2794) represented one of these views in response to an essay question on when a human's life begins.³⁴ For this view to gain prominence, the modern method of genetics-based biological classifications would need to revert to the primitive method of morphology-based biological classifications, whereby organisms are classified based on their physical appearance and abilities rather than their genetics.³⁵ The practical consequences could be that people can capriciously use arbitrary criteria to classify some biological humans as humans and to deliberately exclude others, such that a human fetus could be regarded as no different from a human sperm or any other human body cell that is not an organism developing in the human life cycle.

For instance, given the history of sex-selective abortion in China and India³⁶, such dehumanization could lead to Americans learning the sex of their fetus and either continuing or terminating their pregnancies based on son-preference or daughter-preference; this could then lead to severely unbalanced sex ratios in the U.S. that bring about challenges such as those China currently faces³⁷, which

34. *See supra* n.17 at 252.

35. *See supra* n.25 for a discussion of genetics-based classifications.

36. Ross Douthat, *160 Million and Counting*, NEW YORK TIMES, Jun. 26, 2011, <https://perma.cc/Y9JP-T2MW>.

37. Simon Denyer & Annie Gowen, *Too Many Men*, WASHINGTON POST, Apr. 18, 2018, <https://perma.cc/Q8H5-DJBS>.

have led to its one-child policy giving way to a two-child policy and now a three-child policy to address plummeting birth rates^{38, 39}.

B. Most biologists affirm that a human’s life begins at the start of the human life cycle.

68% of biologists (1898 out of 2794) represented the fertilization view in response to an essay question on when a human’s life begins.⁴⁰ A review of recent discoveries and the development of scientific literature since *Roe* reveals a strong consensus that agrees fertilization—a process which starts with sperm-egg binding and is completed by sperm-egg pronuclear fusion⁴¹—is the starting point of

38. Stephen McDonell, *China allows three children in major policy shift*, BBC NEWS, May 31, 2021, <https://perma.cc/B8W2-8BKN>.

39. If these ability-based standards are used as requirements for one to be biologically classified as a human, it would mean that those who were born without the capacity to feel pain, those whose hearts temporarily stop, and those who might one day undergo a brain transplant are not biological humans.

40. *See supra* n.17 at p. 252.

41. The only genuine debate about the biological perspective of when a human’s life begins focuses on the precise moment, within the one-day fertilization process, that a zygote is classified as a human; this is so because having a human genome is required to be classified as a human, and biologists discuss whether the two pronuclei from the parents need to fuse to be considered a genome or whether the genome can be said to be present at sperm-egg binding: (1) Under the syngamy view, the pronuclei must fuse and form the genome before a zygote can be said to have a human genome (*see, e.g.*, “Once fertilized, the egg is called a zygote. Fertilization is not complete, however, until the two haploid nuclei (called pronuclei) have come together

the self-directed development⁴² and life cycle of a human organism and thus the life of a human.

and combined their chromosomes into a single diploid nucleus.” Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, & Peter Walter, *Molecular Biology of the Cell*, 4th edition, New York: GARLAND SCIENCE, 2002, Chapter on Fertilization available at: <https://perma.cc/8SPB-3NTK>; “[T]he only point at which a clear demarcation line between what is and what is still not an embryo can be drawn is the moment of nuclear syngamy at the outset of the first cleavage division,” Jan Tesarik & Ermanno Greco, *A Zygote is not an Embryo: Ethical and Legal Considerations*, MOLECULAR ASSISTED REP. AND GENETICS Jul. 2004, 9(1), 13-16; (2) Under the sperm-egg binding view, since the contents of the cell are the same throughout fertilization, the zygote is going through routine developmental processes and the genome is present even if it is not fully formed (see, e.g., “[S]yngamy does not form the mature genome of the zygote; the full genome of the zygote is present at sperm-egg fusion and the definitive, diploid genome is formed at the completion of meiosis II,” Maureen L. Condic, *When Does Human Life Begin? The Scientific Evidence and Terminology Revisited*, 8 U. ST. THOMAS J.L. & PUB. POL’Y 44, 56 (2013), <https://perma.cc/7QYM-39NG>); “The essential problem with the view that life begins at syngamy is the notion that a cell can change from one type (a “pre-zygote” that exists following sperm-egg fusion but prior to syngamy) into another type (the zygote that exists after syngamy) without any actual change in the material state or behavioral trajectory of the cell. This argument is simply not consistent with the scientific method,” Maureen L. Condic, *When Does Human Life Begin? A Scientific Perspective*, THE WESTCHESTER INSTITUTE, Oct. 2008, Vol. 1, No. 1, <https://perma.cc/HD4C-YZL6>.

42. Marta N. Shahbazi, Agnieszka Jedrusik, Sanna Vuoristo, Gaelle Recher, Anna Hupalowska, Virginia Bolton, Norah M. E. Fogarty, Alison Campbell, Liani G. Devito, Dusko Ilic, Yakoub Khalaf, Kathy K. Niakan, Simon Fishel & Magdalena Zernicka-Goetz, *Self-organization of the human embryo in the absence of maternal tissues*. NAT CELL BIOL, 2016, 18, 700-708, <https://perma.cc/2E3U-MSTT>.

As will be covered in this brief, this is the leading biological view on when a human's life begins. This is made clear by a review of the scientific literature, legislative testimony from scientists, an international study of biologists' views on when a human's life begins, and statements by abortion doctors and advocates. As it is the leading view, nothing would have to change or come to be seen differently in order for the fertilization view to be recognized; a human zygote is, from a biological perspective, a human organism⁴³ classified as a member of the *Homo sapiens* in the same way⁴⁴ as an infant, a teenager,⁴⁵ or an adult; a human zygote is simply a human

43. “[B]y common understanding and scientific terminology, a fetus is a living organism while within the womb, whether or not it is viable outside the womb. We do not understand this point to be contested by the parties.” *Gonzales v. Carhart*, 550 U.S. 124, 147 (2007).

44. All cellular life with human DNA can be said to be human (*adjective*). However, since the human life cycle and the human life span both begin at fertilization, only an organism with human DNA developing in one of the stages of the human life cycle can be said to be a human (*noun*) who is biologically classified as a member of the *Homo sapiens* species.

45. Dr. Alfred Bongiovanni, University of Pennsylvania School of Medicine, concluded in his testimony for the 1981 U.S. Senate hearing on the Human Life Bill that: “I am no more prepared to say that these early stages [of development] represent an incomplete human being than I would be to say that the child prior to the dramatic effects of puberty... is not a human being. This is human life at every stage” *The Human Life Bill: Hearing on S. 158 Before the Subcomm. on Separation of Powers of the Comm. on the Judiciary*, 97th Cong. 45 (1981).

being in the first stage of a human's development, whether fertilization be deemed a process or an event.^{46, 47}

C. The fertilization view on when a human's life begins is the leading biological view.

Rejecting the fertilization view, or accepting a different view⁴⁸, would require redefining or reconceptualizing

46. Today, a pronuclear one-cell embryo—an embryo that underwent sperm-egg binding but did not complete syngamy, which is the observed developmental stage in which the male and female pronuclei move together in the one-cell embryo—can be transferred to the womb of a non-biological mother almost twenty years after the sperm-egg binding (Donna Dowling-Lacey, Jacob F. Mayer, Estella Jones, Silvina Bocca, Laurel Stadtmauer, & Sergio Oehninger, *Live birth from a frozen-thawed pronuclear stage embryo almost 20 years after its cryopreservation*, FERTILITY AND STERILITY, Mar. 2011, Vol. 95, Iss. 3, <https://perma.cc/6DMD-JL6X>). This is clear and convincing evidence that the developmental process of a new human being is separate from either genetic parent, and this can then be used to suggest that a human's life begins at the moment of sperm-egg binding and not a later point at which some would consider the fertilization process complete. After all, a human's life is a developmental process. Whether a human is a zygote, morula, blastocyst, fetus, infant, child, teenager, or an adult, the same biological human is present in each developmental stage.

47. From a practical perspective, some fear that this view could lead to women being investigated or prosecuted for miscarrying a pregnancy. However, it is important to note that abortion was treated as homicide and child-murder for over a century, throughout the Nation, and yet women were not prosecuted for abortions. *See, e.g.*, Clarke Forsythe, *Why the States Did Not Prosecute Women for Abortion Before Roe v. Wade*, AMERICANS UNITED FOR LIFE, Apr. 23, 2010, <https://perma.cc/348R-DEC4>.

48. While some might quibble and argue that a human's life precisely begins when the sperm and egg first bind or when the

what it means to be a biological human, rejecting the mammalian life cycle paradigm, or regressing the modern system of genetics-based biological classifications back to the outmoded system of morphology-based classifications; it would require one to hold the view that the start of the life cycle is not the start of one's life; it would require one to conclude that a human zygote is not biologically classified as a member of the *Homo sapiens* species and is not a biological human, which is defined as an organism with a human genome who is growing and developing in the human life cycle.

III. THE FERTILIZATION VIEW IS THE LEADING BIOLOGICAL VIEW ON WHEN A HUMAN'S LIFE BEGINS AND HAS BEEN SINCE THE 19TH CENTURY.

A. The discovery of fertilization took place over a century ago.

Over two-thousand years ago, Aristotle correctly observed that new individuals are formed through a fusion

genome forms (*see, e.g., supra* nn.41,45), these events occur within hours of each other during the one-day process of fertilization; similarly, while some might propound cleavage, gastrulation, organogenesis, or some other moment or process in the 6-12 days following fertilization and preceding implantation, all seem to be distinctions without practical differences for the present case since these points all occur many weeks before pregnancy is discovered and many months before a fetus is viable. For a discussion of chimerism and twinning, *see*: Maureen L. Condic, *Untangling Twinning: What Science Tells Us about the Nature of Human Embryos*, UNIVERSITY OF NOTRE DAME PRESS, Indiana, USA, 2020.

of material from a male and a female.⁴⁹ However, it wasn't until 1784 that a scientist established that a male's sperm and a female's ovum interact to form a zygote.⁵⁰ In 1827, Karl Ernst von Baer was the first scientist to record an observation of a mammalian egg; he then proposed the four laws of animal development based on the view that most animals commonly start their lives as embryos and then become morphologically distinct organisms based on the uniqueness of their genetic codes.⁵¹

The early discoveries on the fertilization process, by which spermatozoa enter eggs, took place between 1843 until 1880: "From these observations, in the main, the realization came that fertilization involved the union of egg and sperm nuclei and represented therefore the cytological mechanism underlying biparental inheritance"⁵², which is

49. Jane Maienschein, *The first century of cell theory: From structural units to complex living systems*, 2017, In: Friedrich Stadler (eds.), *Integrated History and Philosophy of Science*, p. 43, Vienna Circle Institute Yearbook. Institute Vienna Circle, University of Vienna, Vienna Circle Society, Society for the Advancement of Scientific World Conceptions, vol 20. SPRINGER, Cham, <https://perma.cc/V275-TFAZ>.

50. Tim R. Birkhead & Robert Montgomerie, *Three centuries of sperm research*, 2009, pp 1-42 in: Tim R. Birkhead, Dave J. Hosken, & Scott S. Pitnick, *Sperm Biology: An Evolutionary Perspective*, ELSEVIER/ACADEMIC PRESS, Amsterdam, <https://perma.cc/TR8T-7HGC>.

51. M. Elizabeth Barnes, *Karl Ernst von Baer's Laws of Embryology*, EMBRYO PROJECT ENCYC. (Apr. 15, 2014, 4:15 PM), <https://perma.cc/G772-J5FB>.

52. C.R. Austin, *The mammalian egg*, 1961, BLACKWELL SCIENTIFIC PUBLICATIONS OXFORD, p. 4. <https://perma.cc/EH8A-XURG>.

sexual reproduction. Most notably, in 1876, Oscar Hertwig has been said to have first established the fertilization view when he described the fusion of the nuclei of a male's spermatozoa and a female's ovum.

B. Peer-reviewed journals present the fertilization view on when a human's life begins as a fact that requires no explanation or citation.

A recent review⁵³ of scientific journals in the biological and life sciences literature reported that peer-reviewed articles contain statements that definitively represent the fertilization view; they continue to do so, today, with the most recent being published in May of 2021.⁵⁴ Since these statements are often offered without explanation or citation, researchers, referees, and editors likely accept the fertilization view on when a human's life begins as such a well-known and well-accepted biological view⁵⁵

53. Maureen L. Condic, *The Origin of Human Life at Fertilization: Quotes Compiled*, BIOETHICS DEFENSE FUND, Nov. 2017, <https://perma.cc/H9ED-9LCC>; see also: Samuel B. Condic & Maureen L. Condic, *Human Embryos, Human Beings: A Scientific and Philosophical Approach*, CATHOLIC UNIVERSITY OF AMERICA PRESS, 2018.

54. "Fertilization is a key process in biology to the extent that a new individual will be born from the fusion of two cells," María Jiménez-Movilla, Julieta G. Hamze, & Raquel Romar, *Oolemma Receptors in Mammalian Molecular Fertilization: Function and New Methods of Study*, FRONT CELL DEV BIOL, 2021 May 19;9:662032, <https://perma.cc/4D7X-D9J5>.

55. For a list of journal articles, medical textbooks, and scientists' legislative testimonies affirming this scientific view, see: *Scientific Sources on When a Human's Life Begins*, WHENDOESLIFEBEGIN.ORG.

that they do not know of a viable alternative view in the scientific literature.

First, consider journals that have published articles with statements that specifically reference the fertilization view as marking the beginning of a human's life: *Reproduction*: "Human life begins with sperm and oocyte fusion,"⁵⁶ *Zygote*: "Such activity is particularly important at the beginning of human life, i.e. at fertilization, immediately after and at the very onset of embryonic development,"⁵⁷ *Australian and New Zealand Journal of Obstetrics and Gynaecology*: "The time of our conception is when we are most vulnerable to survival and growing as a healthy human being,"⁵⁸ *California Medicine*: "[T]he scientific fact, which everyone really knows, that human life begins at conception,"⁵⁹ and *Trends in Cell Biology*: "Most readers of this review originated from a sperm-egg fusion event."⁶⁰

56. Bikem Soygur & Leyla Sati, *The role of syncytins in human reproduction and reproductive organ cancers*, *REPRODUCTION*, 2016, 152(5):R167-78, <https://perma.cc/A7RD-68TF>.

57. Yves Ménézo, Brian Dale, & Marc Cohen, *DNA damage and repair in human oocytes and embryos: a review*, *ZYGOTE*, 2010 Nov;18(4):357-65, <https://perma.cc/ZQ6P-QCP2>.

58. Robert J. Norman, *2015 RANZCOG Arthur Wilson Memorial Oration 'From little things, big things grow: The importance of periconception medicine'*, *AUST N Z J OBSTET GYNAECOL.*, 2015, 55(6):535-40, <https://perma.cc/4WMH-9PH5>.

59. *A New Ethic for Medicine and Society*, Editorial, *CALIFORNIA MEDICINE* 113, Sep. 1970, p. 67-68, <https://perma.cc/D232-XM4G>.

60. Meital Oren-Suissa & Benjamin Podbilewicz, *Cell fusion during development*, *TRENDS CELL BIOL.*, 2007, 17(11):537-46, <https://perma.cc/KK7X-96VE>.

Other articles contain statements that do not make specific reference to humans, but instead make general reference to the view that fertilization marks the point at which a zygote can be classified as a new individual or as a new life: *Nature*: “Fertilization is a fundamental process in sexual reproduction, creating a new individual through the combination of male and female gametes,”⁶¹ *Cell*: “Recognition between sperm and the egg surface marks the beginning of life in all sexually reproducing organisms,”⁶² *Physiological Reviews*: “A proper dialogue between spermatozoa and the egg is essential for conception of a new individual in sexually reproducing animals,”⁶³ *Journal of Assisted Reproduction and Genetics*: “[A] new individual is derived from the fusion of a single sperm and egg,”⁶⁴ *Nature Reviews Molecular Cell Biology*: “During fertilization of an egg with a sperm,

61. Umeharu Ohto, Hanako Ishida, Elena Krayukhina, Susumu Uchiyama, Naokazu Inoue, & Toshiyuki Shimizu, *Structure of IZUMO1-JUNO reveals sperm-oocyte recognition during mammalian fertilization*, *NATURE*, 2016 Jun;534(7608):566-9, <https://perma.cc/3SDM-DJLY>.

62. Isha Raj, Hamed Sadat Al Hosseini, Elisa Dioguardi, Kaoru Nishimura, Ling Han, Alessandra Villa, Daniele de Sanctis, & Luca Jovine, *Structural Basis of Egg Coat-Sperm Recognition at Fertilization*, *CELL*, 2017, 169(7):1315-1326, <https://perma.cc/5LUK-PZUA>.

63. Alberto Darszon, Takuya Nishigaki, Carmen Beltran, & Claudia L. Treviño, *Calcium channels in the development, maturation, and function of spermatozoa*, *PHYSIOL REV*, 2011, 91(4):1305-55, <https://perma.cc/XN6N-9NGL>.

64. Martin Wilding, Gianfranco Coppola, Francesco De Icco, Laura Arenare, Loredana Di Matteo, & Brian Dale, *Maternal non-Mendelian inheritance of a reduced lifespan? A hypothesis*, *J ASSIST REPROD GENET*, 2014, 31(6):637-43, <https://perma.cc/5NW4-XD74>.

the haploid genomes of each parent are unified to form the diploid genome of a new and unique individual,”⁶⁵ and *Cell and Tissue Research*: “[F]ertilization is the process by which male and female haploid gametes (sperm and egg) unite to produce a genetically distinct individual.”⁶⁶

Similarly, some articles include statements that represent the fertilization view in terms of how it connects one generation to the next: *Science*: “Fertilization is the sum of the cellular mechanisms that pass the genome from one generation to the next and initiate development of a new organism,”⁶⁷ *Current Opinion in Genetics & Development*: “In mammals, a new generation begins when an oocyte is fertilized by a sperm to form a zygote,”⁶⁸ and *Methods in Molecular Biology*: “As representatives of the 60 trillion cells that make a human body, a sperm and an egg meet, recognize each other, and fuse to create a new generation.”⁶⁹

65. Dean Clift & Melina Schuh, *Restarting life: Fertilization and the transition from meiosis to mitosis*, NAT REV MOL CELL BIOL., 2013, 14(9): 549-562, <https://perma.cc/7MWS-XD64>.

66. Janetti Signorelli, Emilce S. Diaz, & Patricio Morales, *Kinases, phosphatases and proteases during sperm capacitation*, CELL TISSUE RES, 2012, 349(3):765, <https://perma.cc/R5YD-YS2N>.

67. Paul Primakoff & Diana G. Myles, *Penetration, adhesion, and fusion in mammalian sperm-egg interaction*, SCIENCE, 2002, 296(5576):2183-5, <https://perma.cc/X5SF-GQ2C>.

68. Cheun Yan Leung & Magdalena Zernicka-Goetz, *Mapping the journey from totipotency to lineage specification in the mouse embryo*, CURR OPIN GENET DEV, 2015, 34:71-6, <https://perma.cc/Z3LP-V4EH>.

69. Naokazu Inoue & Masaru Okabe, *Sperm-egg fusion assay in mammals*, METHODS MOL BIOL, 2008, 475:335-45, <https://perma.cc/8XH4-KCHB>.

While these statements vary in their framing of the fertilization view on when a human's life begins—as some specifically state that fertilization marks the beginning of a human's life while others generally state that fertilization marks the beginning of a new life, individual, or generation—they all fundamentally represent and lend credence to fertilization as the leading biological view on when a human's life begins.⁷⁰

C. Scientists' legislative testimony affirms the consensus on the fertilization view.

During hearings conducted by the Senate Judiciary Subcommittee on Senate Bill 158, the “Human Life Bill,” numerous scientific experts testified on the question of when a human's life begins. After hours of testimony by scientists and medical doctors, the Official Senate Report reached the following conclusion: “Physicians, biologists, and other scientists agree that conception marks the beginning of the life of a human being—of a being that is alive and is a member of the human species. There is overwhelming agreement on this point in countless medical, biological, and scientific writings.”⁷¹

70. This view is not merely shared by academics in the literature; it is also the view that college and medical students are taught in their biological and medical textbooks. *See, e.g., Harper Collins Illustrated Medical Dictionary*, New York: HARPER PERENNIAL, 1993, p. 146.; Keith L. Moore., *The Developing Human: Clinically Oriented Embryology*, 8th ed., Philadelphia: SAUNDERS, 2007. p. 2.

71. STAFF OF THE SUBCOMM. ON SEPARATION OF POWERS OF THE COMM. ON THE JUDICIARY, 97TH CONG., REP. ON THE HUMAN LIFE BILL 7 (1981).

French geneticist Dr. Jerome Lejeune testified that “[l]ife has a very, very long history, but each individual has a very neat beginning—the moment of its conception” because “[t]o accept the fact that after fertilization has taken place a new human has come into being is no longer a matter of taste or of opinion . . . it is plain experimental evidence.”⁷² Dr. Hymie Gordon, professor of medical genetics and physician at the Mayo Clinic, testified that “now we can say, unequivocally, that the question of when life begins—is no longer a question for theological or philosophical dispute. It is an established scientific fact. Theologians and philosophers may go on to debate the meaning of life or the purpose of life, but it is an established fact that all life, including human life, begins at the moment of conception.”⁷³ Experts also testified that there are no alternative theories on when a human’s life begins in the scientific literature.

Dr. Gordon claimed: “I have never encountered in my reading of the scientific literature—long before I became concerned with abortion, euthanasia, and so on—anyone who has argued that life did not begin at the moment of conception, or that it was not a human conception if it resulted from the fertilization of a human egg by a human sperm. As far as I know, there has been no argument about these matters.”⁷⁴ This lack of any alternative biological views in the literature was also attested to by Dr. Micheline Matthew-Roth, who worked as a principal

72. *The Human Life Bill: Hearing on S. 158 Before the Subcomm. on Separation of Powers of the S. Comm. on the Judiciary, 97th Cong. 8–10 (1981)* (statement of Dr. Jerome Lejeune, Professor of Fundamental Genetics, Medical College of Paris, France).

73. *Id.* at 13–17.

74. *Id.* at 21.

research associate in the Department of Medicine at the Harvard Medical School.⁷⁵

In 2005, the legislature in South Dakota also took up this question.⁷⁶ Their report concluded that “[t]here can no longer be any doubt that each human being is totally unique from the very beginning of his or her life at fertilization.”⁷⁷

D. 96% of 5,577 biologists from 1,058 academic institutions affirmed that a human’s life begins at fertilization.

1. The survey questions solely focused on the biological perspective on when a human’s life begins.

Since the fertilization view on when a human’s life begins has been shown to be the leading view among Americans⁷⁸, public health students⁷⁹, and *in vitro*

75. See *supra* n.72 at 16; Some have noted there was not “a single expert witness who would specifically testify that life begins at any point other than conception or implantation. Only one witness said no one can tell when life begins,” Landrum Shettles & David Rorvik, *Rites of Life: The Scientific Evidence of Life Before Birth*, Grand Rapids, MI: ZONDERVAN PUBLISHING HOUSE, 1983, 113.

76. H.B. 1233, 2005 Leg. Assemb., 80th Sess. (S.D. 2005).

77. *S.D. Abortion Task Force, Report of The South Dakota Task Force to Study Abortion*, 25 (2005).

78. *National Tracking Poll #190555 by Morning Consult*, May 28-30, 2019, <https://perma.cc/Z2V4-XUP9>; *Americans’ Opinions on Abortion*, KNIGHTS OF COLUMBUS MARIST POLL, Jan. 2018, <https://perma.cc/2PCU-UYSP>.

79. Andie L. Knutson, *When does a human life begin? Viewpoints of public health professionals*, Vol. 57, No. 12, AMERICAN

professionals⁸⁰—and since it has been stated without explanation or citation in articles published in peer-reviewed journals such as *Science*⁸¹, *Nature*⁸², and *Cell*⁸³—a survey was designed to assess whether biologists affirm the fertilization view.

Participants⁸⁴ were presented five statements (Q1-Q5) that represented various semantic framings of the

JOURNAL OF PUBLIC HEALTH, Dec. 1967, <https://perma.cc/XK5J-REDX>.

80. T.A. Elliott, J.A. Friedman, E.T. Siegel, H.I. Kort, & Z.P. Nagy, 'When does life begin?' *Results of an online survey*, FERTILITY AND STERILITY, Vol. 90, S65 - S66, <https://perma.cc/XR5X-67XF>.

81. *See supra* n.72.

82. *See supra* n.66; *see also*: Yuki Okada, Kazuo Yamagata, Kwonho Hong, Teruhiko Wakayama, & Yi Zhang, *A role for the elongator complex in zygotic paternal genome demethylation*, NATURE, 2010, 463(7280):554-8, <https://perma.cc/38A2-SRVS>; Naokazu Inoue, Masahito Ikawa, Ayako Isotani, & Masaru Okabe, *The immunoglobulin superfamily protein Izumo is required for sperm to fuse with eggs*, NATURE, 2005, 434(7030):234-8; Enrica Bianchi, Brendan Doe, David Goulding, & Gavin J. Wright, *Juno is the egg Izumo receptor and is essential for mammalian fertilization*, NATURE, 2014, 508(7497):483-7, <https://perma.cc/ZMP3-KT8E>.

83. *See supra* n.67.

84. Participation in the survey was sought from members of biology departments around the world. Of the participants who provided analyzable data, 5,577 biologists from 1,058 institutions provided analyzable data on operative questions. Most of the biologists in the sample identified as male (63%), non-religious (63%) and the majority held a Ph.D. (95%). Ideologically, most of the sample identified as liberal (89%) and pro-choice (85%). The sample was comprised of biologists from 86 countries. *See supra* n.17 at 239.

fertilization view. Participants were asked to affirm or reject the statements, and they were then presented an open-ended essay question on the biological perspective on when a human's life begins (Q6)⁸⁵:

Question 1: The end product of mammalian fertilization is a fertilized egg ('zygote'), a new mammalian organism in the first stage of its species' life cycle with its species' genome.

Question 2: The development of a mammal begins with fertilization, a process by which the spermatozoon from the male and the oocyte from the female unite to give rise to a new organism, the zygote.

Question 3: A mammal's life begins at fertilization, the process during which a male gamete unites with a female gamete to form a single cell called a zygote.

Question 4: In developmental biology, fertilization marks the beginning of a human's life since that process produces an organism with a human genome that has begun to develop in the first stage of the human life cycle.

Question 5: From a biological perspective, a zygote that has a human genome is a human because it is a human organism developing in the earliest stage of the human life cycle.

85. See *supra* n.17. at 240-241.

Question 6: From a biological perspective, how would you answer the question “When does a human’s life begin?”

While some focus on mammals and others focus on humans; while some are in the form of a declaration and others are in the form of an argument; all fundamentally represent the view that fertilization marks the beginning of a human’s life.

2. The results showed that biologists affirm the fertilization view.

The statement in Q1 was affirmed by 91% of participants (4555 out of 4993). The statement in Q2 was affirmed by 88% of participants (3984 out of 4510). The statement in Q3 was affirmed by 77% of participants (3153 out of 4078). The statement in Q4 was affirmed by 75% of participants (2500 out of 3334). The statement in Q5 was affirmed by 69% of participants (2744 out of 3980).⁸⁶

Of those who assessed at least one of the five statements, 96% of participants affirmed at least one (5337 out of 5577) and 4% did not (240 out of 5577). Similarly, of those who assessed multiple statements, 96% affirmed at least one (4463 out of 4650) while 4% affirmed none (187 of 4650), and 85% affirmed at least half of the statements they assessed (3936 out of 4650).⁸⁷

Consistent with their affirmation rates of the fertilization view in Q1-Q5, 68% of biologists represented the fertilization view (1898 out of 2794) in response to the

86. *See supra* n.18 at 244-246.

87. *Id.* at 249-250.

open-ended essay question on when a human's life begins (Q6). 10% represented some point between fertilization and the moment a fetus is viable (268 out of 2794), 10% represented the viability view (284 out of 2794), and 12% represented the view that a human's life begins at birth (343 out of 2794).⁸⁸

The strictest measure of biologists' views assessed the responses of participants who answered each question consistently—those who either affirmed each statement (Q1-Q5) and represented the fertilization view in response to the essay question (Q6) or rejected each statement and represented some later point. There was a greater number of participants who consistently affirmed the fertilization view (97%; 1011 out of 1044) than the number of participants who consistently did not affirm the fertilization view (3%; 33 out of 1044).⁸⁹

E. Abortion advocates and abortion doctors affirm that a human's life begins at fertilization.

Ethicist Peter Singer supports abortion rights and has promoted the fertilization view: “Whether a being is a member of a given species is something that can be determined scientifically, by an examination of the nature of the chromosomes in the cells of living organisms,” because “there is no doubt that from the first moments of its existence an embryo conceived from human sperm and eggs is a human being.”⁹⁰

88. *Id.* at 252.

89. *Id.* at 256.

90. Peter Singer, *Practical Ethics*, 2nd ed., CAMBRIDGE UNIVERSITY PRESS, 85–86, 1993.

Margaret Sanger, the founder of Planned Parenthood, once affirmed that: “[N]o new life begins unless there is conception.”⁹¹ Dr. Alan Guttmacher, an OB-GYN and former president of Planned Parenthood, wrote that:

We of today know that man . . . starts life as an embryo within the body of the female; and that the embryo is formed from the fusion of two single cells, the *ovum* and the *sperm*. This all seems so simple and evident to us that it is difficult to picture a time when it was not part of the common knowledge.⁹²

While there might be ideological, strategic, or psychological motivations to dispute the view that a human’s life begins at fertilization, proponents of abortion rights have conceded that there is no credible opposition to the scientific observation that fertilization marks the moment at, and process by which, a human begins his or her physical existence as an organism with a human genome developing in the human life cycle.

CONCLUSION

This brief does not represent the fertilization view as an incontrovertible fact of science, as the nature of science requires that any observation, view, or determination be subject to falsification. However, following the scientific method, and taking notice of scientific progress, also

91. Margaret Sanger, *The Pope’s Position on Birth Control*, 1932, <https://www.thenation.com/article/archive/popes-position-birth-control>.

92. Alan Guttmacher, *Life in the Making: the Story of Human Procreation*, VIKING PRESS, 1933, p. 3.

requires accepting fertilization as the leading biological view on when a human's life begins, today, and being open to the possibility of a paradigmatic shift, or scientific revolution, that causes the fertilization view to be supplanted at some point in the future.

The fertilization view is as subject to change due to new information as is the number of hydrogen atoms in a molecule of water: the number might not be two if scientists abandon the modern understanding of hydrogen, oxygen, atoms, molecules, and water—just as a human's life might no longer be deemed to begin at fertilization if scientists abandon the modern understanding of fertilization, the human life cycle, and the genetics-based method of biologically classifying organisms.

For all of the foregoing reasons, as true 'friends of the Court', the *amici curiae* do not ask anything of the Court, but instead respectfully submit this brief in case the Court uses *Dobbs* as an opportunity to analyze and discuss the biological perspective of when a human's life begins. *Amici* hope that the brief helps the Court in issuing a holding that is consistent with the best science available in 2021.

Respectfully submitted:

LYNN D. DOWD
Counsel of Record
LAW OFFICES OF LYNN D. DOWD
29 West Benton Avenue
Naperville, IL 60540
(630) 665-7851
ldowd@msn.com

Counsel for Amici Curiae

APPENDIX

APPENDIX — LIST OF *AMICI CURIAE*

The institutions are listed for identification purposes only, and the views expressed in the brief do not necessarily reflect the views of *amici's* affiliated institutions.

Patricia S. Astry, M.S, MT (ASCP)
State University of New York at Fredonia

Tor A. Bakke, Ph.D.
Natural History Museum, University of Oslo

George M. Branch, Ph.D.
University of Cape Town

Sarah J. Breese McCoy, Ph.D.
Oral Roberts University

C. David Bridges, Ph.D., D.Sc
Purdue University

Jeffery Burkhart, Ph.D.
University of La Verne

Michele Claiborne, Pharm.D.
Regis University

Brittany M. Cook, B.S.,
Mercer University

David P. Crews, Ph.D.
The University of Texas at Austin

Carl Decker, Ph.D.
University of La Verne

Appendix

Henry Disney, Ph.D., Sc.D.
Cambridge University

G. Kevin Donovan, M.D.
Georgetown University Medical Center

John E. Donton, M.L.A.S.
Alvernia University

Stephan Emmrich, Ph.D.
University of Rochester

Paige Ferguson, Ph.D.
The University of Alabama

Ian Fernandopulle, M.D., M.S.
New York City College of Technology - The City
University of New York

Katrina Furth, Ph.D.
Catholic University of America

Francisco García Novo, Ph.D.
Universidad de Sevilla

Evariste Bosco Gueguim Kana, Ph.D.
University of Kwazulu-Natal

James F. Hare, Ph.D.
University of Manitoba

Jeffrey O. Henderson, Ph.D.
Judson University

Appendix

F. Collin Hobbs, Ph.D.
Huntington University

Gavin Jarvis, Ph.D.
University of Sunderland

Manfred Jusaitis, Ph.D.
University of Adelaide

Ivan Robert Kennedy, Ph.D., D.Sc
University of Western Australia

John A. Kloetzel, Ph.D.
University of Maryland, Baltimore County

Nadine Kriska, Ph.D.
University of Wisconsin-Whitewater

Paul Layer, Dr.rer.nat.
Technical University of Darmstadt

Dean Anthony Lee, M.D., Ph.D.
The Ohio State University/Nationwide Children's
Hospital

Ivan Lindhout, B.Sc.
University of British Columbia - Okanagan

Dmitrij Ljaschenko, Ph.D.
University of Leipzig

John Long, Ph.D.
Flinders University

Appendix

Laura Madrigal-Estebas, Ph.D.
Trinity College Dublin

Yingwei Mao, Ph.D.
Penn State University

Graham Anthony Matthews, Ph.D., D.Sc
Imperial College London

Ian McGonigle, Ph.D.
Nanyang Technological University

Richard W. Merritt, Ph.D.
Michigan State University

Nathaniel Mills, Ph.D.,
Texas Woman's University

Robert J. Mitchell, Ph.D.
Ulsan National Institute of Science and Technology
(UNIST), South Korea

Jay Mittenthal, Ph.D.
University of Illinois, Urbana-Champaign

James P. Moné, Ph.D.
Millersville University

Piero Morandini, Ph.D.
Università degli Studi di Milano

J. Jeffrey Morris, Ph.D.
The University of Alabama at Birmingham

Appendix

John Neiswinger, Ph.D.
Belhaven University

Kai Norrdahl, Ph.D.
University of Turku

Fernando Ontiveros, Ph.D.
St. John Fisher College

Jean Peduzzi Nelson, Ph.D.
Wayne State University School of Medicine

Sebastian Padayatty, FFARCS, MRCP, Ph.D.
National Institutes of Health, Bethesda

David Prentice, Ph.D.
Catholic University of America

Todd P. Primm, Ph.D.
Sam Houston State University

Chrisostomos Prodromou, Ph.D.
University of Sussex

Mark T. Quinn, Ph.D.
Montana State University

Joseph W. Rachlin, Ph.D.
Lehman College - The City University of New York

Sir Richard J. Roberts, Ph.D.
1993 Nobel Laureate in Physiology or Medicine
New England Biolabs

Appendix

Tara Sander Lee, Ph.D.
Charlotte Lozier Institute

James L. Sherley, M.D., Ph.D.
Asymmetrex, LLC

Christopher Sobey, Ph.D.
La Trobe University

Janet Sprent, D.Sc
University of Uppsala

L. Andrew Staehelin, Ph.D.
University of Colorado Boulder

Gerald Stubbs, D.Phil.
Vanderbilt University

Mateusz Tałanda, Ph.D.
University of Warsaw

Matthew Temple, Ph.D.
Nazareth College

George S. Vidal, Ph.D.
James Madison University

Timothy Wakefield, Ph.D.
John Brown University

Timothy Walston, Ph.D.
Truman State University

Appendix

James F. Waters, Ph.D.
Humboldt State University

Chad M. Wayne, Ph.D.
University of Houston

Randy Wayne, Ph.D.
Cornell University

Michael Weible II, Ph.D.
Griffith University

Stanley Yu, Ph.D.
University of South Australia