Rabbi Edward Reichman, MD

THE ANATOMY OF JEWISH LAW

A Fresh Dissection
of the Relationship
Between Medicine,
Medical History,
& Rabbinic Literature

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The Anatomy of Jewish Law:
A Fresh Dissection of the Relationship Between
Medicine, Medical History, and Rabbinic Literature

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This book is lovingly dedicated to the memory of our dear parents

Nita Corre and Rabbi Dr. Alan Corre

חנן דוד בן יעקב
חנה מזל טוב בת יצחק

who devoted their lives to the observance and study of Halakha and to promoting the health and well-being of the Jewish community. They were dear friends of Dr. Reichman's parents, Rabbi Bernard and Shoshana Reichman, and cared for Eddie like one of their own. They would have taken great pride in the publication of this volume and its author.

Isaac Corre and Diana Newman

ספר זה מוקדש
לעילוי נשמות הורי היקרים

This book is dedicated in loving memory of
my dear parents, *aleihem hashalom*

Rabbi Baruch Reichman
Rebbetzin Shoshana Reichman

הרב ברוך בן יצחק אייזיק
רייזל שושנה בת אהרן יוסף

The love and guidance that flowed from my wonderful parents shepherded me to this milestone in my life. They completely embodied and exemplified the ideals of a true Torah life in all its manifestations. My parents both descended from prominent *Yerushalmi* families. My father was a descendant of the Hakham Tzvi, and my mother's grandfather, Rabbi David Weingarten, founded the General Israel Orphanage Home in Yerushalayim. My father was one of the few to personally receive *semikha* from Rav Yitzchak Hutner *zt"l,* of Yeshivas Rabbeinu Chaim Berlin. He served as a rabbi in Wisconsin for fifty years. His care and concern for his congregants was legendary. My mother was the consummate *rebbetzin* and teacher par excellence. Yet, they were most proud of the family they raised. Their love and devotion have been a constant source of inspiration for me. They will be forever missed! May their holy נשמות continue to have an עליה and may they be מליצי יושר for our family.

ת.נ.צ.ב.ה

ספר זה מוקדש
לעילוי נשמות מחותני היקרים

This book is dedicated in loving memory of
my dear parents-in-law, *aleihem hashalom*

Professor Louis H. Feldman
Mrs. Miriam Feldman

אליעזר צבי בן שמואל
מרים בת משה יעקב

My father-in-law was Professor of Classics at Yeshiva University for over fifty years. A world-renowned expert on Josephus, his dedication to scholarship and academia was legendary. He was a proud, *frum* Jew and wore his yarmulka to conferences all over the world, long before that was the norm. My mother-in-law was a survivor of the Holocaust, whose escape with her two sisters saved all their lives. Their love for family, combined with hard work and dedication to an ideal, have been a constant source of inspiration for me. They will be forever missed! May their holy נשמות continue to have an עליה and may they be מליצי יושר for our family.

ת.נ.צ.ב.ה

Contents

Foreword

Many sources in the Bible and even many more examples in the Talmud relate to diseases, treatments, medical advice, and other medical-related issues. Several experts in the past have attempted to interpret these matters based on the medical knowledge in the relevant periods. They based their remarks on their vast knowledge of the biblical and the talmudic literature combined with their knowledge of the history of medicine.

The previous experts in the field of Jewish medical history have covered almost exclusively appropriate passages in the Bible and the Talmud only. There has been hardly any effort in discussing and studying medical-historical issues in the halakhic literature of Codes and Responsa.

The knowledge of medical history is very important in understanding the reality according to which a particular *posek* reached his medical-halakhic conclusions. There has been a paucity of studies in medical history related to the halakhic literature. This book is, therefore, a unique and important addition to the field of medicine and halakha enabling one to apply halakhic precedence to current questions and dilemmas.

Rabbi Professor Edward Reichman, MD is one of less than a handful of experts who utilize their vast knowledge of the Codes and Responsa literature combined with his wide-range knowledge of medical

history in order to shed light on numerous issues with halakhic relevance discussed in the halakhic literature.

I have been privileged to know Rabbi Dr. Reichman for many years and to participate with him in numerous conferences on medicine and halakha. It has always been an outstanding learning experience to listen to the eloquent and in-depth lectures by Rabbi Dr. Reichman.

Now everyone has the opportunity to learn Rabbi Dr. Reichman's unique contribution to medicine and halakha through his excellent book, *The Anatomy of Jewish Law: A Fresh Dissection of the Relationship Between Medicine, Medical History, and Rabbinic Literature.* This book is replete with many examples from the halakhic literature where Rabbi Dr. Reichman discovers in a masterful way the underlying medical-historical reality through which the *posek* discusses and concludes his position. The book covers all fields of medicine and halakha, by *poskim* throughout the generations and geographic locations.

It is indeed an in-depth treatise of a unique field, written by a unique individual and expert, both in halakha and in medical history.

I highly recommend to everyone in the fields of medicine and halakha that they acquire and study this exceptional work.

Rabbi Professor Avraham Steinberg, MD

Preface

If you deem this book worthy of purchase, you will need to decide where on the shelves of your precious library it should be placed. In its broadest sense, it clearly belongs in the class of Judaism and science; yet, as our generation has witnessed a massive expansion in this domain, we need to further sub-classify this literature into genus and species.

This book deals primarily with medicine, the understanding of the human body, and the treatment of human disease, as opposed to other scientific endeavors. As such, you will find no discussion of evolution, creation, astronomy and the heliocentric theory, or physics. To be sure, there are significant areas of intersection.[1] Within the genus of Judaism and medicine, further subdivision is needed.

There are two major species within this genus, each with its own subdivisions.

1. Chief amongst them is the so-called topic of *nishtaneh hateva*, addressing scientific passages in *Ḥazal* that seemingly conflict with our modern understanding. This is not the primary purpose of this book, though any work on the frontier of science is invariably swept into the proverbial tide of *nishtaneh hateva*. We do refer to this topic periodically and reference the relevant literature.

- Medical halakha (Jewish medical ethics or Jewish bioethics)
- Jewish medical history

Medical Halakha

Rabbinic authorities have been addressing medical issues since the giving of the Torah. While great Torah sages have continued to address medical issues in the modern era,[2] the founder or grandfather of the academic field of contemporary Jewish medical ethics in the modern era is considered to be Rabbi Immanuel Jakobovits, *zt"l,* whose Ph.D. dissertation from University College of London was published as *Jewish Medical Ethics* in 1959. Since then, the field has blossomed.[3]

Jewish Medical History

There is another species in the genus of Judaism and medicine which focuses on Jewish medical history and its relationship to general medical history. Studies range from the biblical and talmudic period to Maimonides and up to the modern era.[4]

Rarely, if ever, do we find crosspollination between these two species. In the writings of medical halakha, you will scarcely find mention of medical history; likewise, the authors of Jewish medical history rarely invoke halakhic literature. The present work attempts to interface

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2. See Fred Rosner, ed., *Pioneers in Jewish Medical Ethics* (Jason Aronson, 1997). The great rabbinic authorities include Rabbi Shlomo Zalman Auerbach, *zt"l,* Rabbi Shalom Yosef Elyashiv, *zt"l,* Rabbi Moshe Feinstein, *zt"l,* Rabbi Eliezer Waldenberg, *zt"l,* Rabbi Asher Weiss, *shlit"a* and Rabbi Yitzhak Zilberstein, *shlit"a*.
3. The additional foundational pillars of the field who followed shortly thereafter include Rabbi J. David Bleich, Rabbi David Feldman, Dr. Fred Rosner, and Rabbi Dr. Moshe Tendler. They were in turn followed by the second generation of scholars who continued to expand the field, including Dr. Abraham Abraham, Rabbi Dr. Mordechai Halperin, Rabbi Yigal Shafran, Rabbi Dr. Avraham Steinberg, and Rabbi Dr. Akiva Tatz. There are now third and fourth generations continuing to expand the field.
4. Authors who have contributed to this field include Zohar Amar, Ron Barkai, Gerrit Bos, Kenneth Collins, John Efron, Ronald Eisenberg, Gad Freudenthal, Harry Friedenwald, Frank Heynick, Maoz Kahana, Yehudah Leib Katznelsen, Samuel Kottek, Tzvi Langerman, Joshua Leibowitz, David Margalit, Suessman Muntner, Michael Nevins, Moshe Perlman, Julius Preuss, Fred Rosner, David Ruderman, Eliezer Sariel, Joseph Shatzmiller, Avraham Ofir Shemesh, H. J. Zimmels, and Nimrod Zinger.

these largely disparate, dissociated disciplines in hopes of demonstrating that the Jewish and general history of medicine can shed light on, and provide context for, the world of medical halakha.

In the essays before you, we trace medical notions of anatomy, physiology, and therapeutics across time and genres of rabbinic literature. Oft times, our analysis is enlightened or enhanced by a study of the contemporaneous medical history. A few authors, such as Preuss, Zimmels, and Jakobovits, invoked medical theories contemporaneous with the sources they discussed. Their approach, in varying degrees, was performed on a macro, or horizontal, level, and they generally did not plumb the depths of specific topics.

In a sense, this book is an attempt to expand this approach and to apply it vertically. We pick up where they left off, following their lead to its logical extension. This work is by no means comprehensive or encyclopedic, nor is it systematic. The topics chosen to illustrate this approach merely represent the particular interests of the author.

These essays have previously appeared in a wide variety of publications over a span of years. They have been extensively revised, updated and integrated for this publication. The chapters of this book need not be read in sequence and are largely independent. As a result, there will be some limited repetition and overlap between chapters, including footnotes. They do however interrelate with each other, and when viewed in totality, will hopefully reflect a common theme of the value of placing medical halakhic sources into their historical context. It is the hope that this work will spark more research in this area where few have trodden.

Does this endeavor necessitate the creation of a new species or simply the new interrelationship of existing species? I will leave this to the reader to decide. Could this type of research impact the field of contemporary medical halakha? I will leave this to the *poskim* to decide.

As to where this book should sit on your bookshelf, I would suggest placement right between the sections on medical halakha and Jewish medical history, perhaps closer to the former, and serving as a bridge between them. It can serve as a supplement or complement to enhance your appreciation of the vast pre-modern rabbinic literature dealing with medical matters. This literature is the foundation upon which contemporary halakhic discussions are based.

Acknowledgements

It is with profound gratitude to *Hakadosh Barukh Hu* that I offer this humble contribution in partial fulfillment of my obligation of "*kitvu lakhem et hashira hazot*," to write my own Torah scroll, as it were. The gifts Hashem has bestowed upon my family and me are wholly undeserved, and I hope that this effort will serve as a small attempt *lihagdil Torah uleha'adira*, to enhance the glory and greatness of Torah.

I feel blessed to have been born into such a wonderful family, stemming from many generations of *Yerushalmim*. To my knowledge, I am the first physician in a long line of rabbis, scholars, and *gomlei ḥasadim* on both my paternal and maternal sides. My parents, Rabbi Barukh, *z"l* and Shoshana, *a"h* were ideal role models in every sense, encouraging and inspiring me throughout my life. This book is dedicated to their memory.

I feel blessed to have such an amazing wife, Sara, who not only was a superb editor for this book but is my life EDitor (not a typo) as well. My children, Shmulie and Rivka, Ari, Shoshana, and Elana, are the joys of my life. I pray that Sara and I, *b'ezrat Hashem*, continue to have much *naḥas* from our beautiful family. I thank Howard and Elkie, Leah and Brad, and Moshe and Ellen for their love and support and for being such wonderful siblings.

I feel privileged to have been born at a time when scientific advances have progressed more rapidly than any other time in history. I have had the *zechus* of being exposed to the great personalities in the

field of medical halakha, who have all influenced me in varying degrees, both as teachers and mentors, as well as through their writings. I was a student of Rabbi Dr. Moshe Tendler, *shlit"a* and Rabbi Dr. J. David Bleich, *shlit"a* during my years of education at Yeshiva University. I also learned from the *shiurim* of Rabbi Tzvi Flaum, *shlit"a*.

I chose to do my residency training where Dr. Fred Rosner was chairman. I recall the frequent visits to his office when, without exception, there was a handwritten manuscript of the latest medical halakhic topic on his desktop. He has been a mentor to me, a staunch supporter of my research, and has had a profound effect on my life. After residency, we learned Rambam every Friday together at his home for many years until he moved to Israel. Dr. Rosner contributed sections to two of the articles in this book on the topics of the Luz Bone and anesthesia in circumcision.

Over the years, I have had the great fortune to both attend and lecture at the conferences of a number of organizations such as the Association of Orthodox Jewish Scientists, the National Institute of Judaism and Medicine, and Torah in Motion. It is during these conferences that I was exposed to many great personalities in the field, including Rabbi Dr. Avraham Steinberg, *shlit"a*, from whom I have learned immeasurably and whose relationship I deeply cherish. I am profoundly appreciative of his contributing the Foreword to this book.

Aside from the classic works of rabbinic literature, the works that were most influential in the early years of my research for this book were those of Julius Preuss, H. J. Zimmels, and Rabbi Lord Immanuel Jakobovits, *zt"l*, as well as the Jewish medical history journal *Koroth*. A significant portion of my medical historical research was done at the Wellcome Institute for the History of Medicine in London. I recall the librarian mentioning that I was the first Orthodox Jew they had seen in the library since Rabbi Jakobovits, who conducted the research for his dissertation there. Dr. Nigel Allen, past curator of the Wellcome Institute's Oriental Collection, was instrumental in exposing me to the field of Jewish medical history.

On one trip to London, I attempted to visit the House of Commons to hear Margaret Thatcher during her weekly appearance. Unfortunately, the House of Commons gallery was full, so we were shunted to the House of Lords instead. As it turned out, the topic of debate on the floor

of the House of Lords was the status of the human embryo. Rabbi Lord Jakobovits was one of the first speakers of the day. His impassioned and articulate speech had a profound impact on me. I would later have the pleasure of visiting him at his home in London over the years. I also spent time in Jerusalem with Professor Joshua Leibowitz, *z"l*, and Professor Samuel Kottek (current editor of Koroth), two of the leaders in the field of Jewish medical history, who both inspired my passion for Jewish medical history.

I thank those who have provided me an opportunity to share some of these topics in a public lecture forum, which assisted in the development and refinement of the research. These include Sam Lasko of Lasko Tours; Rabbi Moshe and Corrine Fuchs; Robert Frucher and Matty Klein of Leisure Time Tours; Joel Mael and the *Hashkama Minyan* at Young Israel of Lawrence-Cedarhurst; the Edward Avenue *Ḥabura*; Rabbi Ephraim Mintz and Rabbi Mordechai Dinerman of the Jewish Learning Institute and National Jewish Retreat, and Rabbi Jay Kelman and Dr. Lazer Friedman of Torah in Motion.

This book would not have been possible without the aid of countless librarians, archivists and colleagues who were instrumental in recommending or acquiring oftentimes rare references. Tzvi Erenyi and Zalman Alpert of the Yeshiva University Library were always available for consultation, as were many others at institutions throughout the world mentioned by name in the footnotes. The ubiquitous Menachem Butler could always be counted on to obtain the unobtainable or to send an unsolicited rare reference.

A number of the chapters of this book have previously appeared in the following journals and books: *Tradition; Hakirah; Journal of the History of Medicine and Allied Sciences; Jewish Action; Torah U'Madda Journal; Verapo Yerapei: Journal of Torah and Medicine of the Albert Einstein College of Medicine Synagogue; BDD Journal of Torah and Scholarship; Mitoch HaOhel series* (Yeshiva University Press); F. Rosner, ed., *Pioneers in Jewish Medical Ethics* (Jason Aronson, 1997); F. Rosner, *Encyclopedia of Biblical and Talmudic Medicine* (Jason Aronson, 2000); F. Rosner, H. Goldstein, E. Reichman, eds., *Studies in Jewish Medical Ethics* (Hojers Forlag, 2008); Y. Steinberg, ed., *Berakha Le'Avraham*: Tribute volume in honor of Rabbi Dr. Avraham Steinberg's sixtieth birthday (Jerusalem, 2008); K. Collins, E. Reichman and

A. Steinberg, eds., *In the Pathways of Maimonides: Studies in Maimonides, Medical Ethics, and Jewish Law—A Tribute to Dr. Fred Rosner* (Maimonides Research Institute, 2015). They have been extensively revised, updated and integrated for this publication. I thank all the publishers for permission to republish the material here.

OU Press, under the leadership of Rabbi Menachem Genack, has been involved with this project since the outset. I thank Rabbi Simon Posner at OU Press for his tremendous support, dedication, and persistent efforts in seeing this publication to fruition. I cannot thank Yocheved Goldberg enough for her countless hours of excellent editing and her dedication to this project. I also thank Rabbi Daniel Feldman and Rabbi Dr. Stuart Halpern at YU Press for facilitating a joint publication with OU Press. Thanks as well are due to Matthew Miller and his staff at Maggid Books, with a special note of gratitude to managing editor Caryn Meltz, for their professionalism.

The Atran Foundation provided a generous donation towards the publication of the book, for which I am most grateful.

It is deeply meaningful to me and so very much appreciated that this book is generously sponsored by Isaac and Diana Corre in honor of Isaac's parents, Rabbi Dr. Alan and Mrs. Nita Corre, *aleihem hashalom*. Isaac, or Crow as I fondly call him, was my closest childhood friend in Milwaukee, and we were inseparable. I fondly recall those simpler days when the most complex decision I would have each week was whether Isaac should come to my house Shabbos afternoon, or I to his. Many of my most cherished childhood memories include Isaac and his family. Professor and Mrs. Corre were pillars of the Milwaukee Jewish community, as were my dear parents. Rabbi Dr. Corre was a towering intellectual and Professor of Hebrew Studies at the University of Wisconsin. Mrs. Corre was director of the Jewish Home and Care Center in Milwaukee. Her devotion, vision and leadership were legendary. They both served as wonderful role models for me. Furthermore, my parents, *a"h*, and the Corres, *a"h*, were the closest of friends and shared a mutual and deep admiration for each other. There is no question that our parents are smiling down from heaven knowing that they have successfully passed the mutual admiration society to the next generation.

Introduction

The Impact of Medical History on Medical Halakha

There is a foundational idea about the creation of the world expressed by *Ḥazal*: *HaKadosh Barukh Hu histakel be'Oraita ubara alma*—God literally looked into the text of the Torah and created the world. In essence, the Torah is the divine blueprint for the world's creation. I submit that the converse is true for man. *Adam histakel be'alma ubara Oraita*—the human being examines the world around him and creates, in a figurative sense, the Torah. When one delves into the workings of the world through the study of medicine and science, he or she brings the Torah to life and gains an appreciation of God's role in the creation of the world.

The crowning glory of God's creation is the human being. To understand the creation of the human being, the process of conception and birth, human anatomy and physiology, is to understand the human being's Creator. Therefore, people in every generation have sought to gain greater insight into the workings of the human body and the world of medicine.

Regarding the very creation or birth of the human being, the Talmud informs us of the origin of a minor anatomical feature of major consequences called the philtrum—the small infra-nasal indentation. According to tradition, the fetus learns the entire corpus of Torah in utero.[1] Just prior to birth, however, the baby receives the touch of an angel, which causes the indentation of the philtrum. This afflicts the child with transient amnesia, causing the child to forget all he has learned, necessitating years of laborious effort to restore this lost knowledge. What could possibly be the benefit to the child of such a seemingly cruel act? Many have suggested that the very process of reacquiring the Torah through years of struggle and tireless effort (*yegiah*) will lead to a more meaningful and everlasting relationship with the Torah and its Creator. A person can then, theoretically, with proper devotion and effort, ultimately return to his state of knowledge in utero, when he had mastered the entire Torah.

What of the study of science, however, and the understanding of human physiology? Does the individual child learn the intricacies of medicine and science in utero, only to forget and subsequently relearn them all with proper effort? Assumedly not, at least not as an individual. In fact, while it is theoretically possible for one person to learn the entire corpus of Torah teachings, this is decidedly not the case for science and medicine. While throughout the ages we have been blessed with Torah sages who have been the repositories of all extant Torah knowledge, no such analogue exists in science. There is no one human being who possesses all knowledge of medicine and science. The greatest minds in the history of medicine and science knew only the minutia of their specific fields. Einstein knew little about human physiology.

Science, by definition, is a collaborative endeavor, advanced only through the accumulated efforts of thousands of great minds across the span of time. Perhaps, analogous to a person as an individual working to restore his lost knowledge of the Torah, all of humanity works tirelessly to restore the knowledge of the scientific workings of the world that was known at the time of creation, attempting to reverse our global amnesia. This endeavor has progressed slowly, with each generation adding

1. *Nidda* 30b.

incrementally to our collective knowledge of science and medicine, and thus our appreciation of *HaKadosh Barukh Hu*.

Some advances have incorporated and built on pre-existing theories, while others have rejected or supplanted previous notions. This evolution of the understanding of medicine is reflected in the rabbinic literature throughout the centuries.

Rabbinic authorities at every stage of history invariably sought medical consultation, either directly or indirectly, prior to rendering decisions on *materia medica*.[2] The accumulated literature of centuries of medical halakhic discourse serves as the foundation for contemporary medical halakhic analysis. As this literature spans the chronological gamut of scientific and medical discovery, it is essential to view each source in its proper historical context.

The objective of this book is to sensitize the reader to the historical dimension of medical halakhic research. Modern rabbinic authorities integrate the most current medical information in order to address contemporary medical halakhic issues. Rabbis of previous generations most assuredly did the same, though the state of medical knowledge and authoritative sources clearly differed from that of today. What is often neglected is the value of an understanding of medical history as a supplement or adjunct to the study of medical halakha.

This book illustrates how a medical historical approach can be informative. Below I enumerate some specific ways this methodology will be helpful to an understanding of the overall corpus of medical halakhic literature. As this field of research remains largely unexplored, this exercise is an attempt to pave the path for future exploration. It is my hope that these categories and examples will be expanded, refined, restructured, or replaced as research in this area evolves. I make no pretense to determine the halakhic relevance of this research. This lies exclusively in the domain of the great Torah sages and rabbinic authorities. At the very least, it is my hope that this approach will enhance Torah study and provide an appreciation of the ongoing and continuously evolving relationship between science, medicine, and Jewish law.

2. See chapter, "A Letter from a Torah Sage of the Eighteenth Century."

I. TEXTUAL INTERPRETATION

On a microcosmic level, an understanding of medical history can enhance or facilitate the interpretation of a particular text in a number of ways.

Identification of Personalities

Modern medical halakhic responsa, despite their reliance on modern medicine and their inclusion of detailed scientific information, rarely contain references to specific physicians or scientists. In contrast, pre-modern medical halakhic literature frequently contains such specific references. This is due, in large part, to the nature of medical training and tradition in the pre-modern era. Whereas today, medical students study textbooks that are a composite of multiple authors, the medical student curriculum of the Middle Ages and Renaissance consisted of selected works of a handful of authors, primarily from Greek antiquity.[3] Three of these authors, Hippocrates (c. 460 BCE–c. 368 BCE),[4] Galen (c. 130 CE–c. 200 CE)[5] and Avicenna (980 CE–1037 CE),[6] are often cited in rabbinic literature. The references may be accompanied by the title of physician,[7] but sometimes there is no indication of the secular or medical origin of the author.[8] Avicenna is called Ibn Sina in Hebrew and could easily be mistaken for a rabbinic source. The names of these physicians did not require identification by the rabbinic authors, as they were undoubtedly familiar to the contemporary reader. In fact, the works of all the aforementioned medical authors were frequently translated into Hebrew[9] and were an integral part of the Jewish physician's library.

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3. S. D'Irsay, "Teachers and Textbooks of Medicine in the Medieval University of Paris," *Annals of Medical History* 8 (1926), 234–239; S. Cooper, "The Medical School of Montpellier in the Fourteenth Century," *Annals of Medical History: New Series* 2 (1930), 164–195, esp. 174; N. G. Siraisi, *Medieval and Early Renaissance Medicine* (University of Chicago Press, 1990), 70–77.
4. *Teshuvot Maharashdam, Ḥ.M.*, 364. Hippocrates is referred to as *Avukrat* in Hebrew.
5. Ibid.; *Teshuvot Maharshakh* 2:160; *Tzitz Eliezer*, 10:25, chap. 4.
6. *Teshuvot Darkhei No'am, Y. D.*, 26; *Noda BiYehuda, Mahadura Tinyana, Y. D.*, 21; *She'eilat Ya'avetz* 1:41 and 171.
7. *Teshuvot Maharsham, Ḥ.M.*, 364; *Noda BiYehuda, Mahadura Tinyana, Y. D.*, 21.
8. *She'eilat Ya'avetz* 1:41 and 171.
9. E. Lieber, "Galen in Hebrew: The Transmission of Galen's Works in the Medieval Islamic World," in *Galen: Problems and Prospects* (Wellcome Institute for the History

Knowing the nature of an author's reference can enhance the reader's interpretation. It is helpful to know that the author is citing a medical authority when discussing a medical matter. Such reliance on physicians could contribute to the general discussion on the reliance on medical knowledge in halakha (*ne'emanut harofim*). On a pragmatic note, knowing that the citation is not rabbinic in origin may also prevent fruitless searches for a reference.

Clarification of Concepts and Terminology

Just as medical personalities mentioned in rabbinic literature may be unfamiliar to the modern reader, the same is true for medical terminology and theories. Rabbinic literature throughout history, ranging from biblical to halakhic commentaries, is replete with allusions to medical theories. These theories are variously assimilated depending on the context and are better understood in their proper medical historical milieu. Many of the chapters in this book address such theories, such as the theory of innate heat, the doctrine of the seven-chamber uterus, and pre-modern theories of reproductive, cardiac, and respiratory physiology.

Prevention of Misapplication

Another dimension of textual interpretation enhanced by the study of medical history is an appreciation of the medical facts from which a halakhic decision is derived. For example, in the assessment of medical risk in halakha and the permissibility of undergoing potentially dangerous procedures, a passage from the works of R. Yaakov Emden is oft quoted.[10] The medical condition R. Emden discusses is the very same medical

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of Medicine, 1981), 167–186; one need only peruse the index of H. D. Isaacs, *Medical and Para-Medical Manuscripts in the Cairo Geniza Collection* (Cambridge University Press, 1994) under Galen, Hippocrates and Avicenna to appreciate the popularity of these authors. For a list of extant Hebrew manuscripts of Avicenna's Canon, see B. Richler, "Manuscripts of Avicenna's Canon in Hebrew Translation: A Revised and Up-to-Date List," *Koroth* 8:3–4 (August, 1982), 145–68. Avicenna's Canon is the first Hebrew medical book to be printed and the only extant Hebrew medical incunable (Naples, 1491). See also J. O. Leibowitz, "Ibn Sina in Hebrew," *Koroth* 8:1–2 (June, 1981), 3–8; D. Wilk, "One Thousandth Anniversary of Ibn Sina: Notes from the Library," ibid., 91–95.

10. *Mor UKetzia*, *O. H.*, 328.

condition which is the basis for the classic responsum on autopsy by R. Yeḥezkel Landau. The chapter "A Tale of Two Stones" is devoted to placing these responsa in their proper medical historical context and suggesting how this might impact their extrapolation to a modern context.

II. TEXTUAL CONTEXTUALIZATION

An awareness of medical history may also enable the reader to look beyond the text itself and appreciate the particular source in its historical context. What precipitates discussion of certain issues at a certain period in history? A number of our chapters highlight this dimension.

One of the first responsa addressing the issue of autopsy and anatomical dissection is that of R. Yeḥezkel Landau of eighteenth-century Prague.[11] Our chapter "A Tale of Two Stones" explains why this important topic was not addressed previously by Rambam or the *Shulḥan Arukh*.

Another example of the importance of chronology in the interpretation of medical discussions in rabbinic literature can be found not in the halakhic literature but in the exegetical literature. In our chapter "The Doctrine of the Seven-Chamber Uterus" we discuss a curious anatomical notion which is employed by a number of medieval exegetes in their explication of certain biblical passages.[12] If this is how the uterus was thought to be constructed, why is this anatomical notion not mentioned in the Talmud? It would certainly be important for the clarification of the laws of *nidda*. Furthermore, we find no primary rabbinic source mentioning this doctrine after the seventeenth century. Here again, an appreciation of medical history sheds light on these questions.

Similar to the doctrine of the seven-chamber uterus, rabbis of the sixteenth and seventeenth centuries address the halakhic ramification of a medicine called mumia which was derivative from the human corpse. Our chapter on mumia explains why discussions of mumia are not to be found either before or after this time period.

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11. *Noda BiYehuda, Mahadura Tinyana Y. D.*, 210.
12. On what follows, and for a comprehensive treatment of this notion, see chapter, "The Doctrine of the Seven-Chamber Uterus."

Included in this category are discussions about specific diseases in past halakhic literature which are no longer prevalent today, such as smallpox. In addition to smallpox, we have chapters on Rubella, Ebola and Zika. Even Zika, which only surfaced during the writing of this book, has already receded from our memories. As I write these words, we are still immersed in the Covid-19 pandemic, to which we also devote an entire chapter. Therein we compare the halakhic and Jewish communal responses to Covid-19 with the rabbinic responses to previous pandemics.

III. TEXTUAL UTILIZATION

Not only does the study of medical history enhance textual understanding and chronological sensitivity of rabbinic texts, in broadening our scope to view the entire system of halakha, it can also aid in finding halakhic discussions and analyses that can serve as direct or indirect precedents in modern halakhic discourse. As in the practice of medicine, where certain historical medical theories or treatments are occasionally exhumed and resuscitated for modern use, such as the case of leeches, there are many long-forgotten episodes in the history of medical halakha that might bear relevance to modern medical halakhic discourse.

Some of these narratives may have direct relevance to modern discourse, dealing with substantively similar issues, albeit from a different scientific vantage point. Examples of this type, which are developed in the chapters of this book, include the halakhic discussions on smallpox vaccination in the eighteenth century; a journal exchange in the early twentieth century about the halakhic ramifications of ovarian and uterus transplantation; discussions across the centuries of the possibility of shared paternity based on a passage in Talmud Yerushalmi; deliberations on the legal implications of resuscitation after death long before CPR was possible.

Other medical halakhic narratives, especially when viewed as part of a continuum of the interface of science and halakha, may provide theological or philosophical foundations with which to address new scientific discoveries.[13] Some contemporary halakhic issues, such as abortion or Sabbath issues and medicine, can be directly extrapolated

13. See, for examples, chapters, "The Resuscitation of Halakha" and "Shared Biological Paternity in Rabbinic Literature."

from the extant halakhic corpus. The same principles and precedents are simply applied to the newly evolving circumstances. Other issues, however, such as genetic engineering, cloning, and surrogate motherhood, being products entirely of modern composition, have no clear halakhic precedents and test the limits of rabbinic creativity in finding relevant material in the existing body of halakhic literature.[14] It is in the latter circumstances that analysis of earlier halakhic discussions, where rabbinic authorities were grappling with new scientific discoveries, could contribute to modern dialogue and discourse.[15]

Viewing a collection of rabbinic responses to a particular category of scientific discovery may yield theological or halakhic patterns and themes that would not be discernible from viewing one historically isolated incident. The lessons and principles gleaned from this approach could be assimilated or adapted to our modern context.

Cloning and genetic engineering reflect a paradigm shift in our ability to manipulate the human body, and in the way we view the human being. The attendant halakhic issues relate not only to the pragmatic concerns of the definition of personhood and parentage, but also to the larger issues of interference in the process of procreation and the divine order. To assist in the exploration of these broader issues, it might be helpful to return to previous episodes in history where the rabbis were confronted with similar concerns. In the early responsa on artificial insemination, for example, the first form of human intervention in the process of procreation, one may find themes that could be applied equally to the issue of cloning. Concerns expressed in these responsa, such as the dissolution of the family structure, ambiguity of lineage, the generation of people with uncertain parentage, and the propriety of intervening in matters once thought to be the provenance of God exclusively, are all equally applicable to a discussion of cloning. While not always explicitly stated in this book, these ideas can be extrapolated from its pages.

A general approach to scientific theories that seemingly conflict with rabbinic tradition can likewise be gleaned from previous historical

14. See chapter, "Midrash, Miracles, and Motherhood: The Birth of Dinah and the Definition of Maternity—*Tzarikh Iyun LeDina*."

15. See chapter, "The Resuscitation of Halakha."

chapters. In the sixteenth century, in a world that accepted the geocentric theory as absolute, objective fact, Copernicus dared challenge this age-old notion so invested with theological significance. With the heliocentric theory came a reevaluation of the earth's place in the universe. In the seventeenth century, Francesco Redi, with his simple yet elegant experiments, put the first nail in the coffin of the long-held notion that insects generate spontaneously. In the nineteenth century, Darwinism sparked a debate and reassessment of the evolution of the human being in relation to the earth. Each of these paradigmatic shifts in the histories of astronomy,[16] reproductive physiology,[17] and biology[18] produced a response in rabbinic literature. We explore lesser-known historical notions in anatomy and physiology throughout the book. Lessons or themes extracted from this literature contribute to the discourse on modern issues.

16. Andre Neher, *Jewish Thought and the Scientific Revolution of the Sixteenth Century: David Gans (1541–1613) and His Times*, trans. D. Maisel (Oxford University Press, 1986); J. Brown, *New Heavens and a New Earth: The Jewish Reception of Copernican Thought* (Oxford University Press, 2013).
17. Y. Lampronti, *Paḥad Yitzḥak*, s. v., *tzeida asura*; E. Dessler, *Mikhtav MeEliyahu*, 4, ed. A. Carmell (5748), 355, n. 4; D. B. Ruderman, "Contemporary Science and Jewish Law in the Eyes of Isaac Lampronti and Some of His Contemporaries," *Jewish History* 6:1–2 (1992), 211–224, reprinted in ibid., *Jewish Thought and Scientific Discovery in Early Modern Europe* (Yale University Press, 1995); A. Carmell and Y. Levi, "*Re'ot HaEinayim BiKeviut HaHalakha*," *Hama'ayan* 23:1 (*Tishrei*, 5743), 64–69; I. Herzog, *Heikhal Yitzḥak*, O. H., 29; N. Slifkin, "The Spontaneous Sweat-Louse," in his *Sacred Monsters* (Zoo Torah, 2007), 349–381; M. Meiselman, "Lice and Fleas," in his *Torah, Ḥazal and Science* (Israel Bookshop, 2013), 300–320.
18. The literature on evolution merits its own bibliography. See, for example, articles in A. Carmell and C. Domb, eds., *Challenge: Torah Views on Science and its Problems* (Feldheim Publishers, 1978); D. W. Weiss, *The Wings of the Dove: Jewish Values, Science and Halakhah* (B'nai B'rith Books, 1987); L. C. Dubin, "The Reconciliation of Darwin and Torah in *'Pe-er ha'Adam'* of Vittorio Hayim Castiglioni," *Italia Judaica* 4 (1993), 273–284; essays in H. Branover and Ilana Coven Attia, eds., *Science in the Light of Torah: A B'or Ha'Torah Reader* (Jason Aronson, 1994); B. Sterman, "Judaism and Darwinian Evolution," *Tradition* 29:1 (Fall 1994), 48–75; L. Spetner, *Not by Chance: Shattering the Modern Theory of Evolution* (Judaica Press, 1996); N. Aviezer, *Fossils and Faith: Evolution, Darwin, Dinosaurs and the Bible* (Ktav, 1998); N. Slifkin, *The Challenge of Creation* (Zoo Torah, 2012).

IV. CONCLUSION

The principles distilled from the rich history of rabbinic literature, in conjunction with a knowledge and appreciation of medical history, will better equip us to confront the ever-increasing complexities of the medical discoveries that lie ahead. This exercise will hopefully give the reader not only a greater appreciation of the scope and breadth of rabbinic integration of medical knowledge throughout the ages, but will also provide a context and framework within which to address future halakhic issues.

Fertility and Reproduction

The Rabbinic Conception of Conception: An Exercise in Fertility

The extraordinary technological advances of this century have been applied with full force to the field of science and, in particular, to genetics and reproductive medicine. Humankind now has more control over its own reproduction than ever before in history, such that the old notion of the doctor playing God has taken on new meaning. In the ultimate form of *imitatio Dei*, it now appears that just as God creates, so does mankind. Scientists have the ability to manipulate almost every step in the process of procreation.

Although all acknowledge the value of this technology, it is not without its cost. Whereas the Talmud mentions only three partners in creation—the father, the mother, and God—current reproductive practices have expanded the list of potential partners to include the sperm donor, egg donor, surrogate mother, mitochondrial DNA donor, and possibly artificial reproductive seed donor. If our current experience is any measure, then introducing more partners clearly introduces more complications, be they emotional, financial, legal or ethical.

To solve these ethical dilemmas, secular ethicists utilize philosophical principles; some with historical precedent, and others, simply based on human imagination. In either case, ethicists are in no way bound to the ideas of the past. We, however, as Orthodox Jews who subscribe to the halakhic process and live by the words of *Ḥazal*, employ the past to solve the dilemmas of the present and future. We turn to our predecessors for both halakhic and ethical guidance.

All contemporary halakhic discussions of reproductive technology cite sources ranging from antiquity to the Renaissance to modern times. As the understanding of reproductive anatomy and physiology has changed throughout the centuries, the author of each source, depending on its historical period, assumes a unique understanding of embryology and reproductive medicine. Therefore, an awareness of the embryological theories contemporary with each author may aid our understanding of his discussion of medical or scientific ideas. Furthermore, if the context of the source is halakhic, it may enhance our appreciation of the halakhic issues with which the author is dealing. This knowledge can perhaps assist current *poskim* (rabbinic authorities) in their utilization of rabbinic source material for incorporation into medical halakhic responsa. I therefore suggest that we pause for a moment from addressing modern halakhic dilemmas of reproductive technology and look backward to consider our predecessors' conception of conception.

This chapter discusses selected passages from rabbinic literature from antiquity to modern times that explicitly address or allude to theories relating to reproduction. The sources will be discussed both in their own right, as well as in a medical historical context. Although rabbinic sources cover the gamut of issues of reproduction and heredity, I have chosen to concentrate on three topics for purposes of illustration, each highlighting a different aspect of reproductive medicine. The first topic addresses the very nature of the male and female seeds, focusing largely on embryology—in other words, who contributes what material to the fetus. The second section traces the history of artificial insemination, a matter of reproductive physiology, and contains sources that are often quoted in contemporary halakhic discussions. Therefore, the rabbinic sources in this section will receive disproportionately more in-depth study than the secular. The final section addresses a particular notion

regarding reproductive anatomy. In each section, the secular sources will be discussed separately. In the first section only, as a historical introduction, the secular sources will precede the Jewish.

I. EMBRYOLOGY

1) Secular Sources

Almost all major figures in the history of science in antiquity devoted time to the study of animal and human embryology.[1] As knowledge of anatomy[2] and physiology was limited, theories were based on simple observation and philosophical intuition. Analogies were often made to agriculture, the male seed compared to the plant seed and the uterus, to the nourishing earth.[3] The male contribution to conception was readily

1. For an overview of the history of embryology, see J. Needham, *A History of Embryology* (New York, 1959); Howard Adelmann, "A Brief Sketch of the History of Embryology before Fabricius" in his translation of *The Embryological Treatises of Hieronymous Fabricius of Aquapendente* (Ithaca, 1967), I, 36–70. For references to embryology in Jewish sources, see Samuel Kottek, "Embryology in Talmudic and Midrashic Literature," *Journal of the History of Biology* 14:2 (Fall 1981), 299–315; David I. Macht, "Embryology and Obstetrics in Ancient Hebrew Literature," *John Hopkins Hospital Bulletin* 22: 242 (May, 1911), 1–8; W. M. Feldman, "Ancient Jewish Eugenics," *Medical Leaves* 2 (1939), 28–37; D. Shapiro *Obstetrique des Anciens Hebreus* (Paris, 1904); W. M. Feldman, *The Jewish Child* (London, 1917), 120–144; H. J. Zimmels, *Magicians, Theologians and Doctors* (Edward Goldston and Son, 1952), 62–64; Needham, op. cit., 77–82; Julius Preuss, *Biblical and Talmudic Medicine* (Hebrew Pub. Co., 1978), 41–138; Ron Barkai, *Les Infortunes De Dinah: Le Livre De La Generation—La Gynecologie Juive au Moyen Age* (Paris, 1991) (I thank Mr. Tzvi Erenyi for bringing this latter book to my attention).
2. There are no clearly documented human dissections from the time of Rashi, although scattered references to autopsies and dissections appear in the thirteenth and fourteenth centuries. Mundinus (1270–1326) is recognized to have been the first to incorporate human anatomical dissection into the medical curriculum. See, for example, C. D. O'Malley, *Andreas Vesalius Of Brussels* (Berkeley, 1964), 1–20; Ludwig Edelstein, "The History of Anatomy in Antiquity," in *Ancient Medicine* (Baltimore, 1967), 247–302; Charles Singer, *A Short History of Anatomy and Physiology from the Greek to Harvey* (New York, 1957); Mary Niven Alston, "The Attitude of the Church Towards Dissection Before 1500," *Bulletin of the History of Medicine* 16:3 (October, 1944), 221–238; Nancy Sirasi, *Taddeo Alderotti and His Pupils* (Princeton, 1981), 66–69. For further discussion on anatomy in rabbinic literature, see the section below, Anatomy and Physiology.
3. Hippocrates in his essay "The Seed and the Nature of the Child" devotes a lengthy section to agriculture. He says, "You will find that from beginning to end the process

observable, as the male seed was emitted outside the body. The nature of the female contribution, however, was a matter of intense debate.

Female Seed

Since the female seed was not visible to the naked eye and was not emitted externally, its very existence was a matter of conjecture. As a result, two competing theories evolved in antiquity which coexisted until pre-modern times.[4] Galen,[5] following in the footsteps of Hippocrates,[6] maintained that both the male and female contributed seed. The exact identity of the female seed was in question, but he conjectured it might be located in the uterus. He also claimed that the male semen provides the material for the development of the nerves and the walls of the arteries and veins in the fetus, while the menstrual fluid is the source of the blood.[7] Aristotle, on the other hand, denied the existence of a female seed, claiming that only the male possessed seed. This seed provided the "form" and the "principle of the movement" of the fetus, whereas

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of growth in plants and humans is exactly the same." G. E. R. Lloyd, ed., *Hippocratic Writings* (New York, 1978), 341; A. J. Brock (trans.), *Galen On the Natural Faculties* (London, 1916), 19.

4. See Joseph Needham, *A History of Embryology* (New York, 1959) for extensive discussion of ancient theories of embryology. For a comprehensive account of pre-Aristotelian theories of sexual generation, see Erna Lesky in *Die Zeugungs und Vererbungslehre der Antike und ihre Nachwirkung* (Mainz, 1950). This work is widely quoted. See also the classic work by Monica Green, *The Transmission of Ancient Theories of Female Physiology and Disease Through the Early Middle Ages* (Doctoral Dissertation, Princeton University, 1985) and Sarah George, *Human Conception and Fetal Growth: A Study in the Development of Greek Thought From Presocrates through Aristotle* (Doctoral Dissertation, University of Pennsylvania, 1982).
5. Galen discusses his theories of generation in many places. See, for example, Margaret Talmadge May, trans., *Galen: On the Usefulness of the Parts of the Body* 2 (Ithaca, 1968), 620–654. See also Anthony Preus, "Galen's Criticism of Aristotle's Conception Theory," *Journal of the History of Biology* 10:1 (Spring 1977), 65–85.
6. Modern scholarship has revealed that the Hippocratic corpus is not the work of one author. For ideas of conception see, for example, G. E. R. Lloyd, ed., *Hippocratic Writings* (New York, 1978), 317–346, chapter entitled "The Seed and the Nature of the Child."
7. Preuss, op. cit., 83. See also Needham, op. cit., 78 who quotes a similar idea from Hippocrates.

the female provided the material from which the fetus was formed; i.e., the menstrual blood.[8]

It can be argued which of these theories predominated throughout the Middle Ages, but the falsehood of Aristotle's theory was decisively demonstrated by William Harvey. Harvey (1578–1657), known best for his description of the circulation of the blood, was also a pioneer in the field of embryology. While the ovum had not yet been described in his lifetime, he nonetheless postulated that all living beings must derive from eggs.[9] Aside from placing the first nail in the coffin of the theory of spontaneous generation,[10] Harvey superseded Aristotle and paved the path for Reinier de Graaf, who in 1672 first described the egg follicle.[11] The microscopic female human egg as we now know it was

8. See A. L. Peck, (trans.), *Aristotle: Generation of Animals* (Cambridge, 1942), 71, 100–101, note a, 109–112.
9. *Exercitationes de Generatione Animalium* (Amsterdam, 1651), later translated and annotated by Gweneth Whitteridge, *Disputations Touching the Generation of Animals* (Oxford, 1981).
10. The belief in spontaneous generation in Jewish and secular sources merits its own article. A passage in *Masekhet Shabbat* 107b seems to indicate that the rabbis believed that lice could spontaneously generate. This passage, as well as others that conflict with our current understanding of science, have been the subject of many a heated discussion. Francesco Redi (1620–1697) was the first to scientifically study spontaneous generation and he dealt the theory its first major blow in his work, *Esperienze Intorno Alla Generazione Deg'lisetti* (Florence, 1668). Louis Pasteur (1833–93) laid the theory to rest. For treatment of this topic in Jewish sources see Yitzḥak Lampronti, *Paḥad Yitḥak* (*Bnei Brak*, 1980), s. v., "*Tzedah HaAsura*"; Arye Carmell ed. Eliyahu Dessler, *Michtav MeEliyahu* 4 (Jerusalem, 1984), 355, note 4; Arye Carmel and Yehuda Levi, "*Re'ot HaEinayim Bek'viut HaHalakha*," *HaMa'ayan* 23:1 (*Tishri*, 1983), 64–69; David Ruderman, "Contemporary Science and Jewish Law in the Eyes of Isaac Lampronti of Ferrara and Some of His Contemporaries," *Jewish History* 6:1–2 (1992), 211–224; N. Slifkin, "The Spontaneous Sweat-Louse," in his *Sacred Monsters* (Zoo Torah, 2007) 349–381: M. Meiselman, "Lice and Fleas," in his *Torah, Chazal and Science* (Lakewood, NJ: Israel Bookshop, 2013), 300–320; E. Reichman, "The Riddle of Samson and the Spontaneous Generation of Bees: The Bugonia Myth, the Crosspollination that Wasn't, and the *Heter* for Honey That Might Have Been," in Menachem Butler and Marian E. Frankston, eds., *Essays for a Jewish Lifetime: Burton D. Morris Jubilee Volume* (New York: Hakirah Press), in press.
11. See his *De Mulierum Organis Generationi Inservientibus Tractatus Novus* (Leyden, 1672).

not described until 1827, when Karl Ernst von Baer published his classic description of the mammalian ovum.[12]

Male Seed

There were three Greek theories regarding the origin of the sperm.[13] The encephalo-myelogenic doctrine claimed that the sperm was ultimately derived from the brain, and it traversed the spinal cord on its way to the male genital organs. The second theory, of which Hippocrates was an advocate, was called the pangenesis doctrine and contended that the sperm was derived from the entire body. The sperm extracted from each limb would yield the corresponding limb in the fetus. Aristotle supported the hematogenic doctrine, claiming that the seed originated from blood, and was in fact nothing but blood in a certain state of coagulation.

Although a male seed was always acknowledged, it was not until 1677 that Antonie van Leeuwenhoek first visualized the human spermatozoa under the microscope.[14]

Preformation and Epigenesis[15]

The discovery of the egg follicles by de Graaf and the spermatozoa by van Leeuwenhoek gave birth to two opposing theories regarding the embryological development of the fetus in utero. Some maintained that the fetus formed in a stepwise fashion with the development of one organ or limb preceding the next, i.e., epigenesis. Others believed that within the seed, either male or female, there existed a minuscule complete preformed being that simply enlarged during the course of gestation. These so-called preformationists were split into two camps, those claiming

12. *De Ovi Mammalium et Hominis Genesi* (Leipzig, 1827).
13. See Pieter Willem van der Horst, "Sarah's Seminal Emmission: Hebrews 11:11 in the Light of Ancient Embryology" in *Greeks, Romans and Christians: Essays in Honor of Abraham J. Malherbe*, edited by David Balch et al. (Minneapolis, 1990), 287–302. I thank Dr. Shnayer Leiman for directing me to this source, which places a number of rabbinic sources in the context of Greco-Roman theories of embryology. Horst provides a nice summary of these three theories. See also Sarah George, op. cit.
14. A. W. Meyer, "The Discovery and Earliest Representation of Spermatozoa," *Bulletin of the Institute of the History of Medicine* 6:2 (February, 1938), 89–110.
15. See, for example, Needham, op. cit., 205–211; A. Du Bois, "The Development of the Theory of Heredity," *CIBA Symposia* 1:8 (November, 1939), 235–246.

that the preformed child was within the female egg (ovists) and those claiming it was within the male sperm (animalculists).[16]

So convinced of this belief was one animalculist that he drew a diagram of a completely formed child crouched within the confines of one human sperm. This figure became known as the homunculus.[17] It is unclear exactly when the theory of preformation was disproved, but it had its supporters up to the late nineteenth century.

2) Jewish Sources[18]

Equipped with this historical background, we can approach the Jewish sources throughout the ages that address embryological theories both explicitly and implicitly. For the sake of clarity, I have separated, as above, the sections on male and female seed. Since the same sources often discuss both seeds, there will be, by necessity, limited repetition. For the repeated sources, the bibliographical information will be referenced the first time the source is mentioned.

Female Seed

The talmudic source that serves as the foundation of all subsequent rabbinic discussions on embryology, especially with regard to the female seed, is found in *Masekhet Nidda* (30a):

> Our Rabbis taught: There are three partners in the creation of man: God, the father, and the mother. The father emits (*mazria*) the white substance, from which are derived the bones, vessels (*gidim*),[19] fingernails, brain and the white of the eye. The mother

16. According to the theory of preformation, either Adam or Eve, depending on whether one was an ovist or animalculist, contained within them the preformed bodies of all the people that would populate the earth. Within each preformed seed must exist preformed seed of the next generation, and so on.
17. Regarding the origins of this depiction and its initial false attribution to van Leeuwenhoek, see A. W. Meyer, op. cit.
18. See David Feldman, *Marital Relations, Birth Control and Abortion in Jewish Law* (New York, 1974), esp. chaps. 6 and 7, for his excellent treatment of these topics. Some of the sources from this section derive from this book.
19. The term *gidim* is ill-defined and can possibly mean blood vessels, nerves or tendons. It has been used interchangeably in rabbinic literature. The clarification of Hebrew

> emits (*mazra'at*) the red substance, from which are derived the skin, flesh, hair, and the black of the eye.[20] God provides the spirit (*ruaḥ*), the soul (*neshama*),[21] the beauty of the features, vision for the eyes, hearing for the ears, speech for the mouth… and intelligence. When the time comes for a man to depart this world, God takes back His part, leaving behind the contributions of the mother and father.

It seems clear that the rabbis, similar to Galen and in contrast to Aristotle, clearly acknowledged both a male and female seed, the female seed appearing to be identified with the menstrual blood. It is interesting to note that the list of organs that are derived from the respective seeds roughly resembles that of Galen. However, even though Galen was a contemporary of R. Yehuda HaNasi, the compiler of the Mishna, there is absolutely no mention of Galen, or Hippocrites for that matter, in the

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medical terms, especially in the Middle Ages, has plagued many a doctor and historian throughout history. The confusion stems from differing etymologies of medical terms, ranging from Latin, to Greek and later Arabic, as well as the fact that these terms were not easily rendered into Hebrew. Some terms were transliterated, others translated, and often entirely new words were devised. This confusion led many Jewish physicians to include a glossary of medical terms in their books. On Hebrew terminology see, for example, Juan Jose Barcia Goyanes, "Medieval Hebrew Anatomical Names" *Koroth* 8:11–12 (1985), 192–201; A. S. Yahuda, "Medical and Anatomical Terms in the Pentateuch in Light of Egyptian Medical Papyri," *Journal of the History of Medicine* 2:4 (Autumn, 1947), 549–573. Multiple articles have appeared over the years in the journal *HaRofeh HaIvri* on the topic of Hebrew medical terminology. For an excellent review on this general topic, see R. Barkai, "The Rise of Hebrew Medical Literature," in his *A History of Jewish Gynaecological Texts in the Middle Ages* (Brill: Leiden, 1998), 6–37.

20. It is interesting that blood is not mentioned as one of the contributions of the female seed, especially since this seed, according to the Gemara is itself comprised of blood. For a discussion about this discrepancy see *She'iltot DeRav Aḥai Gaon, She'ilta* 56 and commentaries of R. Isaiah Berlin (*She'ilat Shalom*) and R. Naftali Tzvi Yehuda Berlin (*HaEmek She'ela*) on this passage. I thank Dr. Meyer Halberstam for directing me to this source.

21. The terms *ruaḥ, nefesh* and *neshama* are all abstract and difficult to define. They are often used interchangeably. See Samuel S. Kottek, "The Seat of the Soul: Contribution to the History of Jewish Medieval Psycho-Physiology," *Cliomedica* 13:3–4 (1978), 219–246.

entire text of the Mishna and Talmud.[22] As a result, any suggestion of cross-cultural borrowing is purely speculative.

The next source appears in the biblical commentary of R. Moses ben Naḥman. Although Naḥmanides is known for his exceptional talmudic scholarship, he was also a practicing physician, purportedly at Montpellier,[23] the major center of medicine in the Middle Ages.[24] As a matter of fact, one of the few references we have to Naḥmanides' medical practice states that he treated a non-Jew for infertility.[25] Naḥmanides comments on the phrase in Vayikra, *"isha ki tazria veyalda zakhar."*[26] The root of the word "*tazria*" is "*zera*" or seed; hence the translation could be, "when a woman emits seed." Whereas most biblical commentators interpret this phrase to mean when a woman conceives and thereby ignore the issue of the existence of the female seed, Naḥmanides takes this opportunity to address rabbinic theories of embryology:

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22. Rabbinic sources of the Middle Ages and beyond clearly knew of Galen. In addition, Galen himself was at least peripherally familiar with Jews and Jewish medicine. For further discussion on Galen, see chapter, "The Halakhic Definition of Death."
23. We know of Naḥmanides' medical practice primarily from the responsa of his student, R. Shlomo ibn Aderet (Rashba). Responsa numbers 177, 413 and 825 discuss Naḥmanides' use of an astrological figure of a lion to cure a kidney ailment. The Rashba discusses the halakhic issues involved in using astrological figures. See also R. H. Y. D. Azulai, *Shem HaGedolim Ma'arekhet Gedolim*, s. v., "*Ramban*." Medical historians have mentioned that Naḥmanides practiced in Montpellier. See Isaac Alteras, "Jewish Physicians in Southern France during the thirteenth and fourteenth Centuries," *JQR* 68 (1977–1978), 218. No Jewish sources that I have found place Naḥmanides as a physician in Montpellier.
24. On the University at Montpellier in the Middle Ages see Sonoma Cooper, "The Medical School of Montpellier in the Fourteenth Century," *Annals of Medical History*, new series 2 (1930), 164–195; *CIBA Symposia* 2:1 (April, 1940), entire issue devoted to Montpellier. Regarding the Jewish presence at Montpellier, see E. Lehmann, "Jewish Physicians in Provence, Languedoc, and at the Medical School of Montpellier in the 11th, 12th and 13th Centuries," (Hebrew) *Koroth* 3:9–10 (August, 1965), 455–471; Luis Garcia-Ballester, "Dietetic and Pharmacological Therapy: A Dilemma Among Fourteenth Century Jewish Practitioners in the Montpellier Area," *Clio Medica* 22 (1991), 23–37; Joseph Shatzmiller, "Etudiants Juifs a la Faculte de Medicine de Montpellier Dernier Quart du XIV Siecle," *Jewish History* 6:1–2 (1992), 243–255; idem, *Jews, Medicine and Medieval Society* (University of California Press, 1994).
25. Rashba, responsum 120, also quoted in R. Yosef Karo, *Bedek HaBayit* on *Y. D.*, 154.
26. For additional discussion on this phrase, see chapter, "*Parashat Tazria* and Childbirth."

> …Although it says, "when a woman emits seed…" the implication is not that the fetus is made from the female seed. For even though a woman has ovaries (*beitzim*) analogous to those of the male (*beitzei zakhar*) [testicles], either no seed is made there, or the seed has nothing to do with the fetus. Rather the term "*mazra'at*" refers to the uterine blood…that unites with male seed. In their opinion [*Masekhet Nidda* above] the fetus is created from the blood of the woman and the white [semen] of the man, and both of them are called seed…and likewise is the opinion of the doctors regarding conception. The Greek philosophers thought that the entire body of the fetus derives from menstrual blood, and that the man only provides…form to the material.

The mere fact that Naḥmanides mentions this embryological debate reflects that it still was a topic of discussion in his time. Here Naḥmanides accepts the contribution of a female seed and identifies that seed with the uterine blood, based on the passage in the Gemara. He states that this is also the position of the doctors. As we know that Naḥmanides was himself a physician, we accept this statement with more authority. Although he mentions no names of specific doctors, he may be aligning the talmudic position with the teachings of Galen. Naḥmanides also clearly rejects what we know to be Aristotle's position.

R. Baḥya ben Asher (thirteenth century) follows Naḥmanides in his interpretation of the phrase in Vayikra but adds a novel explanation of the term "*tazria*." He suggests it means, "When a woman gives over the *zera*." The *zera*, he maintains, is a deposit which is given to the woman by the man for safekeeping as a plant seed is deposited in the ground. In both cases the matured seed is to be returned from its repository when the time is right.[27] As we have mentioned above, the agricultural analogy is one that has been used since antiquity.

While Naḥmanides claims that a woman may or may not have her own seed independent of the menstrual blood, Maimonides clearly acknowledges the existence of a female seed.

27. Commentary on Vayikra, 12:2.

> …between the *ḥeder* and the *prozdor*[28] lie the two ovaries of the woman and the pathways [fallopian tubes] wherein her seed matures.[29]

Maimonides does not, however, address whether this seed has any role in conception. This issue is discussed in the following sources.

R. Shimon ben Tzemaḥ Duran (1361–1444), also known as Tashbetz, devotes a significant section of his philosophical work, *Magen Avot*, to the anatomy and physiology of reproduction. In this citation he confronts the issue of the female seed:

> Regarding whether the female seed has a role in conception, this has been debated by Aristotle and Galen. We have explained that *Ḥazal* say it has no role whatsoever in conception…The philosophers have concluded that the female seed has no role in conception…and they reached the same conclusion that was received by *Ḥazal* from the prophets and teachings of the Torah.[30]

R. Duran later identifies the menstrual blood as the contribution of the female.

In contradistinction to the above source which acknowledges the existence of an independent female seed but gives this seed no role in conception, the following reference grants a prominent role to this seed. This passage is excerpted from the work of R. Meir ben Isaac Aldabi (1310–1360), the grandson of R. Asher ben Yeḥiel, entitled *Shevilei Emuna*.[31]

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28. These terms derive from the Mishna in *Nidda* 2:5 and have been the source of much discussion regarding their anatomical identification. See, for example, M. Halperin, *Realia and Medicine in Seder Nashim* (Schlesinger Institute, 2011), 3–40 (Hebrew).
29. *Hil. Isurei B'iah* 5:4.
30. 40a.
31. This book is a compilation of theories in philosophy, theology, psychology and medicine. The material was culled from the existing literature of that time, as stated by Aldabi in his introduction, but unfortunately there are no references, for

> …and next to the uterus are the woman's two ovaries … and from them the female seed flows into the cavity of the uterus. When the male seed is emitted into the uterus the female seed also is emitted from the ovaries and joins with the male seed to form the fetus.[32]

This appears to be the first Jewish source that ascribes such significance to the female ovarian seed and thus ends our discussion of Jewish sources prior to the works of Harvey and Leeuwenhoek. In summary, all the Jewish sources espouse the doctrine of the two seeds, both male and female, yet opinions differ as to the identity and contribution of the female seed. These sources are better understood in the context of the ongoing scientific debate in the secular world regarding the existence and nature of the female seed.

We now turn to some Jewish references to embryology at a time when the scientific world had recently undergone major upheaval. The sperm had been identified, the existence of a female egg was universally accepted, although the egg itself had not yet been observed, and the theories of preformation and epigenesis were being debated.

Tobias Cohn (1652–1729),[33] a graduate of the famous University of Padua,[34] was educated in this scientific milieu. His classic work, *Ma'aseh Tuvia*, covers topics including botany, cosmology, and medicine,

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which R. Aldabi apologizes. This book was first printed in 1518 in Riva di Trento, but because of its immense popularity it has been reprinted many times over the centuries, including a recent printing in Jerusalem, 1990.

32. *Shevilei Emuna* (Jerusalem, 1990), 197–198.

33. For biographical information on Tuvia Cohn, see his introduction to *Ma'aseh Tuvia*. See also Dr. D.A. Friedman, *Tobias Cohn* (Tel Aviv, 1940); *Encyclopedia Judaica*, s. v., "Cohn, Tobias"; and see David B. Ruderman, *Jewish Thought and Scientific Discovery in Early Modern Europe* (Wayne State University Press: New Edition, August 1, 2001).

34. On the Jews of the University of Padua see, for example, Cecil Roth, "The Medieval University and the Jew," *Menora Journal* 9:2 (1930), 128–141; Jacob Shatzky, "On Jewish Medieval Students of Padua," *Journal of History of Medicine* 5 (1950), 444–447; Cecil Roth, "The Qualification of Jewish Physicians in the Middle Ages," *Speculum* 28 (1953), 834–843; David B. Ruderman, "The Impact of Science on Jewish Culture and Society in Venice (with Special Reference to Jewish Graduates of Padua's Medical School) in Gli Ebrei e Venezia (Venice, 1983), 417–448. See also, E. Reichman, "The Valmadonna

and the following passage on embryology reflects the climate of his time. As Cohn was well educated in rabbinic as well as scientific literature, his words are of particular relevance to our discussion.

> Aristotle, who rejected the Torah of Moses, brought a number of disappointing proofs that the menstrual blood is in place of the seed, and besides this, a woman has no other seed. However, recent physicians, who accept our holy Torah, have…brought other proofs which contradict his disappointing proofs…The first proof is that one cannot deny the existence of a female seed, for it was not for naught that a woman was created with *beitzim* and pathways that transmit seed similar to a man.
>
> …There is almost no need for the proofs brought by the great physician Harvey on the existence of a female seed…The great physicians of late maintain that the purpose of the ovaries (*beitzim*) is to give rise to tiny eggs (*beitzim*), similar to fish eggs, which have been seen with the microscope.[35]

This is possibly the first Hebrew source that uses the term *beitza* to describe the female egg as we understand it today. In all previous sources, the term *beitzim* is used to refer to the ovaries or testicles interchangeably, and the female seed is called simply her *zera*. Given an understanding of the history of embryology, this observation makes perfect sense, as it is only during this period that Harvey's theory of the existence of a female egg was developed.

A more detailed physiological description of conception is found in the anatomical work of Baruch Schick (1744–1808),[36] entitled *Tiferet*

Trust Broadside Collection and a Virtual Reunion of the Jewish Medical Students of Padua," *Verapo Yerapei: Journal of Torah and Medicine of the Albert Einstein College of Medicine Synagogue* 7 (2017).

35. (Cracow, 1908), 118. Note his mention of the microscope, which was first designed in the late seventeenth century.

36. Note that this author has been variously referred to as Baruch of Shklov, Baruch Shklover or Baruch Schick, the latter name under which he is listed in *Encyclopedia Judaica*. For biographical information see David Fishman, *Science, Enlightenment, and Rabbinic Culture in Belorussian Jewry, 1772–1804* (Ph.D. dissertation, Harvard

Adam. Schick is perhaps best known for translating Euclid's geometry into Hebrew for the Vilna Gaon.[37] In this excerpt, the author, after discussing the passage from *Masekhet Nidda*, mentions the single egg.[38]

> …in the body of the woman are found the ovaries…the seed emitted by the man…induces the emission of a single egg from the ovaries…

The next passage alludes to another embryological theory and stems from a question entertained by R. Yaakov Emden (d.1776) regarding whether it was possible for a virgin woman to conceive in the absence of conjugal relations, e.g., bathhouse insemination. In this passage, he invokes the theory of preformation, particularly that of the animalculists, to answer the above question in the affirmative. The references to the male and female seeds are as follows:[39]

> …such a thing is decidedly not in the realm of the impossible… as *Ḥazal* said "maybe she conceived in the bathhouse?" [*Ḥagiga* 14b]… and this is compatible with the ideas of the scientists, who describe only a limited role for the female seed in conception (…but it is now clear that the female seed provides no material contribution to the fetus whatsoever… and this does not contradict what is written in the Torah, "*isha ki tazria veyalda.*" See the commentary of Naḥmanides on this verse and you will

University, 1985); ibid., "A Polish Rabbi Meets the Berlin Haskalah: The Case of R. Baruch Schick," *AJS Review* 12:1 (Spring,1987), 95–121; Noach Shapiro, "R. Baruch Schick Mi-Shklov," *HaRofe HaIvri* 34:1–2 (1961), 230–235 (Hebrew); David Margalit, "Dr. Baruch Schick V'Sifro 'Tiferet Adam'," *Koroth* 6:1–2 (August,1972), 5–7 (Hebrew). There is debate in the above sources as to whether Baruch Schick was a physician. See also Israel Zinberg, *A History of Jewish Literature: The German-Polish Cultural Center* (New York, 1975), 271–274.

37. Hague, 1780. In the introduction to this book appears the oft quoted notion, in the name of the Vilna Gaon, that scientific knowledge is needed for the study of Torah.

38. *Tiferet Adam* (Berlin, 1777), 3. This book was printed together with *Amudai Shamayim*, an astronomical work by the same author. As this latter work appears first in the combined volume, the book is often referenced by its name only.

39. This is a loose translation from *Iggeret Bikoret* (Zhitomer, 1868), 25b.

> see that it is not a contradiction.)[40] They have found through the use of the glass [microscope] and other experiments that man, like birds and fish, is created from an egg in the ovary of the woman. And in the male seed they have seen … the image of a tiny human being, complete with its limbs…

R. Emden goes on to explain that the preformed fetus in the male seed receives its nourishment and sustenance, including warmth and moisture, from the female seed. It is interesting to note that he accepts the notion of the homunculus (preformation) and claims that this is in consonance with the commentary of Naḥmanides. We mentioned above that Naḥmanides granted no role to a female seed independent of the menstrual blood. However, Naḥmanides does maintain, based on the Gemara in *Nidda*, that the menstrual blood does contribute materially to the fetus. This latter notion, I believe, would not be compatible with the theory of preformation. In any case, R. Emden incorporates the contemporary embryological theories into his halakhic discussion.

The final selection in this section comes from the work of Pinḥas Eliyahu Hurwitz (1765–1821), *Sefer HaBrit*.[41] This work is a compilation of medical and scientific theories culled from sources in many languages and served as a valuable resource for its Jewish audience, to whom many of these ideas were inaccessible. This fact accounts for the book's popularity and multiple reprintings. This selection gives a balanced view of the opposing embryological theories and at the same time incorporates the teachings of *Ḥazal*:

> Some scholars have written that all the features of the entire human body, complete with its limbs, are found within the egg of the woman … and some scholars have written that within the seed of the man is the form of a minuscule human being, for when male seed … are viewed under the microscope small creatures can be seen

40. Parentheses are in original text.

41. On this work, see D. Ruderman, *A Best-Selling Hebrew Book of the Modern Era* (University of Washington Press, 2015).

> within them moving to and fro…God knows the truth of this matter. However, it is known in truth that the woman also emits seed, as the verse explicitly states, "*isha ki tazria*." And her seed is not white, but red as *Ḥazal* have said" the mother emits the red substance."[42]

In conclusion of our discussion of the female seed, it is apparent that these sources do not reflect a consensus of opinion regarding the identity and nature of the female seed. Many of the sources, irrespective of the theories they espouse, attempt to align their positions with the words of *Ḥazal*; in particular, the passage from *Masekhet Nidda*.

Male Seed

We now analyze a selection of Jewish sources that address theories regarding the origin and nature of the male seed. Some of these sources have already been discussed in the above section on the female seed. We begin with a passage from the Talmud, from which we can infer the understanding of the origin of the male seed:

> Levi was sitting in a bathhouse and observed a man fall and strike his head. He said, "His brains were agitated (*nitmazmez*)"… Abaye said, "He has lost the ability to procreate."[43]

According to Rashi, the implication is that an injury to the brain somehow affects the male seed. This is an allusion to the encephalo-myelogenic theory of the origin of the sperm.[44]

In *Sefer HaBahir*, a kabbalistic work attributed to R. Neḥunia ben HaKana (a first-century *Tanna*), the reference to the encephalo-myelogenic doctrine is more explicit:[45] "The spinal cord, which comes from the brain, enters the male organ (*amma*) and from there comes the seed."

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42. *Sefer HaBrit* (Jerusalem, 1990), vol. 1, chap. 2, 240.
43. *Ḥullin* 45b.
44. Loc. cit., s. v., "*she'eino molid*."
45. *Sefer HaBahir* has also been referred to as *Midrash* R. *Neḥunia ben HaKana*. Naḥmanides refers to it by this title in his biblical commentary. This citation is from chapter 51 and is quoted by Moshe Perlman in his *Midrash HaRefua* (Tel Aviv, 1926), 23.

Meir ben Isaac Aldabi (1310–1360) (see above) mentions the encephalo-myelogenic as well as the pangenesis doctrine, but does not indicate which one he advocates:

> The scientists have debated. Some say the seed comes from the brain, by way of the spinal cord, to the testicles, and there it matures and whitens. There are two proofs to this: pain in the spine will sometimes heal with emission of seed, and one whose spinal cord is severed cannot procreate. However, Hippocrates maintains that the seed is an extract from all the limbs of the body.[46]

Tashbetz refers to the pangenesis doctrine: "We must ascertain … if the seed derives from the entire body or not. Behold, the ancients have said this …"[47] But he ultimately rejects this in favor of the hematogenic doctrine of Aristotle, which he claims *Ḥazal* also espoused:

> … and this is their intent, *z"l*, when they said, "The seed is intermixed" (*mebalbel zarei*). The meaning of this phrase is that from all the limbs there is a combined power, not that each limb yields its corresponding limb [pangenesis doctrine] … this is their opinion, *z"l*, in agreement with the opinion of the philosopher [Aristotle].[48]

In summary, up to this point, we have seen Jewish sources referring to all three theories regarding the origin of the male seed.[49] We now shift our attention to the period following the discoveries of Leeuwenhoek

46. *Shevilei Emuna* (Jerusalem, 1990), *netiv* 4, 211.

47. *Magen Avot*, 38b. Tashbetz mentions some of the proofs to this doctrine. These proofs make fascinating reading and reflect the medieval understanding of heredity, particularly the inheritance of acquired characteristics. The concept of heredity in *Ḥazal* is another topic that merits medical/historical analysis.

48. Ibid., 39a.

49. The encephalo-myelogenic doctrine was also mentioned by R. Yeḥiel Mikhel Epstein in his halakhic work *Arukh HaShulḥan, E. H.*, 23:3.

and Harvey, when the theories of epigenesis and preformation were prevalent.

In the passage cited above, Pinḥas Eliyahu Hurwitz refers to the theory of preformation and mentions the position of the animalculists as well as the ovists. In the following quote, he invokes the position of the animalculists in a novel interpretation of a talmudic passage:

> … and they have seen with a microscope that in the seed of a man … exist tiny creatures, whose form resembles that of man, and that are alive and move within the drop.
>
> With this we see how all the words of *Ḥazal* are to be believed and how all their words are truthful and just … even regarding those matters which seem far-fetched or inconceivable … Our Talmud treats this sin [*hotza'at zera levatala*—wasteful emission of the male reproductive seed] harshly, equating it to murder, as it is written, R. Eliezer ben Yaakov said that one who emits seed wastefully is considered as if he killed a soul … and so said R. Yitzḥak and R. Ami in *Masekhet Nidda*. This statement seemed so far-fetched in the eyes of the philosophers amongst our people … who were unaware of the looking glass mentioned above [microscope]. How could it be considered murder prior to the conception of the child … when the human being had not yet appeared? … the seed at this time is only fluid from the brain[50] and is still substance without form … But now, after it has been seen with the aforementioned instrument that living beings in the image of man move to and fro within the seed, it is remarkable … to hear such a thing. Every intelligent person would judge such a sin as truly equivalent to murder.[51]

While most Jewish sources accepted the theory of preformation, it is my opinion that Baruch Schick (1744–1808) (see above) stood alone in rejecting the theory of preformation in favor of epigenesis:

50. This is a reference to the encephalo-myelogenic doctrine.
51. *Sefer HaBrit* (Jerusalem, 1990), *ma'amar* 16, chapter 3, 232–233.

> The limbs of the body are not all formed at once, rather they grow one by one like a tree… Some have said that the form of a small human being is found within the egg, and there is no place for their words. Still others have said that within the male seed is found the image of a tiny living being, their proof being that when the male seed is viewed under the microscope moving objects, like worms,[52] can be observed. They therefore say that these worms are in fact little human beings… This assertion is also baseless. First, if they are correct, why are there so many worms [sperm]. Second, the very form of the worm attests that it is not the likeness of a man.[53]

Despite Schick's refutation of the theory of preformation, it was still perpetuated by rabbinic sources, especially with reference to the prohibition of *hotza'at zera levatala*.[54] This may be due, in part, to the fact that while *Sefer HaBrit* was a popular, widely read work, *Tiferet Adam* was more obscure.

In summary, we have seen Jewish sources that cover the gamut of embryological theories regarding the origins of the male seed. As with the female seed, attempts were made to align these theories with the words of *Ḥazal*, including areas of halakha. An historical understanding

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52. Many scientists of that time referred to sperm as seminal worms. See for example, William Cullen, trans., *Albrecht Haller, First Lines of Physiology* (Edinburgh, 1786), 205.

53. *Tiferet Adam* (Berlin, 1777), 3b–4a. Other arguments against the preformationists are cited in Needham, op. cit., 210. It appears from the last sentence of this quote that Schick may himself have viewed the sperm under the microscope. There is debate amongst historians whether Schick had a laboratory where he performed medical experimentation. See Shapiro, op. cit., 234–235; Israel Zinberg, op. cit., 282. It is also noteworthy that this entire passage is strikingly similar to the writings of Albrecht Haller, whose works were very popular in the scientific world at the time Schick was writing. Compare the passage below with the one by Schick:

> To the father, some have attributed everything; chiefly since the seminal worms, now so well known, were first observed in the male seed by the help of the microscope… But in these animals, there is a proportion wanting betwixt their number and that of the fetuses; they are also not to be constantly observed throughout the tribes of animals. (from Cullen, op. cit., 205–206)

A broader comparison between *Tiferet Adam* and the works of Haller may yield interesting results.

54. R. Yosef Ḥayyim ben Eliyahu, *Rav Pe'alim,* vol. 3, *E. H.*, 2; R. Yeḥiel Mikhel Epstein, *Arukh HaShulḥan*, *E. H.*, 23:1; R. Eliezer Waldenberg, *Tzitz Eliezer*, vol. 9, 51.

of the various embryological theories contemporary with each of these sources gives us a better appreciation of each author's context and scientific frame of reference.

II. REPRODUCTIVE PHYSIOLOGY—ARTIFICIAL INSEMINATION[55]

Artificial insemination is a commonly practiced procedure for the treatment of infertility. Although the procedure has grown tremendously in popularity and application over the last few decades, the concept of intentionally injecting sperm into a woman for the purpose of impregnation dates back to at least the mid-eighteenth-century, when John Hunter successfully inseminated a woman whose husband had a severe form of hypospadias.[56] As early as 1934, Hermann Rohleder wrote the first history of the artificial impregnation of human beings.[57] However, since the widespread application of this procedure is, as stated, only relatively recent, it is in this period that we find the proliferation of rabbinic responsa dealing with every imaginable halakhic consequence of artificial insemination.[58] But what sources could there be in the Talmud or *Rishonim* that could possibly aid in the halakhic explication of this seemingly novel procedure? To answer this question, we must mention yet another form of artificial insemination, this one more indirect in nature. There was a widely held belief, dating back to antiquity, that a woman could become pregnant in a bathhouse, for it was thought that

55. Numerous authors have previously written on this topic from an historical perspective. See H. J. Zimmels, *Magicians, Theologians and Doctors* (London, 1952); Immanuel Jakobovits, *Jewish Medical Ethics* (New York, 1959), 244–250. This essay treats the topic more comprehensively.

56. John Hunter (1728–1793) was a prominent scientist and comparative anatomist who is known for his self-experimentation with venereal disease. His original manuscripts detailing his application of artificial insemination are currently housed at the Hunterian Museum in London, where one can also see on display thousands of human and animal anatomical specimens which Hunter collected during his lifetime.

57. *Test Tube Babies* (New York, 1934).

58. See, for example, Fred Rosner, *Modern Medicine and Jewish Law*, 2nd ed. (New York, 1991), 85–100; Abraham Steinberg, *Entzyclopedia Hilkhatit Refuit* (Jerusalem, 1988), 148–161. For a bibliography of responsa on this topic, see R. Yaakov Weinberg and R. Maier Zichal, "*Hazra'a Melakhutit*," *Assia* 55 (December, 1994), 75–89.

when a woman bathes in a bath into which a man had previously emitted sperm, she may become pregnant. In the following section, I will briefly trace the history of the notion of artificial insemination in both Jewish and non-Jewish sources, from antiquity to the present.

1) Jewish Sources

Two early references to so-called "bathhouse insemination" have served as the source for virtually all contemporary halakhic discussions on modern artificial insemination. The first case is mentioned in *Ḥagiga*[59] in the course of a discussion about whether a *Kohen Gadol* (High Priest), who is prohibited from marrying any woman who is not a virgin, may marry a pregnant woman who claims she is still a virgin.[60] How could a virgin possibly be pregnant? Shmuel attests that it is possible to have intercourse without perforating the *betulim* (hymen), but the Gemara entertains another possibility, that of impregnation in the bathhouse, in which case, the woman, still a virgin, would be permitted to marry a *Kohen Gadol*.

The second case is mentioned in the *Alphabet of Ben Sira*[61] in reference to the nature of Ben Sira's birth. This narrative work, of questionable date and authorship (some date this work from the Geonic period), details the life of Shimon ben Sira (second century BCE), the author of *Divrei Shimon Ben Sira* (The Wisdom of Ben Sira). The relevant passage appears in the first section of this work, which is a biography of Ben Sira from his conception to the age of one year. The passage, apparently omitted in many editions, describes how the prophet Jeremiah was simultaneously both the father and grandfather of Ben Sira. Ben Sira's mother was Jeremiah's daughter. Jeremiah was forced by evil men to perform

59. 14b–15a. Some have construed this passage to be a sarcastic allusion to the Christian doctrine of immaculate conception. See R. Yehoshua Baumel, *Emek Halakha*, 1:68; Jakobovits, op. cit., 359, n. 31. Preuss, op. cit., 477, has already pointed out that this cannot be, as the doctrine of the Immaculate Conception was not yet known at the time of Ben Zoma (first century CE).

60. See *Tosafot*, loc. cit., s. v., "*betula*." Whether it is only claimed or actually verified that the woman is a virgin is a matter of discussion.

61. I consulted the text based on an Oxford manuscript, published in A. M. Haberman, *Ḥadashim Gam Yeshanim* (Jerusalem, 1976), 125–127.

an act of onanism in a bathhouse, and his daughter conceived from his emissions when she inadvertently bathed in the same bath. Ben Sira was born seven months later,[62] the product of artificial insemination.[63] The text further mentions that it is no mere coincidence that the numerical value of the Hebrew letters (*gematria*) of "Sira" equals that of "Yirmiyahu," thereby hinting that Ben Sira was, in fact, the son of Jeremiah.

Not everyone accepted the veracity of this story of Ben Sira's birth. Solomon ibn Verga (c. 1460–1554) states in his historical narrative *Shevet Yehuda* that Ben Sira was the grandson of Yehoshua ben Yehotzadak and makes no mention of any relation to Jeremiah.[64] R. David Ganz, the seventeenth century chronicler, claims that this story is mere exaggeration, as "I have not found it anywhere in the Talmud, and I have not heard from my teachers that it is found in any Aggada or Midrash."[65]

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62. See Pieter W. Van Der Horst, "Seven Months' Children in Jewish and Christian Literature from Antiquity," in his *Essays on the Jewish World in Early Christianity* (Gottington, 1990), 233–247. (I thank Dr. Shnayer Leiman for this reference.) Van Der Horst does not include Ben Sira in his list. There is a notion in *Ḥazal* that babies born in the seventh and ninth months are viable, whereas those born in the eighth month are not (see, for example, *Shabbat* 135a and *Yevamot* 80a). This was a prevalent notion in antiquity and the Middle Ages and is another example of a topic where a medical historical analysis may shed light on rabbinic sources. This issue has been previously addressed. See Neria Gutal, "*Ben Shemona: Pesher Shitat Ḥazal Benoge'a Lev'ladot Bnei Shemona*," *Assia* 55–56 (1989), 97–111; Dr. Rosemary Reiss and Dr. Avner Ash, "*Ben Shemona—Mekorot Klasi'im L'Emuna Amamit*," ibid., 112–17. See also Ron Barkai, "A Medieval Hebrew Treatise on Obstetrics," *Medical History* 33 (1988), 96–119, esp. 101–104. For further information on the secular sources see Ann Ellis Hanson, "The Eight Months' Child and the Etiquette of Birth: Obsit Omen!" *Bulletin of the History of Medicine* 61 (1987), 589–602; Sarah George, op. cit., 204–233.

63. The text also mentions that the *Ammoraim* Rav Zeira and Rav Pappa were also born by artificial insemination, but unlike Ben Sira, the identity of their fathers was unknown. Yeḥiel Halprein in his *Seder HaDorot* (Jerusalem, 1988), section 2, 118, quotes *Sefer Yuḥsin* by Abraham Zacuto, who, in turn, quotes this notion from *Sefer Kabbalat HaḤasid*. Halprein then cites the original source of this idea from the *Alphabet of Ben Sira* and subsequently refutes the belief that R. Zeira and R. Pappa were products of artificial insemination. He does not, however, assail the belief that Ben Sira was a product of artificial insemination.

64. (Pietrikov, 1904), introduction.

65. *Tzemaḥ David*, section 1, *eleph revi'i*, 448. See also *Tzitz Eliezer*, vol. 9, no. 51, gate 4, chap.1, letter *tet*.

Assuming for our discussion the veracity of the passage in the *Alphabet of Ben Sira*, some important halakhic points can be derived, which explains why it has been so extensively quoted by subsequent *Rishonim* and *Aḥaronim*. Ben Sira is clearly assumed to be the product of Jeremiah and his daughter. Whether this was known to Jeremiah by *ruaḥ hakodesh* or whether this is because Jeremiah's daughter was trusted to have been a virgin is unclear. In either case, despite the fact that Ben Sira was the product of an halakhically illicit relationship, nowhere do we find aspersions cast on his lineage, and never is he referred to as a *mamzer* (legal bastard). The implication is that only the marital act can create the prohibition of *arayot* (illicit sexual relations) and label the resultant child a *mamzer*. The relevance of this to artificial insemination with donor sperm should be obvious. Secondly, Ben Sira was known as the son of Jeremiah. This fact implies that a child born from artificial insemination may be considered halakhically related to the sperm donor.

One of the earliest references to the case of Ben Sira is by R. Peretz ben Eliyahu of Corbeil (c. 1295) in his glosses on *Sefer Mitzvot Katan* (also referred to as *Amudei Gola*).[66] He states that a woman need not refrain from sleeping on her husband's sheets while she is a *nidda* out of the concern that she might bear a child from the remnant seed on the sheet and the child will be a *ben nidda*. However, R. Peretz does warn that a married woman should not sleep on the sheets of a strange man. Why R. Peretz differentiated between these two cases is a matter of halakhic import, but implicit in these statements is that R. Peretz

66. This reference is mentioned by the *Bayit Ḥadash* (R. Y. Sirkes 1561–1640) in *Y. D.*, 195 (s. v., "*v'lo*") as appearing in the "*hagahat Semak yashan*" of R. Peretz. The glosses of R. Peretz first appeared in the printed text of *Sefer Mitzvot Katan* in the mid 1500s and all subsequent editions invariably contained these glosses. I consulted the 1556 Cremona edition and could not find this particular gloss. It seems that this gloss remained in manuscript form and was never printed; hence the term "*yashan*" of the Baḥ likely refers to an old manuscript edition. This fact is further evidenced by the comment of R. Ḥayyim Y. D. Azulai (*Birkei Yosef E. H.*, 1:14) that after much effort he was finally able to locate this particular gloss of R. Peretz in an old manuscript.

A passage similar to that of R. Peretz appears in the *Shiltei HaGiborim* on the Rif (*Shavuot* 2a) attributed to an author referred to by his acronym, *HR"M*. R. Eliezer Waldenberg (*Tzitz Eliezer* vol. 9, no. 51, gate 4, chap. 1, letter *ḥet*) has postulated that this may be a misprint, and the text should actually read *HR"P*, an acronym for HaRav Rabbenu Peretz.

acknowledged that a woman could become pregnant in this manner. He brings proof from the case of Ben Sira who, despite being the product of an halakhically illicit union, was not considered a *mamzer* as no conjugal relations (*bi'ah*) had taken place. Jacob Moelin (c. 1365–1427) also mentions the case of Ben Sira in the *Likutei Maharil*, where it appears as a statement without particular halakhic context.[67]

More elaborate treatment of this topic is found in the responsa of R. Shimon ben Tzemaḥ Duran,[68] to whom a question was posed about a woman who claimed to have had a virginal conception. R. Duran, who was also a physician, was asked to determine whether this was in fact possible, and, if so, what would be the halakhic ramifications. Whether this so-called bathhouse impregnation was actually feasible or simply contrived for the sake of halakhic analysis was a matter of intense debate amongst the *Aḥaronim*, as we shall soon see. Tashbetz was one of few *Rishonim* who addressed this topic. He concludes that it is feasible, marshaling evidence from the aforementioned passage in *Masekhet Ḥagiga*, as well as from the case of Ben Sira. With respect to the latter he prefaces with the disclaimer that "if we believe the Apocrypha" then we have proof from Ben Sira. What is particularly interesting is the Tashbetz's reference in a gloss to two of his contemporaries, one an unnamed non-Jew and the other named R. Abraham Israel, both of whom claimied to have been familiar with cases of virginal women who had conceived.

The next Jewish reference to artificial insemination is not rabbinic in origin, but appears in the case studies of the famous marrano physician Amatus Lusitanus (1511–1568).[69] This discussion, like the aforementioned passage of Ben Sira, is not found in all versions of Lusitanus' classic work, *Centuriæ*, as it was expurgated by the censors.[70] Here Lusitanus invokes the notion of artificial insemination (*sine concubito*) to exonerate a nun with a uterine mole who was accused of impropriety. He adduces his

67. *Sefer Maharil*, Shlomo Spitzer, ed. (Jerusalem, 1989), 611–612.
68. 3:263.
69. On Lusitanus, see essays in Harry Friedenwald, *The Jews and Medicine* 1 (Baltimore, 1944), 332–390. The section relevant to our discussion is on page 386. Preuss (op. cit., 464) also quotes Lusitanus in discussing the Gemara in *Ḥagiga*.
70. Friedenwald, op. cit., 363, n. 98.

proofs from the case of Ben Sira, as well as from other scientific sources discussed below.

Another famous Jewish physician makes mention of artificial insemination in his work,[71] but this particular work is halakhic, not medical in nature. R. Yitzḥak Lampronti (1679–1756),[72] in his magnum opus, *Paḥad Yitzḥak*, poses the following riddle: A child is the son of a woman who was impregnated by her father, yet he is not a *mamzer*. How is this possible?[73] He answers, "This is Ben Sira," and recounts the incident in the bathhouse, "as is written in '*ketubot.*'" This reference is clearly not to the talmudic tractate by the same name, as we have already mentioned that the story derives from the *Alphabet of Ben Sira*. The term "*ketubot*" can be translated as "the writings," without reference to a specific body of work.[74]

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71. See the work of another famous Jewish physician, Tobias Cohn, who mentions artificial insemination in his *Ma'aseh Tuviah* (Cracow, 1908), section 3, 118b.

72. Although known for his halakhic expertise, Lampronti was a prominent Italian physician and a graduate of the University of Padua. See Abdelkader Modena and Edgardo Morpugo, *Medici E Chirurghi Ebrei Dottorati E Licenziati Nell Universita Di Padova dal 1617 al 1816* (Bologna, 1967), 55–57. Lampronti consulted the famous physician Morgagni for assistance with his difficult medical cases. Saul Jarcho elaborates on these consultations in his article, "Dr. Isaac Lampronti of Ferrara," *Koroth* 8:11–12 (1985), 203–206. For more on Lampronti, see D. Ruderman, "Contemporary Science and Jewish Law in the Eyes of Isaac Lampronti and Some of His Contemporaries," *Jewish History* 6:1–2 (1992), 211–224; D. Margalit, "R. Yitzḥak Lampronti: Rabbi, Physician, Lexicographer," (Hebrew) in his *Ḥakhmei Yisrael KeRofim* (Mosad Harav Kook, 5722) 152–174; H. Savitz, "Dr. Isaac Lampronti: Rabbi, Physician, Teacher, Preacher, Encyclopaedist," in his *Profiles of Erudite Jewish Physicians and Scholars* (Spertus College, 1973), 29–32. For a collection of all the medical matters in R. Lampronti's magnum opus, see D. Margalit, "Medical Articles in the Encyclopedia Paḥad Yitzḥak by R. I. Lampronti," (Hebrew) *Koroth* 2:1–2 (April, 1958), 38–60.

73. *Paḥad Yitzḥak* (Bnei Brak, 1980), s. v., "*Ben Bito*." David Margalit does not mention this passage in his essay, "*Erkhim Refui'im ShebeEntzyclopedia HaHilkhatit Paḥad Yitzḥak L'R. Y. Lampronti*," *Koroth* 2:1–2 (April, 1958), 38–61.

74. Although the *Wisdom of Ben Sira* is included in the works of the Apocrypha, the *Alphabet of Ben Sira* is not. See R. Yehoshua Baumel, *Emek Halakha*, no. 68, regarding the quotation of R. Lampronti: "…even though he did not cite his source for this, still his words are believed, and this *tzaddik* is free from iniquity." R. Baumel apparently thought the word "*ketuvim*" to be a generic reference, not a reference to a specific work or body of works.

We now turn to the scientific question of whether bathhouse impregnation is even possible. Implicit from all the above sources is that they accepted the possibility of this unique form of artificial insemination. However, few of them address the question specifically, with the exception of Tashbetz and Lusitanus, both of whom accept the possibility. One of the first to expressly deny the possibility of such an event was R. Yehuda Rosanes (d. 1727), who articulates his position in his glosses to Maimonides' *Mishneh Torah*, entitled *Mishneh LeMelekh*.[75] R. Rosanes maintains that a woman can only become pregnant through the completion of the natural marital act (i.e., *gemar bi'ah*). He brings support for this notion from talmudic sources, and also discusses the talmudic teaching that a woman cannot become pregnant from the first intercourse (*bi'ah rishona*). Based on these as well as other sources, he concludes that bathhouse impregnation as impossible.

This passage from the *Mishneh LeMelekh* is cited widely by subsequent authorities, some with approbation,[76] others with condemnation, as we will soon see. Although a number of *Aḥaronim* mention the *Mishneh LeMelekh* approvingly, including R. Moses Schick, perhaps his most enthusiastic advocate was R. Solomon Schick. In a responsum to R. Yosef Edinger, coincidentally a student of R. Moses Schick, R. Solomon Schick states assuredly, with no ambiguity, that bathhouse impregnation could never happen. In addition to quoting R. Rosanes and R. Moses Schick as concurring, he interprets the passage in *Ḥagiga* in a novel fashion. As the aforementioned passage follows the story of the four rabbis who entered "*pardes*" (however it is to be defined), and one of those rabbis is the same Ben Zoma of our relevant passage, and this Ben Zoma was harmed by his journey into "*pardes*," R. Solomon Schick maintains that the Gemara is possibly mocking him. Never, according

75. *Hil. Ishut*, 15:4. See also *Mishneh LeMelekh* on *Hil. Isurei Bi'ah* 17:15 where R. Rosanes discusses these matters in great detail and states that the passage of Ben Zoma in *Ḥagiga* is not considered halakhic.

76. See, for example, Malakhi ben Yakov HaKohen (d.1785–1790), *Yad Malakhi* (Berlin, 1857), *klalei hadinim* no. 247; R. Moshe Schick, known as Maharam Schick, *Taryag Mitzvot* no.1.

to R. Solomon Schick, did the Gemara actually believe that bathhouse insemination could occur.[77]

Other authorities subsequent to R. Rosanes have independently questioned the possibility of bathhouse impregnation. R. Ḥayyim (1835–1909), author of *Ben Ish Ḥai*, espouses a novel position in his work, *Torah Lishma*.[78] R. Ḥayyim was asked whether he would allow sperm procurement from an ill man to facilitate a proper medical diagnosis. The questioner maintained that since the sperm could subsequently be used to impregnate a woman, this should mitigate the prohibition of *hashḥatat zera*. R. Ḥayyim's contention is that "nature has changed" (*nishtaneh hateva*)[79] with respect to artificial insemination. Whereas insemination through an intermediary medium (e.g., bathhouse impregnation) was possible in the times of the *Tannaim* due to their greater bodily strength and potency of their seed, such was not the case from the time of the *Ammoraim* and onward. He maintains that if it were at all possible, it would be an extremely rare occurrence as was the case mentioned by the Tashbetz. Therefore, as the likelihood of impregnating a woman with the remaining seed was so remote, sperm procurement would not be allowed.[80] Around the time this responsum was written, John Hunter performed the first successful artificial impregnation of a human being. However, this success was not widely publicized.[81]

Along a similar vein, a number of *Aḥaronim* also maintained that bathhouse impregnation was not possible in their time due to the changed nature. However, it was the changed nature of the baths, they maintained, not that of the seed, that explained why insemination was

77. *Teshuvot Rashban*, *E. H.*, no. 8.

78. (Jerusalem, 1976), no. 481. R. Ḥayyim wrote these responsa under a pseudonym.

79. The concept of "*nishtaneh hateva*" has been invoked many times in rabbinic literature. See, for example, *Tosafot* in *Avoda Zara* 24b, s. v., "*Para*"; *Tosafot* in *Ḥullin* 47a, s. v., "*kol*"; *E. H.* 156:4 in the Rema. Two areas where authorities often discuss this principle are *Hil. Treifot* and *metzitza* in *mila*. See also later in this article regarding the two pathways of the male genital organ.

80. R. Ḥayyim cites other reasons for forbidding sperm procurement in this case, such as, some seed might spill in the process of collection, or, even if they collect all the seed, it might not all be used for the purpose of insemination. These concerns have been voiced by current *poskim* in their discussions on artificial insemination.

81. See Rohleder, op. cit.

no longer possible.[82] According to this opinion, since the baths in talmudic times were heated from below,[83] it was theoretically possible for insemination to occur, either because a man was more likely to emit seed in this kind of bath, or because this particular heat source was more conducive to the survival of the seed.[84]

While others questioned the possibility of bathhouse impregnation, as we have seen, it was R. Rosanes who was always hailed as the main opponent to this notion. His position did not remain unopposed, as a number of *Aḥaronim* reject his contention.[85] There were three different approaches in response to R. Rosanes. R. Yehonatan Eybeschuetz (1690–1764) argued against R. Rosanes based on a re-analysis of the *talmudic* passages that R. Rosanes cites, concluding that the latter's interpretations were incorrect, hence, artificial insemination is possible.[86] R. Ḥayyim Yosef David Azulai (1724–1806) mentioned on three separate occasions in his writings that bathhouse impregnation was possible because it was accepted as fact by the Gemara, as well as by

82. R. Yaakov Reischer, *Iyun Yaakov* (Wilhelmsdorf, 1725), on *Masekhet Ḥagiga* 14b. See also R. Pinchas Horowitz, *Pitḥa Zuta al Hil. Nidda UTevilla* (London, 1958), 195:7, who explains the position of R. Reischer. Both of these sources question why Maimonides omits the case of Ben Zoma from his code.

83. See *O. Ḥ.* 230:3 and *Mishna Berura*, loc. cit.

84. R. Yekutiel Greenwald, in his *Kol Bo Al Aveilut* (New York, 1947), 305–330, n. 8, states that the majority of *poskim* hold that bathhouse insemination could never happen. However, if it were ascertainable that such an event had occurred, the parents and children would be obligated to mourn for each other. Another halakhic question unique to a child born from bathhouse insemination is whether such a child could have his *mila* performed on Shabbat. See R. Moshe Bunim Pirutinsky, *Sefer HaBrit* (New York, 1973), 9, who states, based on the interpretation of R. Ḥananel to the Gemara in *Ḥagiga*, that since such a birth is considered miraculous, and not by natural methods of conception, the *mila* could not be performed on shabbat. See also J. David Bleich, "Circumcision of a Child *Sine Concubito*," in his *Bioethical Dilemmas* 2 (Targum Press, 2006), 93–97; Y. Kohn and G. Weitzman, "Shabbat Brit of a Child Conceived Through Medical Intervention," *Journal of Halacha and Contemporary Society* 61 (Spring 2011), 56–81.

85. Many *Aḥaronim* still maintained the possibility of bathhouse impregnation without specifically addressing the *Mishneh LeMelekh*. See R. Yaakov Emden *Iggeret Bikkoret* (Zhitomer, 1868) and *She'ilat Yaavetz*, vol. 2, no. 97.

86. *Bnei Ahuva* (Jerusalem, 1965), on Maimonides, *Hil. Ishut* chap. 15.

a number of prominent *Rishonim*.[87] The third approach of refutation is scientific in nature and was taken by R. Baruch Mordechai ben Yaakov Libschitz (1810–1885). R. Rosanes had stated that conception could only be accomplished with *gemar bi'ah*. R. Libschutz responded that with respect to bathhouse impregnation, the waters of the bath could transport the seed to the internal organs of the woman, thereby effectively accomplishing the same result as *gemar bi'ah*.[88]

Contemporary *poskim*, in their discussions on modern therapeutic artificial insemination, refer to some of the aforementioned sources. However, as the possibility of such an occurrence, at least in the modern medical context, is an accepted fact, little space is devoted to the scientific question of feasibility.[89] More time is apportioned for the resolution of attendant halakhic dilemmas.

2) Secular Sources[90]

The notion of virginal or non-natural conception dates back to antiquity and antedates Christianity.[91] Explicit reference to the phenomenon of artificial insemination, however, is found in sources from the Middle Ages. Avicenna in his *Canon* on medicine and Averroes (d. 1198) in his *Colliget* acknowledge the possibility of artificial

87. *Birkei Yosef*, *E. H.*, 1:14; *Yair Ozen, ma'arekhet* 1 no. 93; *P'tach Einayim* on *Ḥagiga* 14b. See also R. Y. S. Nathanson, *Shai LeMoreh*, Glosses on *E. H.*, 1;6; ibid., *Responsum Shoel UMeshiv*, Vol. 3, section 3, nos. 34 and 132 (end); R. Eliezer Fleckles, *Teshuva MeAhava*, *Y. D.*, no. 195.

88. *Brit Yaakov* (Warsaw, 1876), *E. H.*, no. 4. The author employs the same logic with respect to R. Peretz's pronouncement about a woman becoming pregnant from seed remaining on the sheets. Here, too, he maintains that a woman may use the sheets for internally cleaning herself, thereby bringing the seed into close proximity with the uterus.

89. See R. Shalom Mordechai Schwadron (1835–1911), *She'elot UTeshuvot Maharsham* (New York, 1962), vol. 3, no. 268, who was asked whether it was permissible to undergo artificial insemination.

90. For the material on artificial insemination in medieval times, I have relied on secondary sources, primarily Preuss. The primary sources are in Arabic and Latin and, for the most part, remain untranslated into English.

91. See Robert Graves, *The Greek Myths* (Baltimore, 1955), 51 for descriptions of non-natural methods of conception. I thank Dr. Louis Feldman for this reference.

impregnation.[92] Thomas Aquinas (d. 1274) relates that a woman became pregnant from lying in a bed into which sperm was previously discharged.[93] As discussed above, R. Peretz of Corbeil, a contemporary of Aquinas accepted this possibility and therefore dealt with the halakhic ramifications. Amatus Lusitanus quotes Avicenna and Al-Jazzar (tenth century)[94] as authorities who accept artificial insemination.[95]

In 1750, a pamphlet entitled *Lucina Sine Concubito* by Dr. Abraham Johnson was published in London.[96] It was submitted by Johnson to the Royal Society, the pre-eminent scientific body in England, and is comprised of a personal account of a patient of Johnson's, whom the latter believed had conceived by artificial insemination. In this fantastical essay, Johnson postulates the means by which this insemination was achieved. He believed, based on classical sources, that the reproductive seed derived from the western winds and was accidentally ingested by his female patient. He further claimed that he tested his theory experimentally on his housemaid, without her consent, and achieved positive results (i.e., the maid became pregnant). He therefore submitted his results to the Royal Society with suggestions for wider applications of his technique.

While the belief in bathhouse insemination persisted into the twentieth century,[97] similar to the Jewish sources above, it was not without its detractors. Paolo Zacchias (1584–1659), physician to Pope

92. Preuss, 464.

93. Ibid. Preuss provides no reference for this statement.

94. On this author see Gerrit Bos, "Ibn Al-Jazzar on Women's Diseases and Their Treatment," *Medical History* 37 (1993), 296–312. In personal communication Dr. Bos says he is unaware of any reference to artificial insemination in the extant works of Al-Jazzar.

95. Preuss, 464.

96. This work was reprinted and appended to Hermann Rohleder, *Test Tube Babies* (New York, 1934).

97. Preuss, 464, cites Stern, who stated that the belief in bathhouse insemination was still prevalent in Turkey at that time, i.e., early twentieth century. See also George Gould and Walter Pyle, *Medical Curiosities* (New York, 1896), 42–45, who state that the possibility of bathhouse insemination was still being debated. They also relate an extraordinary, if not fantastical, story from the Civil War of how a woman, struck in the abdomen with a bullet that previously hit the testicle of a soldier, gave birth, after 278 days, to an eight-pound boy.

Innocent X and prominent medical legal writer,[98] rejects the possibility, as did the great scientist Albrecht Haller (1708–1777).[99]

In conclusion, since the possibility of bathhouse insemination would be difficult to disprove, whether it has or can actually occur remains a mystery.[100]

III. REPRODUCTIVE ANATOMY—THE TWO PATHWAYS (*SHNEI SHVILIN*)

1) Jewish Sources

Rabbinic sources throughout the ages have discussed the intricate details of male reproductive anatomy, as it directly relates to the laws governing the definition of an halakhically infertile man (i.e., *petzua daka* and *kerut shafkha*).[101] In the context of one such discussion, the Gemara in *Bekhorot* (44b) makes a statement that seems somewhat puzzling today. The Gemara states that there are two pathways in the male genital organ, one for urine and one for seed,[102] and that these two pathways are separated by a fine membrane the width of a garlic peel whose integrity is necessary for fertility. Should this membrane rupture and allow communication between the two channels, the man may be rendered halakhically infertile *(petzua daka)* and consequently may be forbidden to marry.

The existence of these two pathways in the male organ was an accepted fact amongst *Rishonim* and early *Aḥaronim*, and many halakhic discussions revolved around cases where one or the other pathway was perforated, especially in cases of hypospadias (i.e., when the opening of the urethra is not at the tip of the *ever*, but at varying points along the

98. On Zacchias and other medical legal writers see Bernard Ficarro, "History of Legal Medicine," *Legal Medicine Annual* (1979).

99. Both Zacchias and Haller are mentioned in Preuss, op. cit., 464.

100. Although I have been unable to find any contemporary medical references to bathhouse insemination, I have found an interesting case which attests to the viability of the human sperm. See Douwe A.A. Verkuyl, "Oral Conception: Impregnation Via the Proximal Gastrointestinal Tract in a Patient with an Aplastic Vagina," *British Journal of Obstetrics and Gynaecology* 95 (September, 1988), 933–934.

101. See *E. H.*, 5.

102. See also Rashi on *Yevamot* 75b, s. v., "*guvta*."

shaft).[103] In the latter case, it was unclear whether the existing opening was only for the urine, which could easily be ascertained, or whether it was also for the seed, which was halakhically difficult to determine given the prohibition of *hotza'at zera levatala*. The following section highlights some of the sources, both Jewish and secular, that have addressed this unique anatomical notion.

R. Shimon ben Tzemaḥ Duran mentions the notion of the two pathways in his philosophical work, *Magen Avot*.[104]

> ...for the organs of reproduction in the man are two, the *ever* and the *beitzim* [testicles] ... and *Ḥazal* added the *ḥutei beitzim*[105] ...should any of these three organs be damaged a man will be rendered infertile ... and *Ḥazal* have written extensively on these topics, based on their *kabbala*, and have understood matters that scientists have not ... and in the Canon [of Avicenna][106] it states that there are three pathways, one for urine, one for seed and one for [other] fluids ... but this does not appear to be so according

103. See *Otzar HaPoskim* (Jerusalem, 1962), *E. H.*, 5, no.25 and Abraham Tzvi Hirsch Eisenstadt, *Pitḥei Teshuva*, *E. H.*, 5, no. 5 for a series of halakhic queries regarding both acquired and congenital variants of the male genitalia.

104. 37b. A loose translation of the passage follows.

105. It is a matter of debate as to the halakhic definition of *ḥutei habeitzim*. For our purposes we can assume it refers to the vas deferens.

106. Avicenna (980–1037), known in Hebrew sources as Ibn Sina, was a Persian physician of great renown. His main work, *The Canon*, was considered the authoritative work on medicine for many centuries, and is quoted extensively by rabbinic sources. The only extant Hebrew medical incunabula is a copy of Avicenna's *Canon* (Naples, 1491). Many Hebrew manuscripts of Avicenna were found in the Cairo Geniza. See Haskell D. Isaacs, *Medical and Para-Medical Manuscripts in the Cambridge Genizah Collections* (Cambridge, 1994).

It appears that the printer of *She'elot UTeshuvot Ḥavot Yair* (reprinted, Jerusalem, 1973) by R. Yair Bacharach was not familiar with the work of Avicenna, as I believe there is a misprint in responsum no. 234. In this responsum, addressing the permissibility of using talmudic remedies for medical treatment, R. Bacharch discusses a particular theory of medical therapeutics. R. Bacharach claims that he found support for this theory in "*Sefer HaKinyan Le'even Pinah*." I have found no bibliographical reference to such a work, and, given the medical context of the statement, believe the proper reading should be "*Sefer HaKanon le'Ibn Sina*."

> to *Ḥazal* [who say there are two] … all this is based on the true *kabbala*, which the scientists have not acquired … and since the wisdom of our sages has been lost through the exiles we must labor [to restore it] … and one should not err and say that *Ḥazal* were not expert in the sciences …

Most *poskim* have understood the passage in *Bekhorot* to mean that there are two pathways extending all the way to the tip of the *ever*, and such was clearly the opinion of R. Moses Sofer in considering the suggestion of physicians to repair a hypospadias.[107] R. Yisroel Yehoshua Trunk (1820–1893), however, interpreted the Gemara differently. He understood the two pathways for urine and seed to refer to the internal anatomy, but not that they extended into the *ever*. It is a mistake to think this, he maintained, as both the urine and seed traverse one path in the *ever*.

Ḥazon Ish, R. Avraham Yeshayahu Karelitz (1878–1953), apparently agreed with the anatomical observation of R. Trunk, but did not accept his interpretation of the Gemara:

> In the Gemara, it states that there were two pathways, one for the urine and one for the seed … in this matter, the nature has changed (*nishtanu hativ'im*),[108] as today there is only one pathway in the *ever*.[109]

Ḥazon Ish also claimed, based on his discussion with physicians, that the particular part of male anatomy under discussion is subject to variation, be it a function of time or of geographical location.[110] R. Yosef Ḥayyim

107. R. Moshe Sofer, *Teshuvot Ḥatam Sofer* (Vienna, 1882) vol. 6, no. 64, s. v., "*akh ma*."
108. See the position of R. Yosef Ḥayyim above in section on artificial insemination.
109. *Ḥazon Ish* (Bnei Brak, 1991) *E. H.*, 12, no. 7.
110. Ibid. See *Tzitz Eliezer*, vol.10. no. 25, chap. 24. These two sources deal with the halakhic aspects of prostate surgery, which can involve intentional ligation of the vas deferens. The issue discussed is whether such a procedure renders the patient a *kerut shafkha* (one who is castrated and therefore prohibited from marrying into the people of Israel). On this topic, see the important responsum of R. Moses Feinstein, *E. H.*, vol. 4, nos. 28 and 29.

mentions a number of such anatomical variants that were found in the city of Bagdad.[111]

2) Secular Sources

The notion of there being more than one pathway in the *ever* was prevalent in the Middle Ages, especially in the Arab world,[112] but does not appear to have clear roots in antiquity. Galen, a contemporary of R. Yehuda HaNasi, states unequivocally that there is one path for both urine and semen,[113] though Hippocrates appears to have supported the two-path theory.[114] Avicenna, as quoted by R. Duran above, claimed there were three canals in the *ever*, and Mondino (d.1326), the Italian anatomist, described a separate canal for the sperm.[115] These ideas permeated the works of the Renaissance artist and anatomist Leonardo da Vinci (1452–1519), who drew two distinct passages in his anatomical drawings.[116]

Andreas Vesalius (1514–1564) is credited with rectifying the Arab belief and clarifying, by anatomical dissection, that there is only one

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On the effect and importance of geographical location in the *Talmud* as compared to classical sources see Stephen Newmyer, "The Concept of Climate and National Superiority in the Talmud and its Classical Parallels," *Transactions and Studies of the College of Physicians of Philadelphia*, series 5, vol. 5, no. 1 (March, 1983), 1–12. On the concept of climatology in general, see Genevieve Miller, "'Airs, Waters and Places' in History," *Journal of the History of Medicine* 17 (January, 1962), 129–140. The notion of climatic changes in time and place has been employed to explain the concept of "*nishtaneh hateva*."

111. *Rav Pe'alim*, vol. 3, *E. H.*, no. 12.
112. Preuss, op. cit., 110; *Magen Avot*, cited in the text above; Cecil Roth, ed., *Encyclopedia Judaica*, 2 (Jerusalem), 932.
113. Margaret Talmadge May, ed., *Galen: On the Usefulness of the Parts of the Body* (Ithaca, 1968), 660.
114. See *Hippocrates: Generation. Nature of the Child*, Volume X of the Loeb Classical Library (Harvard University Press, 2010), 9: "…the seed passes through the middle of the testicles to the penis, not running where the urine does, but contained in another passage which exists for it." I thank Dr. Moshe Pinchuk for this reference.
115. J. Playfair McMurrich, *Leonardo da Vinci, the Anatomist* (Baltimore, 1930), 202.
116. Ibid., 180; Charles D. O'Malley and J. B. de C. M. Saunders, *Leonardo on the Human Body* (New York, 1983), 460–463.

pathway in the *ever*.[117] He also postulates how the Arabs arrived at their conclusion.[118] Interestingly, by way of discussion, he cites an actual case of a young man from Padua who had two passages at the tip of the *ever*, one for semen and one for urine.[119]

The susceptibility of the urethra to anatomical variation, and in particular to duplication, has been recorded in medical case records.[120] Frank Netter, in his contemporary classic, *The CIBA Collection of Medical Illustrations*, draws accessory urethral channels as an example of congenital variations.[121]

IV. CONCLUSION

The understanding of embryology, as well as reproductive anatomy and physiology, has changed significantly over the centuries. The sources in rabbinic literature that address these issues, whether directly or indirectly, reflect these changes. It is essential for the modern reader to appreciate the historical dimension when learning or extrapolating from these sources.

117. See C. D. O'Malley, *Andreas Vesalius of Brussels* (Berkeley, 1964), 358. The appendix contains a selection of translations from Vesalius' famous work, *De Humani Corporis Fabrica* (Basel, 1543).
118. Preuss, op. cit., 110.
119. C. D. O'Malley, et al., trans., *William Harvey: Lectures on the Whole of Anatomy* (Berkeley, 1961), 142, n. 509. Harvey followed Vesalius and confirmed that there was only one path in the *ever*.
120. See George Gould and Walter Pyle, *Anomalies and Curiosities of Medicine* (New York, 1896), 317. They also quote the case studies of Fabricius Hildanus (1560–1624), Marcellus Donatus (1538–1602) and others, including Vesalius.
121. *Reproductive System*, vol. 2 (New York, 1988), 31. Here, however, the accessory urethra ends in a blind pouch and does not carry either sperm or urine.