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THE HALAKHIC CHAPTER OF OVARIAN TRANSPLANTATION

INTRODUCTION

The field of contemporary medical halakha has clearly earned its place as a bona fide specialty. With the plethora of articles appearing in halakhic periodicals, and the ever-increasing list of independent treatises on medical halakhic topics, the field can no longer be said to be in its infancy. Yet, there is an important dimension of medical halakhic research that remains largely unexplored—the interface between medical history and medical halakha. Halakha, by definition, is a precedent-based system. In solving modern medical halakhic dilemmas, rabbinic authorities invariably draw on halakhic material, often medical in nature, from previous generations, in which the medical and scientific knowledge may have differed radically from ours. While the principles of halakha have remained unchanged throughout history, scientific understanding has evolved. It is therefore incumbent upon us to appreciate these earlier sources in their proper medical historical context in order to optimally apply them to modern dilemmas.

There are two dimensions of medical historical analysis that can be applied to pre-modern rabbinic sources. The first, which I shall call the contextual approach, involves assessing the author's medical knowledge relative to his contemporaries. As the dissemination of knowledge in pre-modern times was far slower and more variable than today, it cannot be assumed that all authors of the same time period possessed the same medical knowledge. Nor can it be assumed that each author was aware of the contemporary advances in medicine. News of scientific change, depending on multiple variables, could take decades, or even centuries, to reach different parts of the world.¹

The second dimension, which I shall call the comparative approach, is predicated on the accuracy of the first, and entails comparing the sci-

entific theories assumed by the author of a particular source with the theories espoused today. As the theories and dogmas of medicine have evolved over the centuries, the reader must be aware if an author's medical understanding differs from his own. Such an approach prevents the reader from erroneously interpolating modern theories into pre-modern texts, a practice which can lead to faulty interpretation and misapplication. Only the application of both the contextual and comparative approaches will facilitate proper extrapolation from pre-modern sources to contemporary medical halakhic debates.

In contemporary discussions on issues relating to reproductive technology and infertility, a number of rabbinic authorities refer to a previous chapter in the history of medical halakha. This chapter, of both medical and halakhic literature, may be unfamiliar to the modern reader. But unlike other chapters in the history of medical halakha, such as the use of mummies for medicinal purposes in the 16th and 17th centuries,² or the treatment of smallpox in the 18th and 19th centuries,³ which recount the use of now obsolete medical practices, this chapter is directly applicable to contemporary halakhic discussions of current and future issues in reproductive technology. Reviewing the halakhic literature of this chapter, placing it in its rightful historical context, and applying the aforementioned medical historical methodology will hopefully facilitate the proper use of this material for modern medical halakhic discourse.

OVARIAN TRANSPLANTATION

R. Eliezer Waldenberg,⁴ in a series of responsa written in the 1960s on marital issues, questions whether a woman who had undergone a uterine transplant is obligated to inform her potential suitors of her operation. He cites earlier authorities who address the halakhic ramifications of such a surgery and ponder the definition of maternity for the resulting offspring. In 1971, R. Yitzchak Isaac Liebes, in the context of his expansive essay on the halakhic issues of organ transplantation,⁵ discusses the issues unique to ovarian transplantation, citing earlier halakhic literature on this topic. R. Azriel Rosenfeld, in a number of articles in the 1970's,⁶ uses the literature on ovarian transplantation to explore the issues of gene design and human identity. Also in the 1970's, R. J. David Bleich, addressing the then new advances in assisted reproduction, draws on the literature of this little known halakhic chapter to solve the issue of maternal identity in surrogate motherhood.⁷ More recently, R. Waldenberg relies on this literature in deciding the halakhic maternal identity in a

case of surrogate motherhood;⁸ Dr. Fred Rosner incorporates it into his discussion of sex organ transplants,⁹ and R. Dr. Mordechai Halperin cites it in an article discussing the use of donated genetic material in assisted reproduction.¹⁰

As neither uterine nor ovarian transplants are performed today on humans, to what could these authorities be referring? Are these simply hypothetical discussions for the sake of halakhic clarification, or do they have a basis in medical reality? All the aforementioned sources refer to an earlier halakhic chapter on ovarian transplantation. When was this chapter written, and why? Was it written as an halakhic intellectual exercise, or was it perhaps a response to medical and scientific advances?

Unbeknownst to many a modern reader, physicians and scientists of the late 19th and early 20th centuries experimented with human ovarian transplantation, with variable success. Already from the earliest stages of experimentation rabbinic authorities began to address the attendant halakhic ramifications. It is to this halakhic chapter, which spans roughly twenty-five years, that the aforementioned modern authorities refer, and a detailed analysis of the early rabbinic sources discussing ovarian transplantation comprises the core of this essay. The focus of this article is to highlight the importance of a medical historical approach to these sources; however, due to the potential value of this literature for contemporary discussions, the entire halakhic chapter on ovarian transplantation is discussed in great detail, including halakhic proofs and analyses for which a medical historical analysis is not applicable. Where relevant, an historical analysis will be applied, including both the comparative and contextual approaches.

The core section is preceded by an historical overview of ovarian transplantation, thus facilitating an appreciation of the medical context of the halakhic discussions,¹¹ and is followed by a discussion concerning the application of earlier halakhic sources regarding ovarian transplantation to modern dilemmas. The essay concludes with a look at the future medical prospects of ovarian transplantation, pondering the potential application of the aforementioned halakhic literature to future halakhic dilemmas.

MEDICAL HISTORY OF OVARIAN TRANSPLANTATION

Before beginning a focused discussion on the history of ovarian transplantation in the late 19th and early 20th centuries, I should like to preface with a few remarks on the status of reproductive physiology and

genetics during this time period. Despite the microscopic visualization of the human spermatozoa and ovarian follicle in the late 17th century, confusion still persisted regarding the respective roles of the male and female seeds in conception and heredity.¹² It was not until 1827 that the human female egg was directly visualized for the first time by Ernst Von Baer, and it was only in the late 19th and early 20th centuries that the process of reproduction was understood on a cellular level. Simultaneous with the research in reproductive physiology evolved the field of genetics and research into the heredity of human characteristics.¹³ Although Gregor Mendel's classic study on plant hybridization was published in 1866, it lay unnoticed until 1900, the year that marks the beginning of the modern period of the study of heredity.¹⁴ Already in the early 20th century chromosomes were understood to be the material responsible for heredity, but it was only in 1953 that Watson and Crick first described the molecular structure of DNA.¹⁵ Concurrent with the basic scientific research in the fields of reproductive physiology and genetics, clinicians were also experimenting in the field of clinical reproductive medicine.

In the late 19th century, physicians were grappling with ways to overcome the ravages of gynecological disease. In cases of diseased ovaries or Fallopian tubes, the affected organs were usually surgically removed, not only rendering the patient infertile, but also subjecting her to early menopause. In 1895, Dr. Robert Tuttle Morris (1857-1945)¹⁶ postulated that transplanting a small piece of functioning ovary into a patient who had undergone bilateral ovary removal would alleviate the untoward symptoms of menopause and possibly restore menstruation and fertility.¹⁷ The donor tissue, he theorized, could either derive from the residual functioning ovarian tissue of the patient herself (i.e., autotransplant), or from a functioning ovary of another patient (i.e., heterotransplant). Regarding the reestablishment of fertility in these patients, the theory was that eggs would be spontaneously ovulated from these graft sites and would encounter the sperm in either the Fallopian tubes or uterus, as in a normal case of spontaneous conception.

Later that year, Morris reported the results of two successful ovarian transplants: one autotransplant, after which the patient subsequently became pregnant and aborted in the third month, and one heterotransplant,¹⁸ after which the patient resumed menstruation, but did not conceive.¹⁹

Two aspects of Morris' technique are important for our discussion: the size and location of the transplant. Only a pea-sized section of ovary was removed from the donor, with apparently no residual effect on her fertility.²⁰ This small section was surgically implanted into one of three

possible locations: the uterus, Fallopian tubes or peritoneum.²¹ No other organs were transplanted, and the transplanted piece of ovary was placed deep within the pelvic organs.

In the subsequent years, a number of physicians performed research in the field of heterotransplantation, some reporting cases where the woman regained menstruation;²² but in 1906, Morris reported a case that sent shock waves throughout the medical community. In 1902, Morris had treated a woman with polycystic ovary disease.²³ After completely removing both of the patient's ovaries with a surgical instrument designed specifically for this procedure,²⁴ Morris then transplanted a small piece of another woman's ovary into the peritoneum of the patient.²⁵ Four months later, the patient resumed menstruation; in 1905, she became pregnant, and on March 15, 1906, she delivered a baby girl weighing seven and one half pounds. In addition to Morris' personal account of this case,²⁶ extensive reports appeared in the French and English literature.²⁷

Many physicians at that time doubted the veracity of the case, and even Morris himself was skeptical about the conclusions that could be drawn from it. Morris, as well as others, wondered whether some of the patient's own ovarian tissue had remained after the initial surgery.²⁸ In fact, pregnancy had been observed in cases where allegedly both ovaries were removed and no transplant was performed.²⁹ Morris further speculated that a heterotransplant might stimulate activity of previously latent ovarian cells in the patient.³⁰

Aside from scientific critique, the case spawned numerous discussions regarding the ethical and legal ramifications of transplanting an ovary from one woman to another. One article in an English journal presented a discussion addressing the question of who is considered the mother of the child.³¹ Dr. Freeland Barbour opined that from a medico-legal point of view, the lawyer would require an exploratory incision in order to satisfy himself that all the recipient's ovarian tissue had been removed before giving an opinion. Mr. Scott Carmichael concurred, claiming that "the crux of the whole matter was whether the ovaries had been completely excised."³²

One group of respondents believed the donor of the ovary to be the mother. Dr. Paterson likened the organ recipient to an incubator, claiming that since the life of the ovum was given to it by the donor, the donor should be considered the mother of the child.³³ Dr. Dewar also considered the ovary donor to be the mother, rendering the child (the offspring of the father and another woman, not his wife) illegitimate and possibly unable to collect inheritance. Professor Croom con-

curred, adding "that when a man married a woman her ovaries belonged to him; and even after they were transferred to another woman they were still his. So the offspring of the second woman must be a bastard."³⁴

Others contended that the recipient, or gestational mother, was the mother, since once the ovary was removed, "it no longer belonged to the woman who supplied the graft, but had become an integral part of the woman who bore the child."³⁵ Dr. Taylor added that since the law does not recognize a child until after the occurrence of quickening, the only possible legal mother is the one who gave birth to the child.³⁶

Some suggested observing the child as she grows, to see which mother's characteristics she develops.³⁷ Dr. Darling remarked that it would be easier to determine maternity if one of the mothers was white, and the other black.³⁸

Morris himself mentioned some of the concerns that were voiced by others regarding ovarian heterotransplantation.³⁹ One of his patients wanted to know whether the ovary donor was a Methodist or Episcopalian,⁴⁰ and others objected to the procedure because the child would have "treble parentage."⁴¹ Lawyers were concerned that such interventions would confuse the laws of entitlement of property.⁴²

While work in the field of ovarian transplantation continued for a number of decades after the publication of Morris' case report, the research was largely restricted to autotransplantation.⁴³ A number of authors mention, *inter alia*, that conception had been known to occur in cases of heterotransplantation, but they provide no documentation.⁴⁴ It is possible that these references all refer to Morris' one case report.

Despite the immense popularity this case enjoyed shortly after its publication, it seems to have been quickly forgotten. Even Fielding Garrison, whose classic work on the history of medicine was first published in 1913, does not mention Morris' case report, let alone his general contribution to the field of ovarian transplantation.⁴⁵ In 1934, Dr. Edward Richardson, in his comments on an article on ovarian transplantation, states that "so far as I know, pregnancy following actual transplantation of ovarian tissue has not been achieved."⁴⁶

In 1970, Hans Simmer wrote, in reference to Morris' case report, that "doubts remain about the validity of this case, especially, since as far as can be determined, in no other instance of human ovarian homotransplant (i.e. heterotransplant) has pregnancy ensued."⁴⁷

In conclusion, it appears that despite the intense medical research in the field of ovarian transplantation in the late 19th and early 20th cen-

turies, there is only one recorded case in the entire medical literature, albeit of questionable veracity, of pregnancy and live birth following an ovarian transplant (i.e. heterotransplant).⁴⁸ This case, which briefly sparked intense scientific debate and ethical discussion, was soon forgotten.⁴⁹ Research in the field of human ovarian heterotransplantation continued for some years after Morris' case report, with only limited success, and has not been attempted since the 1920s.⁵⁰

HALAKHA OF OVARIAN TRANSPLANTATION

The earliest halakhic references to ovarian transplantation appear in a series of articles in two European journals spanning from 1907-1908. The halakhic sources on this new procedure deal exclusively with heterotransplantation, and are not a product of rabbinic imagination, but a response to a new medical development. As the practice of ovarian transplant was in its infancy at this time, the authors are uniformly skeptical of the success, not to mention reality, of the procedure. In addition, their unfamiliarity with the medical facts is betrayed by the nature of their halakhic concerns.

The issue of ovarian transplantation resurfaced again in halakhic literature in the late 1920's to early 1930's, with two rabbinic scholars independently addressing the topic, followed by a series of articles in another European journal. As there was only one reported case, in 1906, of human ovarian transplantation followed by a live birth, it is unclear what precipitated the renewed interest in the topic at this time. Either the rabbinic authorities were addressing the continued research in heterotransplantation, or they were only then informed of the earlier discussions of Morris' case report. Some sources, such as R. Kamelhar's response below, confirm the latter possibility. With some exceptions, the discussants in this later stage fail to mention the existence of the earlier halakhic literature. Yet, these authors address the identical halakhic issues, even utilizing some of the same proof texts. In addition, since by this time ovarian transplantation had become relatively more established and publicized, the rabbinic authorities of this period are significantly more familiar with the medical facts. Although some medical ambiguities are scattered throughout their remarks, they are, on the whole, less skeptical and more knowledgeable about ovarian transplantation than their predecessors. It will be evident that the rabbinic authorities shared many of the same factual, legal and ethical concerns as their medical counterparts.

EXCHANGE IN *VA-YELAKET YOSEF*

It appears that the earliest halakhic reference to ovarian transplantation is found in the pages of *Va-yeLaket Yosef*, a Hungarian journal edited by Yosef Schwartz.⁵¹ In an article published in 1907,⁵² roughly one year after Morris' famous case report, Rabbi Yaakov Gordon of England informs the readers of a new medical procedure involving the transplantation of reproductive organs from one female to another infertile female, enabling the latter to conceive.⁵³ Without elaborating on the details of the procedure, he ponders its halakhic implications: can one perform a transplant from mother to daughter?; is the resulting progeny considered an halakhic *bekhor* (first born)?; who is the halakhic mother, the donor or the recipient? After cursorily alluding to his own theories on the topic, R. Gordon invites a forum discussion.

The first respondent, R. Eliezer Deutch, head of the Bonyhad rabbinical court, assumes that the entire set of female reproductive organs, including the external genitalia, was transplanted in the procedure. As discussed above, only the ovary, or a part thereof, was actually transplanted. This misconception likely resulted from the ambiguity of R. Gordon's initial question, and highlights the importance of applying a contextual approach. The question posed to the rabbinic authorities states that the "female reproductive organs" were transplanted, and raises the issue of *bekhor*, since in this case the "uterus belongs to another woman." As the medical literature on ovarian transplantation was unavailable to the rabbis of Eastern Europe, and the details of the procedure were unknown to them, each simply responded to the question as it was presented, or as he understood it. The modern reader must realize that R. Deutch operates with this misconception in order to appreciate his halakhic concerns and analyses. For example, since R. Deutch believed that the external genitalia were included in the transplant, he is concerned with the issue of *erva*, as the husband would be having direct sexual contact with the reproductive organs of an *ishet ish* (another married woman).⁵⁴ R. Deutch considers this case to be halakhically comparable to having relations with a corpse—an act which, although reprehensible and perhaps rabbinically prohibited, nonetheless does not constitute a biblical violation of *erva*.⁵⁵ The organs, once removed from the donor, are simply inanimate limbs of a corpse, rendering the prohibition of *erva* inapplicable to them.⁵⁶ Had R. Deutch known that only the ovary was transplanted, and that there would be no direct contact with it during marital relations, he may not have been concerned with the issue of *erva*.⁵⁷ He further concludes that, without question, and in all respects, the transplanted organs halakhically become part

of the recipient's body. This conclusion would likely not be affected by the aforementioned misconception.

In the next issue of *Va-yeLaket Yosef*⁵⁸ R. Deutch addresses the issue of *bekhor*. The *gemara* (*Hullin* 70a) brings a hypothetical case where the birth canal is so wide that the fetus can exit without direct physical contact with the uterine (or vaginal) walls. Is the air space of the uterus sufficient to generate the status of *bekhor*, the *gemara* queries, or is direct physical contact with the uterine walls required? Rambam maintains that the fetus in this case would be a *safek bekhore*.⁵⁹ In our case, according to R. Deutch, the uterine walls belong to the donor, while the air space belongs to the recipient. Therefore, a child born to the organ recipient would be the first to pass through the air space of her birth canal, and, according to this logic, would be considered a *safek bekhore*.⁶⁰ Here, too, R. Deutch's misconception regarding the nature of the procedure impacts on his halakhic analysis, reflecting the importance of the contextual approach. Had he understood that only a piece of ovarian tissue was transplanted, and that the uterus and external genitalia of the recipient remained intact, then the issue of *bekhor* would not be in doubt. As both the air space and the uterine walls belong to the recipient, she is clearly the one who determines the *bekhor* status of the child. This is not a *safek bekhore*, but a *vadai bekhore*.

Despite his reasoned response, R. Deutch still doubts the medical reality of such a transplant, advancing a rabbinic proof for this position. According to the *gemara*, Sara the matriarch was infertile due to congenital absence of her uterus.⁶¹ Had transplantation of reproductive organs been possible, he argues, there would have been no need for God to perform a miracle to reverse Sara's infertility.⁶² He concludes by saying that would it not have been for his respect for the questioner, he would not have answered such a ridiculous query. As mentioned above, many physicians at that time also questioned the veracity of the case report of human ovarian heterotransplantation.

The discussion continues in the journal in two subsequent issues. Citing a passage from *Hullin*,⁶³ R. Sheftel Weiss believed that he had found a remarkable talmudic analogue to our case of reproductive organ transplantation.⁶⁴ In the talmudic hypothetical, the uteri of two animals are adjacent to each other and the fetus moves from one uterus to the second before being born.⁶⁵ The *gemara* ponders for which animal would this fetus be considered a *bekhor*. R. S. Weiss does not elaborate, however, as to how this passage would be practically applied to our case.⁶⁶

Two additional concerns are briefly raised by R. S. Weiss: the prohi-

bition of deriving benefit from a corpse,⁶⁷ and the issue of submitting to a procedure involving a halakhically questionable risk.⁶⁸

The final note on this topic in the journal was authored by R. Binyamin Arye Weiss.⁶⁹ According to R. Weiss, if this procedure would be medically possible, which he doubts, it would be halakhically forbidden to undergo; for even if there were no danger to the patients involved, the donor would be undergoing sterilization (*sirus*), a prohibition which, at the very least, is of rabbinic origin.⁷⁰ Regarding R. Weiss' concern about *sirus*, a contextual approach may shed some light. R. Weiss, like the other respondents in the journal, apparently believed that the entire set of reproductive organs, including both of the ovaries, were removed from the donor for transplantation. Consequently, the issue of *sirus* is without question applicable to the donor. However, had R. Weiss known that only a small piece of ovarian tissue was removed from the donor, and that the donor likely retained her fertility, he may have questioned the applicability of the laws of *sirus* to this case.⁷¹

If, however, one already underwent the procedure, R. Weiss adds, the halakhic mother of the offspring would be the organ recipient. R. Weiss brings proof for this position from the case in *Sota* 43b, where a branch of an *orla* tree, which is less than three years old and forbidden to eat, is grafted onto an older tree, whose fruit is permitted. The *gemara* concludes that for halakhic purposes the branch becomes an integral part of the receiving tree and loses its original identity. Here, too, the transplanted organs would lose their identity and become an integral part of the recipient's body. The recipient would therefore be considered the sole halakhic mother. The argument that removed organs no longer belong to the donor, but become an integral part of the recipient, was advanced by physicians in their discussions on this topic as well.⁷²

R. Weiss' comments are brief, and he does not elaborate exactly how the case of *orla* is applicable to the case of ovarian transplantation. Furthermore, he makes no mention as to how he understands the nature of the donor's contribution to the subsequent offspring,⁷³ a point which is crucial to whether or how one can extrapolate from R. Weiss' responsum to contemporary discussions, as will be discussed below.

EXCHANGE IN *TEL TALPIYOT*⁷⁴

A similar exchange of ideas on the topic of transplantation of the reproductive organs appeared just a few months later in another Hungarian

journal, *Tel Talpiyot*.⁷⁵ The discussion is introduced by the identical question of R. Gordon, and is followed by the response of R. Eliezer Deutch, verbatim as they appeared in *Va-yeLaket Yosef*.⁷⁶ In a footnote to R. Deutch's remarks, the editor argues against the latter's conclusion that the recipient is considered the sole mother, claiming that both the donor and the recipient have significant contributory roles (i.e., *ze ve-ze gorev*). In addition, he rejects the halakhic comparison of the transplanted limbs to the limb of a corpse, for while the latter is cold and lifeless, the transplanted organs are rejuvenated in the recipient and restored to life. Sexual contact with such organs would be prohibited. He therefore considers the recipient to be a *safek erva*, in which case she would be forbidden to her husband.

The second respondent, R. Yeshaya Silverstein, head of the rabbinical court in Veitzen, likewise concludes that the transplanted organs, for halakhic purposes, become part of the recipient's body. He adduces proof from a passage in *Bekhorot* 28b regarding the *treifa* status of an animal whose uterus has been removed. In support of the position that such an animal is not a *treifa*, the *gemara* mentions the practice in Alexandria, Egypt of removing the uteri of cattle that were sold or exported.⁷⁷ Since these animals obviously lived for prolonged periods of time after the procedure (longer than twelve months), this is proof that the absence of a uterus does not create an *isur*. R. Silverstein questions the *gemara*'s proof. If, by definition, the absence of a particular organ creates an *isur*, then the animal's subsequent lifespan is irrelevant. Even should such an animal live longer than twelve months, it would still be considered a *treifa*.⁷⁸ R. Silverstein therefore understands the reasoning of the *gemara* as follows: an animal lacking a uterus is not a *treifa* because its condition can be reversed with the transplantation of a uterus from another animal. An *isur treifa*, by definition, only applies in the case of an irreversible ailment. If the removed organ can be effectively replaced, then its absence does cause an animal to be considered a *treifa*.⁷⁹ After transplantation the animal could return to complete health and fertility. Furthermore, the transplanted organs must be considered part of the recipient in order to sustain this proof; otherwise, the recipient would still be halakhically considered to have missing organs.

If one believed, as R. Silverstein and R. Deutch did, that the uterus was included in the transplantation, then this proof is particularly salient. However, despite the fact that this was not the case, this analysis is still applicable to an ovarian, or any organ transplant.

R. Silverstein brings further proof from the laws of *nidda*. One of

the requirements for generating the *tuma* of *nidda* is for the woman to actually sense the menstrual flow “*bi-vsara*” (i.e., in her flesh) as it exits her body.⁸⁰ In a case of transplantation of the reproductive organs, one might argue that the menstrual flow of the recipient would not be felt “in her flesh,” as the organs are not hers, but those of the donor. This cannot be, contends R. Silverstein, as this would effectively circumvent all the laws of *nidda*. Rather, the organs become part of the recipient’s body such that any flow would be considered “in her flesh.”⁸¹ This latter proof confirms that R. Silverstein believed, as did R. Deutch, that the entire set of reproductive organs would be included in the transplant. Had he understood that the uterus and outflow tract of the menstrual blood remained intact in the recipient, this analysis would have been irrelevant.

The final response, by R. David Tsevi Katzburg, the journal’s editor, is introduced with three prefatory comments. He first asserts that the progeny should be considered that of the birth mother (i.e., the one in whose body the fetus gestated), and not that of the organ donor, because the offspring is a composite of material from the entire body, and not just the reproductive organs. The seed, originating from the brain, travels via the spinal cord to the genital area. This notion (that the seed is a composite of material from the entire body) explains why children resemble their parents. Consequently, as the transplanted reproductive organs play only a minor role in the process of conception, the organ donor is eliminated as a candidate for maternity. The recipient, from whose entire body the seed is derived, is the only logical halakhic (and physiological) mother.

To appreciate this prefatory comment, we must apply the comparative approach. This discourse on reproductive physiology may seem enigmatic to the modern reader, as we currently understand that the embryo is formed from an equal contribution of genetic material (DNA) from a man and a woman. The parental resemblance is explained by the transmission of one’s genes to one’s offspring. This understanding, however, is a product of the mid-twentieth century. Prior to this period, there were a number of co-existing theories, dating back to antiquity, regarding the composition and contribution of the male and female seeds. The author actually combines two of these theories in his comment. The encephalo-myelogenic doctrine claimed that the seed originated in the brain and traveled via the spinal cord to the genital organs. Hippocrates advanced the so-called pangenesis doctrine, claiming that the seed was derivative from material from the entire body. Part of his logic for advancing this theory was based on the observation that offspring can

resemble their parents in all bodily aspects. He therefore postulated that the parents must in fact be transferring material from each part of their body to their offspring. R. Katzburg alludes to this reasoning.⁸²

R. Katzburg's second preface addresses the veracity of the scientific information of the query. Doubting that any successful transplant of the reproductive organs could have occurred, especially since such a revolutionary procedure would surely have been more widely publicized, he postulates that it was likely an unsuccessful experiment about which R. Gordon had heard. Nonetheless, unable to verify the facts, he hazards an educated guess as to what form of transplant could theoretically be done.⁸³ He categorically dismisses the notion that the external genitalia are included in the transplant for two reasons. First, as these structures are unlikely to contribute to infertility, there would be no need to replace them. Second, it is unlikely that a woman would willingly suffer the pain of such a radical surgical procedure. He therefore postulates that the organ which is transplanted is the uterus. It is the uterus, he contends, that can prolapse outside the body and can therefore be easily excised and replaced.⁸⁴ In addition, as the uterus houses the fetus and is adjacent to the ovaries and Fallopian tubes, its malfunction can lead to infertility. It therefore follows that this is the organ that physicians would theoretically transplant.

While the editor's logic with respect to the transplantation of the external genitalia is correct, he nonetheless erred in his assumption that the uterus would be transplanted. As is evident from our historical discussion, it is the ovary, or part thereof, that was in fact transplanted. As with R. Deutch and R. Silverstein, one cannot fault R. Katzburg for not knowing the details of ovarian transplantation. The relevant medical literature was unavailable to him, and he simply responded to the question as he saw fit. Nonetheless, it is important to be aware of this misconception when extrapolating from these sources.

The third prefatory remark includes a number of rabbinic references to cases where objects are severed and reconnected. The common denominator in all the cases is that the objects may again be considered halakhically whole. The editor infers from these sources that in our case of transplantation the organs would be considered an integral part of the recipient.

Having presented his conceptual framework, the editor addresses the halakhic issues of the query. Regarding the prohibition of *erva*, it is evident to him that only the recipient's status is relevant. As the uterus becomes an integral part of the recipient, the status of the donor is irrelevant.⁸⁵

Furthermore, in addressing the permissibility of transplanting a woman's uterus into her daughter, the editor compares the case of uterine transplant to the case of bathhouse insemination.⁸⁶ In the latter case, even if the woman were a *nidda*, the status of a *ben nidda* would not be conferred upon the child, since no illicit sexual activity took place. Likewise, he claims, in the case of uterine transplant, even though the uterus originally derived from the woman's mother, a person considered an *erva* for the husband, since the uterus becomes an integral part of the daughter's body, the husband is not technically considered to be having illicit relations with his mother-in-law.⁸⁷

In the final section of this article R. Katzburg discusses the issue of *bekhor*. He claims that even though the uterus, while part of the donor, had already borne fruit and previously yielded a *bekhor*, since it takes on a new identity in the recipient, the first born for the recipient with the transplanted uterus would be considered an halakhic *bekhor*. Furthermore, he contends that the reason a cesarean birth precludes *bekhor* status is because the fetus must exit naturally through the birth canal.⁸⁸ In our case, since only the uterus is transplanted, the birth canal was always part of the recipient's body. Therefore, a child born after the transplant would in fact be the first child to exit the recipient's birth canal (assuming she had no children before the procedure). As mentioned above regarding R. Deutch's remarks on the issue of *bekhor*, this discussion is rendered superfluous with the knowledge that only the ovarian tissue was transplanted.

Two additional responses to R. Gordon's query appeared in a subsequent issue of the journal.⁸⁹ R. Yerahmiel Katzburg, while questioning the veracity of the medical account, is in agreement with the editor's comments on the response of R. Deutch, and believes this to be a case of *ze ve-ze gorev*. He marshals support from the biblical stories of the matriarchs' infertility.⁹⁰ According to rabbinic tradition, God reversed the normal course of nature and "opened the wombs" of the matriarchs. If a "natural" remedy, such as transplantation of the reproductive organs, was possible, then why was it necessary for God to change the course of nature? It therefore must be that even if such a procedure were possible, the offspring would not be related exclusively to the gestational, or birth, mother. Therefore, the transplanted organs retain their independent status in the recipient. As a result, there would be a prohibition of *erva* with the donor. In addition, he rejects the editor's comparison to the case of bathhouse insemination, since in our case, as opposed to bath house insemination, there is actual sexual contact. He goes so far as to say that the organ recipient might require a new marriage contract (*ketuba*) with her husband.

R. Moshe Yosef Roth offers a novel support to the position that the organ donor is the sole halakhic mother. In *Sefer Pane'ah Raza*⁹¹ the question is raised as to how Shimon could have married his sister Dina.⁹² Marriage of maternal siblings is forbidden even according to the Noahide laws.⁹³ He answers that according to tradition, Leah conceived a boy, and Rachel a girl. Through the prayers of Leah the two were switched in utero such that Leah gave birth to a girl (Dina), and Rachel to a boy (Yosef). Rachel is analogous to the donor in our case, having donated her fetus (and possibly uterus) to Leah, and Leah is likened to the recipient, having received the female fetus from Rachel.⁹⁴ Since Dina was conceived by Rachel, Rachel is considered her halakhic mother, even though Leah was the birth mother. Therefore, since Shimon's halakhic mother was Leah and Dina's halakhic mother was Rachel, they were only paternal siblings, and consequently permitted to marry. We therefore see that with respect to *erva*, it is the donor of the organs that determines the status.⁹⁵

It is unclear to me how this proof of R. Roth is to be applied to our case of ovarian transplantation. In the biblical case, Rachel donates a complete fetus. What does R. Roth consider the donor's contribution to be in the case of ovarian transplantation? He must assume that the donor provides at least some material contribution, although it was too early in the history of genetics for R. Roth to have understood the female's genetic contribution. As will be discussed below, not all rabbinic authorities accepted the notion that the donor provided a material contribution to the subsequent child.

R. BETSALEL ZE'EV SAFRAN (1866-1930)

The next to discuss reproductive organ transplantation in detail is R. Safran, a noted Romanian rabbi and talmudic scholar, whose comments were recorded posthumously by his son.⁹⁶ In contradistinction to his predecessors, R. Safran's knowledge of the medical facts is more precise; by this time, some twenty years after the initial halakhic discussions, the procedure of ovarian transplantation had been more widely practiced and publicized. He understood that only the ovary was transplanted, and not the uterus or external genitalia. The fundamental halakhic question, however, remained the same; who is the mother of the child?

R. Safran makes no mention of the aforementioned halakhic interchange, and offers his own opinion. To answer the question, he invokes the *Targum Yonatan Ben Uziel* that Dina, conceived by Rachel, and

Yosef, conceived by Leah, underwent an inter-uterine transfer such that Rachel gave birth to Yosef and Leah to Dina.⁹⁷ Despite being conceived in the womb of Rachel, the Torah considers Dina to be the daughter of Leah.⁹⁸ This is clear proof, he contends, that the birth mother, not the donor of the ovary, is considered the mother. Although using the same analogy to the inter-uterine exchange as R. Roth above, R. Safran arrives at the exact opposite conclusion.

Regarding the issue of *erva*, R. Safran is concerned that the process somehow involves an *eishet ish* (married woman) and concludes that the matter requires further thought. He beseeches the great rabbis of his generation to address this issue more fully.

R. YEKUTIEL KAMELHAR (1871-1937)⁹⁹

R. Kamelhar's contribution to this debate can be found in his classic work "*HaTalmud u'Mada'ei haTevel*,"¹⁰⁰ where he mentions that at a medical conference in Chicago in 5671 (1910-1911) doctors discussed a case in which a woman gave birth to a child after undergoing an ovarian transplant.¹⁰¹ He then offers his halakhic opinion of this case. Like R. Safran, he is familiar with the medical realities of ovarian transplantation, yet does not reference any previous halakhic discussions on the topic.¹⁰² In his introductory comments, however, he is unclear as to which woman has the primary impact on the fetus. While acknowledging the possible role of the donated ovary in the subsequent conception, he seriously entertains the possibility that the transplanted ovary might stimulate the natural fertility of the recipient without providing any material contribution, in which case the recipient would be the sole halakhic mother. This theory is reminiscent of Dr. Morris' comment that heterotransplant might stimulate the patient's own ovarian cells.

R. Kamelhar draws on a number of rabbinic discussions which he believes are comparable to ovarian transplantation. The first is an agricultural analogy based on a passage in *Sota* 43b, which discusses the impact of tree grafting on the laws of *orla*. R. Kamelhar, perhaps unaware that R. Binyamin Weiss had earlier applied the same analogy,¹⁰³ reaches the same conclusion: that just as the grafted branch loses its original status and becomes an integral part of the post-*orla* tree,¹⁰⁴ likewise, in our case, the transplanted ovary loses its original status and becomes an integral part of the recipient's body. The birth mother is therefore the sole halakhic mother, and no violation of *erva* is incurred.

The second relevant rabbinic discussion is found in *Hullin* (79a-b)

regarding whether the male seed is considered to be of halakhic significance when determining the halakhic status of a hybrid animal (*im hosheshin le-zera ha-av*).¹⁰⁵ R. Kamelhar opines that both sides of this debate would agree that in the case of ovarian transplant the recipient is the halakhic mother. Those who maintain that the male seed is insignificant would surely hold likewise for the donated ovary. If the male seed, which clearly has an independent role in conception, is not deemed significant, all the more so the donated ovary, which has no independent role in conception, and either stimulates the natural conception of the recipient or simply serves as a receptacle for her seed, both merely peripheral contributions.

Even those who grant significance to the male seed, R. Kamelhar continues, would still not necessarily bestow such significance on the donated ovary. After all, while the male seed has an active role in conception (*is molid*), the transplanted ovary, dissociated from the donor, is merely a receptacle which could easily have been artificial. Surely an artificial organ could have no halakhic significance, nor could such an organ be considered an halakhic mother? Without the seed of the recipient, and the physiological environment of her body, the transplanted ovary would be useless. The halakha therefore must be that the woman who gave her seed and gave birth to the child is considered the halakhic mother.

From the above analysis, it is clear that R. Kamelhar adopts the position that the donor in an ovarian transplant has no material contribution to the fetus, a position likewise entertained by contemporary physicians, as discussed above. In this analysis, he seems to entirely dismiss the possibility that the egg is provided by the transplanted ovary.

The third rabbinic dictum which R. Kamelhar believes bears relevance to our case is that regarding birds that grow on trees (a.k.a. barnacle goose).¹⁰⁶ R. Yosef Karo, in his *Shulhan Arukh*,¹⁰⁷ categorizes these creatures as crawling insects and forbids their consumption. Even though the creatures originate from the seed of birds, since the tree, which is the dominant element (*ikar*), gives forth the eggs, the creature is halakhically considered an insect. This is yet another proof that the ovary recipient, whose role predominates in the process of conception, and who gives birth to the child, would be the halakhic mother.

R. Kamelhar reports that R. Meir Arik (1855-1926) concurred with the entire aforementioned analysis.¹⁰⁸ Elaborating on his position regarding the relevance of *erva* to ovarian transplantation, R. Kamelhar points out that despite the fact that Eve was created from one of Adam's own ribs, the latter was not guilty of cohabitation with another

male. This is true, he asserts, because the organ takes on a completely new identity in the recipient. There is therefore no prohibition of *erva* for the transplanted ovary, as this ovary acquires a new identity in the recipient and is no longer associated with the donor.

In explaining the biblical incident where the sheep of Ya'akov multiplied,¹⁰⁹ the *midrash*¹¹⁰ claims that the water ingested by the sheep turned into reproductive seed.¹¹¹ Yet, according to R. Kamelhar, there is no doubt that the offspring were considered normal sheep, to which the laws of *shehita* and *bekhor* would apply. This is proof that only the gestation and parturition determine the offspring's status, for despite the miraculous origin of the male seed, the sheep were considered halakhically normal.¹¹²

R. Kamelhar also refers to a contemporary animal experiment of ovarian transplantation where the offspring's coat color was found to be identical to that of the ovary donor, a finding that apparently proves that the donor of the ovary is the mother.¹¹³ While the *gemara* does address the transmission of characteristics (*simanim*) from parent to offspring,¹¹⁴ R. Kamelhar contends that this discussion is restricted to bodily features, and does not include skin color. The latter can be affected by external influences, as evidenced by the story of Ya'akov's sheep acquiring a different color after gazing upon the colored rods.¹¹⁵ The *midrash* mentions a similar story where external influences altered the color of a fetus.¹¹⁶ In addition, R. Kamelhar asserts that one cannot extrapolate from experiments on animals to human beings. Even data gleaned from the study of non-Jewish bodies cannot be applied to Jews.¹¹⁷ He therefore concludes that, with respect to human beings, the father is the one who provides the seed, and the mother the one who conceives and gives birth to the child.¹¹⁸

EXCHANGE IN *HABE'ER*¹¹⁹

In the early 1930's there appeared an exchange of ideas on the halakhic aspects of ovarian transplantation in the Eastern European journal *Ha-Be'er*, much like that which appeared over twenty years earlier in the journals *Va-yeLaket Yosef* and *Tel Talpiyot*. The topic is introduced in a section of the journal devoted to contemporary halakhic problems.¹²⁰ The preface of the article, authored by the editor, R. Tsevi Hirsch Freidling, explains that doctors in England and America are now successfully treating infertility by transplanting ovaries from fertile to infertile women. As Morris' 1906 case is the only recorded successful treat-

ment of infertility with ovarian transplantation, it is unclear what precipitated the discussion of this issue in the journal at this time.

R. Freidling raises four halakhic questions: Who is the halakhic mother of the resultant child? Is there a prohibition of *erva* since the donor is a married woman? Is the child blemished (*pasul*)? Is it even permitted for a woman to undergo such a surgical procedure, or to receive another woman's organs?

This issue of *bekhor*, which was addressed by a number of the earlier authorities, is conspicuously absent from this list. As the rabbis of this later period were aware that only the ovary was transplanted, there was no doubt for them regarding the status of *bekhor*. This illustrates the importance of the contextual approach as applied to rabbinic sources dealing with the same medical issue, yet separated in time.

To answer the questions, R. Freidling quotes the entire response of R. Kamelhar (above), either ignoring or unaware of the other aforementioned discussions, and offers additional support to R. Kamelhar's position. He also cites the opinion of R. Eliyahu Posek on this issue,¹²¹ who, similar to R. Safran above, brings the *Targum Yonatan* to *Bereishit* 30:21 as proof that the birth mother is the halakhic mother. The issue of *erva* is therefore irrelevant because the transplanted organs become an integral part of the recipient.

R. Posek continues that one dare not undergo such a procedure because it would violate the prohibition of *havala* (sustaining unnecessary bodily harm) for both the donor and the recipient.¹²² The physicians' testimony regarding the success of the procedure is not to be believed, as it is possible that these women would have become pregnant even without the transplant.¹²³

R. Freidling concludes by quoting the responsum of R. Binyamin Arye Weiss, as it appeared in the latter's work *Even Yekara*.¹²⁴

In a subsequent issue of *HaBe'er*,¹²⁵ the editors return to the question of ovarian transplant, publishing two additional responsa. The first is by R. Hanokh Henekh Safran, who merely quotes the responsum of his father, R. Betsalel Safran, author of *Teshuvot Rabaz* (see above).¹²⁶ He notes that his father discusses the same issues and sources as R. Kamelhar and R. Posek, whose comments were both published in the earlier issue of the journal, despite having never seen either of their works on this subject.

The final respondent, R. Hayyim Zev Wolf Weinreb, addresses the halakhic issues raised by R. Freidling. In referring to the articles from *Va-yeLaket Yosef*, R. Weinreb is the first to mention the existence of an earlier literature on this topic. However, as he was unable to obtain the journals, this literature was not incorporated into his response.

He first addresses the comments of R. Binyamin Weiss regarding the organ donor's violation of the prohibition of sterilization (*sirus*). Explaining why R. Weiss is not concerned that the recipient, whose ovaries are also removed before the transplant, is violating the same prohibition, R. Weinreb opines that the removal of nonfunctional ovaries may not constitute *sirus*.¹²⁷ He hastens to add, however, that one cannot trust the physician's assessment that the ovaries were in fact nonfunctional; the prohibition of *sirus* may therefore apply to the organ recipient as well.

On the other hand, he argues, since both women's role in the sterilization procedure is passive, and the prohibition of sterilization devolves upon the one who actively performs the procedure and not upon the one to whom it is done (i.e., the passive recipient), perhaps neither the donor nor the recipient would violate the prohibition.¹²⁸

R. Weinreb next takes up the issue of *havala* raised by R. Posek. While agreeing that the prohibition of *havala* likely applies to the donor, even if only minimal danger is involved, he contends that this prohibition does not apply to the recipient for two reasons. First, the procedure would likely be performed by expert surgeons, a fact which might minimize the *havala*, and second, the prohibition might be waived for the sake of procreation and marital harmony.

Regarding the issue of *erva* with the organs donated by a married woman (*eishet ish*), R. Weinreb advances the novel suggestion that the donor either be unmarried or non-Jewish in order to circumvent the problem.¹²⁹ However, he argues, even if the donor were an *erva*, since the ovary is placed intra-abdominally, and there would be no direct physical contact with the organ during marital relations, the prohibition of *erva* would not apply.¹³⁰ Going one step further, he maintains that even if theoretically the external genitalia were also transplanted,¹³¹ which he understood was not the case here, no violation would be incurred; for once the organs are removed from the donor, they lose their *erva* status and are considered mere flesh.¹³²

R. Weinreb considers the question of maternal identity to be the most serious halakhic issue, and his comments on this matter reflect a detailed understanding of the physiological basis for ovarian transplantation far beyond that of his predecessors. According to the physicians, he writes, the female's role in conception is to provide a single egg, which is emitted from the ovary and travels towards the uterus to meet the male seed. In the case of ovarian transplant, it is the donor who provides that egg. It is therefore difficult to maintain that the donor has no maternal rights whatsoever, a position held by R. Kamelhar and R.

Posek. R. Weinreb does however acknowledge that it can be argued that the recipient also has maternal rights.¹³³

CONTEMPORARY REFERENCES TO THE CHAPTER OF OVARIAN TRANSPLANTATION

As mentioned in the introduction to this article, a number of rabbinic authorities over the last thirty years have incorporated the halakhic chapter of ovarian transplantation into their discussions of modern medical halakhic issues. It is my contention that in order to effectively apply this halakhic chapter to contemporary dilemmas, one must first appreciate the historical context of each source, as well as the author's knowledge of the contemporary medicine (i.e., utilize the contextual approach). Then, based on a comparison of the state of medicine at the time of the author as compared to our own (i.e., the comparative approach), a rabbinic authority can decide whether, or with what limitations, a particular source can be applied to a contemporary halakhic issue.

R. Waldenberg refers to a case of uterine transplantation in his responsum.¹³⁴ This reference is clearly a perpetuation of the misconception held by the early discussants of ovarian transplantation, such as R. Deutch, R. Silverstein and R. Katzburg, that the uterus, and perhaps even the external genitalia were transplanted. In the context of R. Waldenberg's initial mention of this halakhic literature, however, where he addresses the issue of premarital disclosure, this misconception has no halakhic ramifications. This may not be the case, however, regarding R. Waldenberg's later responsum. There he concludes, based on R. Weiss' comments on ovarian transplantation, that in the case of surrogate motherhood, the gestational mother is the halakhic mother. Here, an historical approach to R. Weiss' responsum may impact on its interpretation and application.

R. Weiss' responsum, although later published in his *Even Yekara*, was initially published in the halakhic exchange in *Va-yeLaket Yosef*. At this early stage of the halakhic discussions, the belief was that the entire set of reproductive organs was transplanted. R. Weiss does not refute this notion. In addition, R. Weiss states, based on the agricultural analogy from *orla* discussed above, that the birth mother is the halakhic mother.

First, in applying the contextual approach, it must be determined what R. Weiss understood about ovarian transplantation relative to his

contemporaries. R. Weiss' comments are terse, with no accompanying explanation. It is unclear whether he believed that the donor contributed materially to the offspring, as was believed by R. Roth and some members of the medical community, or that the donor organs served merely as a conduit for, or stimulant to, the recipient's egg, without providing any material contribution, a position espoused by R. Kamelhar and theorized by Dr. Morris. This ambiguity alone, a product of the contextual approach, may preclude or limit the use of this material for modern discourse.

The next step in the analysis, the comparative approach, is predicated on the accuracy of the contextual approach. For example, if R. Weiss concurs with R. Kamelhar that the donor has no material contribution, then R. Weiss' decision may not be applicable to the modern case of surrogate motherhood, where the genetic contribution of the donor is indisputable. However, if R. Weiss concurs with R. Roth, that the donor contributes materially to the fetus, then his analysis may be applied to our modern circumstance.

In the same vein, R. Dr. Mordechai Halperin mentions the halakhic literature on ovarian transplantation in an article discussing the use of donated genetic material in assisted reproduction.¹³⁵ He cites the responsum of R. Weiss, who considers the birth mother to be the halakhic mother, and concludes that the genetic contribution is not halakhically significant for the determination of maternity. It is questionable whether one can draw this conclusion from R. Weiss' comments. R. Weiss himself, as discussed above, may have thought that the egg is provided by the organ recipient, not the donor. If such is the case, one cannot conclude from his responsum that the genetic contribution is not halakhically significant. Had R. Weiss acknowledged a material or genetic contribution of the donor, he may have granted the latter halakhic maternity.

While R. Waldenberg and R. Dr. Halperin rely on the responsum of R. Weiss, which is ambiguous regarding the nature of the donor's contribution, R. Bleich, in an early essay on host mothers, turns to the work of R. Kamelhar for possible application to the issue of maternal identity.¹³⁶ As R. Kamelhar explicitly denies any material contribution of the donor, it is debatable whether his conclusions can be applied to a case of surrogate motherhood, where the donor's substantial contribution is irrefutable.¹³⁷ R. Rosenfeld, who also incorporates passages from R. Kamelhar's work, likewise does not mention that R. Kamelhar expressly denies any material contribution of the ovary donor. However, he does state that our understanding of heredity and genetics may be cause to reverse the decisions of the earlier rabbinic authorities.¹³⁸

The authorities above specifically mention the halakhic literature on ovarian transplantation in their contemporary halakhic discussions on issues of assisted reproduction, and in particular surrogate motherhood. It should be noted that many contemporary authorities cite source material similar to that raised in the initial halakhic discussions of ovarian transplantation, without direct reference to this previous halakhic chapter.¹³⁹ In particular, two sets of sources first mentioned with reference to ovarian transplantation have been cited extensively in the contemporary maternal identity debate: the sources dealing with the inter-uterine transfer of Yosef and Dina¹⁴⁰ and the agricultural sources from *Sotà* 43b and *Menahot* 69b.¹⁴¹ In addition, the passage from *Hullin* 70a discussing the transfer of an animal between two uteri, first mentioned by R. Sheftel Weiss, has received some attention in contemporary discussions,¹⁴² as has the passage from *Hullin* 79a, cited by R. Kamelhar above.¹⁴³ As these sources are incorporated independently, without reference to the chapter of ovarian transplantation, an historical analysis does not affect their interpretation.

THE FUTURE OF OVARIAN TRANSPLANT

The fertility benefit of ovarian transplantation has recently been superseded by in-vitro fertilization. Now that a donated egg can be fertilized in a petrie dish and transferred directly into a woman's uterus for implantation, it is no longer necessary to surgically transplant a piece of ovarian tissue in order to potentially restore fertility. One might therefore think that the halakhic literature on ovarian transplant, much like Morris' case report, may soon be relegated to obscurity. Current medical research, however, may lead to the resurrection of this halakhic chapter.

A new procedure is being investigated to preserve the fertility of women with cancer. The procedure involves removing the ovaries of a woman who is about to undergo chemotherapy or radiation therapy, freezing the ovaries, and reimplanting them after remission.¹⁴⁴ Although the research is currently at the stage of animal experimentation only, one company is offering to remove and freeze the ovaries for women with cancer based on the potential future success of this procedure.¹⁴⁵ Although the procedure currently under consideration involves reimplanting a woman's own ovaries, a variation of autotransplantation (see above section on medical history), it is possible that it will also include the transplantation of another woman's ovaries. This is exactly the case discussed above in the halakhic chapter of ovarian transplantation, and would undoubtedly lead to a re-evaluation of this literature.

Another form of ovarian transplantation is also in its infancy, although ethical objections may arrest its development. Research from Edinburgh University is aimed at transplanting the ovaries of an aborted fetus into an infertile woman in order to restore fertility.¹⁴⁶ This research could potentially produce a child who will inherit the genes of a woman who herself never lived. There are clearly other halakhic issues involved with the general use of fetal ovarian tissue,¹⁴⁷ let alone its use in assisted reproduction; but the basic issues of ovarian transplantation, including sterilization, *erva*, and maternal identity would be similar.

Could the sources from the aforementioned chapter on ovarian transplantation be equally applied to the future cases of ovarian transplantation? If so, to what extent? From the early literature one can glean the attendant halakhic issues involved in human ovarian transplantation, such as the risk of the procedure to both donor and recipient, the concern for violating the prohibitions of *erva* and *sirus*, and the definition of maternity. In addition, one can find potentially relevant source material and novel halakhic analyses for application to the modern dilemmas of ovarian transplantation. However, relying on the previous decisions of the early rabbinic authorities regarding the halakhic issues of ovarian transplantation is fraught with difficulty, and should be done only with extreme caution. The author to author variability in medical and physiological understanding, and the paradigm shift in reproductive physiology and genetics since the writing of this literature are obstacles that are not easily hurdled. A medical historical analysis of the sources, including both contextual and comparative approaches, may facilitate optimal use of these sources by rabbinic authorities.

CONCLUSION

The halakhic chapter on ovarian transplantation is a precursor to the contemporary halakhic discussions on assisted reproduction. An awareness of this literature, coupled with an appreciation of its medical historical context, will hopefully contribute to the evolving medical halakhic discussions. Rabbinic authorities who wish to apply these early sources must understand the scientific and physiological conceptions, as well as misconceptions, with which each author is operating in order to better extrapolate from these sources to contemporary halakhic problems.

NOTES

The author wishes to thank Dr. Fred Rosner, Dr. David Shatz and Dr. Joel Wolowelsky for their valuable editorial comments.

1. See "The Slowness with Which Important Medical Discoveries are Generally Put to Practical Use," *Journal of the American Medical Association* 27 (December, 1896), pp. 1210-1211, reprinted in *Journal of the American Medical Association* 276:24 (December, 1996), p. 1932. For an extreme example of this, see J. J. Izquierdo, "On Spanish Neglect of Harvey's 'Du Motu Cordis' for Three Centuries, and How it was Finally Made Known to Spain and Spanish Speaking Counties," *Journal of the History of Medicine* (Winter 1948), pp. 105-124.
2. See E. Reichman, "The Impact of Medical History on Medical Halakha: The Case of Mumia," in *Pioneers in Jewish Medical Ethics* (Northvale, NJ: Jason Aronson, Inc., 1998).
3. On the treatment of smallpox in halakhic literature, see Y. Z. Kahana, "*HaRefua beSafrut haHalakha she-leAhar Hatimat haTalmud*," *Sinai* 14 (1944), pp. 76-77; H. J. Zimmels, *Magicians, Theologians and Doctors* (London: Edward Goldston Publishers, 1952), pp. 107-110; David Margalit, *Derekh Yisrael beRefua* (Jerusalem, 1960), 376-379. Abraham Nansich wrote an entire treatise devoted exclusively to smallpox, *Ale Terufa* (London, 1785), in which he discusses rabbinic adaptation to medical and scientific advances and beseeches the rabbis of his time to address the issue of the halakhic permissibility of the use of smallpox inoculation.
4. *Tsits Eliezer* v. 7, sect. 48, chap. 5, n. 16.
5. Y. I. Liebes, "*BeInyan Hashtalat Eivarim*," *Noam* 14 (Jerusalem, 5731), pp. 28-111, esp. 86-109.
6. A. Rosenfeld, "Judaism and Gene Design," *Tradition* 13:2 (Fall 1972), pp. 71-80; *idem*, "Human Identity: Halakhic Issues," *Tradition* 16:3 (Spring 1977), pp. 58-72. I thank Dr. Joel Wolowelsky for directing me to these sources.
7. J. D. Bleich, *Contemporary Halakhic Problems* 1 (New York: Ktav Publishing House, 1977), pp. 106-109.
8. *Tsits Eliezer*, v. 20, sect. 49. The responsum is dated 5753.
9. F. Rosner, *Modern Medicine and Jewish Ethics*, 2nd ed. (New York: Ktav Publishing House, 1991), pp. 115-118.
10. M. Halperin, *Terumat Homer Geneti beTipulei Poriyut*, in the *HaKinus haBenleumi haSheni: Refuah, Etika veHalakha* (Jerusalem: Schlesinger Institute, 1996), pp. 321-327.
11. Only the historical aspects of ovarian transplantation relevant to the halakhic discussions will be presented. The footnotes will refer the reader to sources for further study.
12. See J. Needham, *A History of Embryology* (New York: Abelard Shuman, 1959). On the Jewish sources on embryology and the contributions of the male and female seeds see E. Reichman, "The Rabbinic Conception of Conception: An Exercise in Fertility," *Tradition* 31:1 (Fall 1996), pp. 33-63.

13. See J. A. Peters, ed., *Classic Papers in Genetics* (Englewood Cliffs, NJ: Prentice-Hall, 1959) and C. Stern and E. R. Sherwood, eds., *The Origin of Genetics: A Mendel Sourcebook* (San Francisco: W. H. Freeman, 1966).
14. See R. A. Fisher, "Has Mendel's Work Been Rediscovered," in Stern and Sherwood, *op. cit.*, pp. 139-171.
15. J. D. Watson and F. H. C. Crick, "Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid," *Nature* 171 (1953), pp. 737-738. Later that year, the authors proposed the chemical mechanism by which cells pass on their character accurately. See *idem*, "Genetic Implications of the Structure of Deoxyribonucleic Acid," *Nature* 171 (1953), pp. 964-967.
16. For more information on Morris, see his autobiography, *Fifty Years a Surgeon* (New York: E. P. Dutton, 1935). In chapter 15, entitled "Gland Grafting," Morris recalls his experiences with ovarian transplantation. On Morris and the general history of ovarian transplantation, see H. H. Simmer, "Robert Tuttle Morris (1857-1945): A Pioneer in Ovarian Transplants," *Obstetrics and Gynecology* 35:2 (February, 1970), pp. 314-28; V. C. Medvei, *The History of Clinical Endocrinology* (Pearl River, NY: Carnforth Parthenon, 1993), pp. 203-206.
17. Morris first reported this novel idea in his *Lectures on Appendicitis and Notes on Other Subjects* (New York: G. R. Putnam's Sons, 1895), before he had actually performed any such procedures.
18. A note on clarification of terminology is in order. Two forms of ovarian transplant were performed by Morris and his peers. One procedure involved the removal and reimplantation of a piece of the patient's own ovary, referred to in the literature interchangeably as auto—or homotransplant; the other procedure, of concern for our discussion, involved the transplantation of a donor ovary, or part thereof, into the patient, referred to interchangeably as homo—or heterotransplant. In this article, I will use the terms autotransplant and heterotransplant exclusively. In addition, throughout the medical literature on this topic, the terms grafting, implantation and transplantation are used interchangeably to refer to either auto—or heterotransplant. Articles bearing the words "ovarian transplant" in the title may deal exclusively with autotransplant. See, for example, W. S. Bainbridge, "Transplantation of Human Ovaries: Present Status and Future Possibilities," *American Journal of Obstetrics and Gynecology* 5:5 (May, 1923), pp. 493-498.
19. R. T. Morris, "The Ovarian Graft," *New York Medical Journal* 62 (1895), p. 436.
20. As one ovary was entirely untouched, and the other, from which the small section was removed, remained structurally intact, there is no reason to assume that the fertility of the donor would be affected. However, as the physicians were not concerned about the donors' subsequent history, they did not comment on their subsequent fertility.
21. R. T. Morris, "Notes on Ovarian Grafting," *Medical Record* 57 (January, 1901), pp. 83-87, esp. 85.
22. See F. H. Martin, "Transplantation of Ovaries," *Surgery, Gynecology and Obstetrics* 7 (1908), pp. 7-21 for a report on Martin's personal cases as well as a review of the literature until that time. F. H. Martin was a pio-

- neer in the field of ovarian transplantation and wrote extensively on the topic.
23. I do not refer here to the disease known today as polycystic ovaries (PCO), as that would be anachronistic. Rather, I simply refer to the pathological description of the ovaries by Morris.
 24. The instrument was called Truffier's angiotribe, after Theodore Truffier (1857-1929), a French surgeon who pioneered the field of ovarian auto-transplantation.
 25. Hermann Boldt operated on the donor for uterine prolapse, and a small wedge of ovary was removed at that time in order to alleviate what was believed in those days to be ovarian congestion. See Morris' autobiography, op. cit., p. 217.
 26. R. T. Morris, "A Case of Heteroplastic Ovarian Grafting Followed by Pregnancy and the Birth of a Living Child," *Medical Record* 69:18 (May 5, 1906), p. 697.
 27. See Simmer, op. cit., p. 320, for references.
 28. See Morris' autobiography, op. cit., pp. 215-216. Morris, however, was fairly certain that he had removed both ovaries, especially since he had used Truffier's angiotribe. In addition, Dr. Boldt, who was present at the operation, later testified that he had seen Morris remove both ovaries completely. See Simmer, op. cit., p. 321.
 29. J. A. Robertson, "A Renewal of Menstruation and Subsequent Pregnancy After Removal of Both Ovaries," *British Medical Journal* 2 (1890), p. 722 (cited by Simmer). In 1901 Morris addressed this issue extensively in his "Notes on Ovarian Grafting," *Medical Record* 57 (January, 1901), pp. 83-87, esp. 83-84.
 30. These thoughts were later published in his autobiography, *Fifty Years a Surgeon* (New York: E. P. Dutton, 1935), p. 200.
 31. J. H. Croom, "A Case of Heteroplastic Ovarian Grafting, Followed by Pregnancy and a Living Child: Query—Who is the Mother?" *Transactions of the Edinburgh Obstetrical Society* 31 (1906), pp. 194-200. The article begins by reviewing the facts of the case, then opens the question of maternity for forum discussion. The case is clearly that of Morris, but all the participants are referred to by initials only. The surgeon who removed the ovarian tissue from the donor is called Dr. B., likely referring to Dr. Hermann Boldt, but interestingly, there is no mention of a Dr. M. (i.e., Morris).
 32. Croom, op. cit., pp. 196-7.
 33. However, he added, if the recipient had purchased the ovary, the response might be different.
 34. *ibid.*, p. 199.
 35. *ibid.*, p. 198.
 36. *ibid.*, p. 199.
 37. *ibid.*, pp. 198-200.
 38. *ibid.*, p. 198.
 39. See his autobiography, op. cit., pp. 211-224.
 40. *ibid.*, p. 215.
 41. *ibid.*, p. 217. The phrase "treble parentage" was used by Simmer, op. cit., p. 321.

42. *ibid.*, p. 216.
43. See, for example, W. S. Bainbridge, "Transplantation of Human Ovaries: Present Status and Future Possibilities," *American Journal of Obstetrics and Gynecology* 5:5 (May, 1923), pp. 493-498; W. L. Estes Jr. and P. L. Heitmeyer, "Pregnancy Following Ovarian Implantation," *American Journal of Surgery* 24:3 (June, 1934), pp. 563-581. See also Simmer, *op. cit.*, 324.
44. F. H. Martin does make specific mention of Morris' case in his "Transplantation of Ovaries," *Surgery, Gynecology and Obstetrics* 7 (1908), p. 14. See also F. H. Martin, Ovarian Transplantation in Lower Animals and Women: Review of the Literature and Bibliography," *Surgery, Gynecology and Obstetrics* 13 (1911), pp. 53-63, where he quotes Mauclair as stating that conception had occurred after auto—and heterotransplantation in animals as well as human beings. The same unreferenced statement was made twelve years later by Bainbridge, *op. cit.*, p. 498.
45. Simmer, *op. cit.*, p. 316.
46. Richardson's note is appended to the 1934 article of Estes, *op. cit.*, n. 43.
47. Simmer, *op. cit.*, p. 321.
48. There have been a number of recorded cases of pregnancy associated with autotransplant. See, for example, Estes, *op. cit.*
49. Hans Simmer is responsible for rescuing these early accounts from oblivion and granting Morris the rightful title as the first surgeon to successfully transplant human ovarian tissue. See Medvei, *op. cit.*
50. E. S. Taylor, *The History of the American Gynecological Society 1876-1981 and American Association of Obstetricians and Gynecologists 1888-1981*, (Denver: Mosby Publishers, 1985), p. 94.
51. On the history of this journal see I. Lewin, *Otsar Kitvei'et Toraniyim*, (New York, 5740), pp. 88-95.
52. Year 10, vol. 3 (15 *Heshvan*, 5668-October 23, 1907), pp. 9a-9b.
53. R. Gordon states that ovarian transplantation with subsequent live birth had occurred in his country. In fact, there are no such recorded cases from England. R. Gordon is probably referring to the reports of Morris' case which appeared in the British literature. See, for example, the above discussion on Croom's article.
54. Of course, we don't know for sure that the donor is married, but as the prohibition is biblical in nature, it is assumed so until proven otherwise. In addition, since the donor presumably had children, it is a reasonable assumption that she was married. There is no discussion about how halakha would view a circumstance where the donor was non-Jewish. See comments of R. Weinreb below in section from the journal *HaBe'er*.
55. *Yevamot* 55b and *Rambam, Hilkhot Issurei Bi'a* 1:12.
56. The respondent acknowledges that in the case of a man having relations with a complete corpse, there is a rabbinic prohibition which was instituted in order to prevent one from extrapolating that, amongst other things, relations with a *treifa* would be permitted. However, once the body is no longer whole, as in this case, the decree would not apply. In addition, he argues that it must be the living body that generates *erva*, and not simply the reproductive organs. For if it were the latter, one could envision a scenario whereby one could circumvent the prohibition of *erva* with a

- woman by replacing her reproductive organs with those of a non-*erva*. Furthermore, he argues, if the reproductive organs were the determinant for *erva*, doubt would be cast on all legal cases of *erva*. It would be impossible for witnesses to ever verify whether the reproductive organs of the female were in fact her own, or those of a non-*erva*.
57. R. Deutch might still have been concerned with the issue of *erva*, as others in the discussion address the issue of *erva* even while acknowledging that the transplanted organs are far from sexual contact.
 58. Year 10, vol. 4 (1 *Kislev* 5668–November 7, 1907), pp. 12a–12b.
 59. *Sefer haKorbanot*, *Hilkhot Bekhorot* 4:19.
 60. Since the procedure is done for infertility, it is assumed that the recipient had no previous children. In fact, ovarian transplant was sometimes performed exclusively to preserve normal female hormonal production in previously fertile women.
 R. Deutch does not consider the transplanted organs to be an halakhic barrier to the uterine air space of the recipient. He bases this on the principle that *min be-mino eino hotsets* (i.e., like substances do not constitute an halakhic barrier).
 61. *Yevamot* 64b bases this on the extraneous phrase “*ein la valad*,” in *Bereishit* 11:30.
 62. This reasoning seems to negate the notion of advancement in medicine and science. If such a procedure can be done today, the author argues, it must have been able to be done in the time of Sara. While God’s powers are infinite and eternal, one must acknowledge that man’s ability to cure disease has undergone an evolutionary process. During the historical period of Sara, the contemporary medical treatments would have been ineffective for congenital absence of the uterus. It was therefore necessary for God to intervene with the performance of a miracle. If God wished to bestow the gift of fertility on someone today, it might be done through a physician specializing in reproductive medicine.
 63. 70a. This passage immediately follows the passage mentioned above by R. Deutch. It is interesting that R. Deutch chose not to cite it.
 64. Year 10, vol. 6 (*Hannuka* 5668—December, 1907), p. 21b.
 65. It is unclear from the passage where the exact point of contact is. *Tosafot* s.v. “*ad*” in *Ketubot* 4b considers this case to be purely hypothetical (“*davar shelo ba le-olam*”).
 66. The *gemara* considers this a case of *teiku* (i.e., no clear solution) and Rambam, *Sefer haKorbanot*, *Hil. Bekhorot* 4:18 considers it a *safek bekhhor* to the second animal (and presumably for the first as well). Applying the logic of R. Deutch above, we might consider the offspring in our case to be a *safek bekhhor* to both mothers, therefore requiring a *pidyon ha-ben* from both husbands. One could argue, however, how comparable this case is to ours. In the case of the *gemara*, the fetus exits two separate uteri, each of independent halakhic status. It is therefore theoretically possible for both animals to have produced a *bekhor*. In our case, there is only one uterus, the status of which is in question. If the status of the uterus were clarified, there would only be one possible candidate for the *bekhor*. However, it is even possible in our case, I believe, to envision a dual *bekhor* status. The status would not be conveyed sequentially, as in the

- case of the *gemara*, but simultaneously. The *gemara* debates whether the walls of the uterus or the air space of the uterus generates the status of *bekhor*, and Rambam, as discussed above, considers this a *safek*. In our case, according to the conception of R. Deutch, the walls of the uterus belong to the donor, while the air space of the uterus belong to the recipient. When the fetus exits, it may therefore be simultaneously considered a *bekhor* to both women.
67. It is unclear whether the respondents believed the donation to be post-mortem or from a living donor. Assumedly, R. Weiss believed it to be post-mortem.
 68. Regarding the permissibility of undergoing risky or unproved therapy see J. D. Bleich, "Experimental Procedures: The Concept of *Refuah Beduka*," in his *Contemporary Halakhic Problems* 4 (New York: Ktav Publishing House, 1995), pp. 203-217.
 69. Year 10, vol. 9, no. 77 (*Shevat*, 5668; January, 1908), p. 29a. This response to R. Schwartz was subsequently published in R. Weiss' *Even Yekara*, n. 29.
 70. The biblical origin for the prohibition of sterilization, or *sirus*, is *VaYikra* 22:24-5. The context of the biblical discussion is the prohibition of using castrated or sterilized male animals for temple sacrifice. The *Midrash Sifra*, Chapter 7, extends the prohibition to all animals, both kosher and non-kosher, and the *Gemara* (*Shabbat* 110b) extends the prohibition to human beings as well. To what extent this prohibition applies to females of the human species is a matter of debate. Rambam in *Hilkhot Isurei Bi'a* 16:10-11 implies that sterilization for women is only rabbinically prohibited, while *Turei Zahav*, *Even haEzer* 5:6, claims that the prohibition of sterilization does not apply to women at all. For further discussion, see J. Ozarowski, "Tubal Ligation and Jewish Law: An Overview," *Journal of Halakha and Contemporary Society* 7 (Spring 1984), pp. 42-52. See also below, comments of R. Weinreb in section from the journal *HaBe'er*.
 71. While one can argue that any manipulation of the reproductive organs constitutes a violation of *sirus*, some authorities invoke *sirus* only if infertility results. In any case, as many authorities consider *sirus* for a woman to be only rabbinically prohibited, the added fact that the woman in this case retains her fertility would at least have caused R. Weiss to entertain some doubt about the applicability of *sirus* to the donor in an ovarian transplant.
 72. See above discussion on the history of ovarian transplantation.
 73. See section below on R. Kamelhar, who also applies the analogy from *orla*, but is more explicit regarding his understanding of the donor's contribution.
 74. For information on this journal see I. Lewin, op. cit., pp. 305-306.
 75. Year 17, no. 19 (*Sivan*, 5668-June, 1908), pp. 169-171.
 76. The response of R. Deutch spanned two issues in *Va-yeLaket Yosef*. Only the first part of R. Deutch's response is published in *Tel Talpiot*. It is possible that the editor of the latter journal read the initial discussion in *Va-yeLaket Yosef* and published the query and first response in his journal in order to generate further discourse.
 77. The cattle from this region were considered of superior quality. Removing

- the uterus would prevent the buyer from using the animal for breeding, thereby insuring the seller's control of the market.
78. This is the position of R. Yehezkel Landau in his commentary *Dagul meRevava*, Y.D., 29.
79. This proof is perplexing since the entire purpose for removing the uterus was to prevent subsequent fertility of the animal. It seems clear that in Alexandria they assumed the effects of uterine removal to be irreversible. Of note, Alexandria was the major center of anatomical studies in antiquity. See, for example, Ludwig Edelstein essay entitled "The History of Anatomy in Antiquity" in his *Ancient Medicine* (Baltimore: Johns Hopkins University Press, 1967), pp. 247-301; H. Von Staden, *Herophilus: The Art of Medicine in Early Alexandria* (Cambridge: Cambridge University Press, Cambridge, 1993).
80. This halakha is derived from the term "*bi-vsara*" (her flesh) in *VaYikra* 15:19. See *Nidda* 57b and Y.D., 183:1.
81. Today, we understand sensation to be dependent on innervation. Even if uterine transplant were possible, the severed sensory nerves could not regain their function in the recipient. Even if the transplanted organs were halakhically considered an integral part of the recipient's body, the recipient would still be unable to actually sense the menstrual flow.
82. For more comprehensive treatment on the history of reproductive physiology as found in rabbinic sources see E. Reichman, "The Rabbinic Conception of Conception: An Exercise in Fertility," *Tradition* 31:1 (Fall 1996), pp. 33-63.
83. In the ensuing discussion the editor employs the rabbinic terms for the female reproductive anatomy: *prozdor*, *aliya*, and *mekor* (*heder*). These terms are derived from the Mishna in *Nidda* 2:5. While the *mekor* clearly refers to the uterus, there has been much debate regarding the exact anatomical definitions of the former two terms. I shall avoid the use of these terms to prevent ambiguity, as the nuances of the definitions are not relevant to our discussion. For further discussion about the identification of these terms see, for example, Fred Rosner, trans. Julius Preuss, *Biblical and Talmudic Medicine* (New York: Hebrew Publishing Company, 1978), pp. 115-19; Abraham Abraham, *Nishmat Avraham, Yore De'a* (Jerusalem, 1985), pp. 76-79; I.M. Levinger, "*HaMivne haAnatomi shel Eivarei haMin beIsha u-veBa'alei Hayyim*," *Korot* 4: 8-10 (June 1968) pp. 611-15; Tirzah Z. Meachum, "*Mishna Tractate Nidda with Introduction: A Critical Edition with Notes on Variants, Commentary, Redaction and Chapters in Legal History and Realia*," (unpublished doctoral dissertation; Hebrew University, 1989), pp. 224-31.
84. He cites *Nidda* 41b which discusses a case where a woman's uterus becomes detached. The passage describes the fate of the uterus as *ve-nafalla-arets*. This could mean that the uterus falls in the direction of the ground, consistent with a case of prolapse, but this seems unlikely given the context of the passage. The phrase appears to be taken literally, that the uterus actually falls to the ground. Preuss, op. cit., p. 378, considers this passage to be a purely theoretical discussion. In any case, the author proves from here that the uterus is easily accessible for surgical removal and replacement.

There is, however, another passage, in *Hullin* 70a, that, to my mind, directly refers to a case of prolapsed uterus. The context is a discussion on the requirements for generating the status of *bekhor*. Amongst a series of different cases testing the nuances of the law, the following case is brought: “*ne’ekru kotlei bet ha-rehem, mahu?*” What would the halakha be, the *gemara* asks, if the walls of the uterus were “*ne’ekar*,” the same word used in the passage in *Nidda* 41b. The *gemara* then continues, “how does one define *ne’ekru*?—when the uterus is detached but still hanging from its neck.” How else could one define the term? Rashi, s.v. “*ne’ekru*,” clarifies that one might have thought that “*ne’ekru*” means that the uterus actually fell to the ground, and therefore the *gemara* has to tell us that the uterus is still connected. I believe Rashi is implicitly alluding to the aforementioned case in *Nidda*. While making it clear that the passage in *Nidda* refers to a uterus fallen to the ground, this passage is itself an excellent description of a prolapsed uterus. Prolapse of the uterus in pregnancy, although uncommon, has been documented. See, for example, J. P. Lavery, et. al., “Uterine Prolapse with Pregnancy,” *Obstetrics and Gynecology* 42:5 (November, 1973), pp. 681-3; P. S. Hill, “Uterine Prolapse Complicating Pregnancy: A Case Report,” *Journal of Reproductive Medicine* 29:8 (August, 1984), pp. 631-3. Whether the case of the *gemara* is actual or theoretical has no bearing on the halakhic discussion.

85. Since according to this author, only the uterus, and not the external genitalia, is transplanted, he could have dismissed the problem of *erva* by claiming that there would be no direct sexual contact with the transplanted organ. We must therefore assume one of two possibilities. Either the editor thought that the cervix is also transplanted, in which case there could potentially be direct sexual contact with the transplanted organs; or, the prohibition of *erva* can theoretically apply even without direct physical contact, as long as the organs of an *erva* are somehow involved. See below, comments of R. Weinreb in section from the journal *HaBe'er*.
86. This possibility of bath house insemination is first mentioned in *Hagiga* 14b-15a. For treatment of the sources on bath house insemination and artificial insemination, see E. Reichman, op. cit., pp. 44-50 and 57-61.
87. Both cases involve a theoretically illicit union that, by virtue of unique circumstances, is not considered halakhically forbidden. But the comparison ends there. The analogy may have been somewhat better had the author invoked the specific case of Ben Sira, who was believed to have been the product of the seeds of the prophet Yirmiyahu and his own daughter, a biblically forbidden union, after the latter conceived in the bath house from her father's seed. Despite the mixture of seed of those considered *erva* to each other, due to the absence of illicit sexual contact, no prohibition was considered violated. All the more so here, in a similar case of biblical *erva*, since only the uterus is transplanted, and there is no direct mixture of seed, nor direct sexual contact with the transplanted organ, no prohibition should be considered violated. For more on the case of Ben Sira see E. Reichman, op. cit.
88. The Mishna in *Bekhorot* 47b excludes a child born by cesarean section from the laws of *bekhor*. The law is codified in *Y.D.* 305:24. Regarding the history of cesarean section in Jewish sources see J. Boss, “The Antiqui-

- ty of Cesarean Section with Maternal Survival: The Jewish Tradition," *Medical History* 5 (1961), 117-131 and E. Reichman, "The Halakhic Definition of Death in Light of Medical History," *Torah U'Madda* 4 (1993), pp. 148-174, esp. 162-165 and 174-175.
89. Year 17, no. 21 (*Tammuz*, 5668-July, 1908), pp. 191-192.
 90. This is an elaboration of the same proof brought by R. Deutch above. R. Deutch mentions that Sara suffered from congenital absence of her uterus. R. Yitzchak Ya'akov Weiss, in his *Teshuvot Minhat Yitshak* vol. 1, no. 125 (cited in Bleich, *Contemporary Halakhic Problems* 3 (New York, 1989), p. 124) claims that Rachel suffered from the same condition. The verse in *Bereishit* 29:31 describes Rachel as an "akara," and Rashi in *gemara Yevamot* 42b states that the term "akara" is used to describe a woman who is sterile due to absence of her uterus. One could therefore apply R. Deutch's argument to the case of Rachel as well.
 91. See *Paneah Raza* on *VaYigash* and on *VaYeitsei*, s.v. *ve-ahar yalda bat*.
 92. This discussion is based on *Bereishit* 46:10 which mentions one of the children of Shimon to be *Shaul ben haKena'anit*. The commentaries note that since Avraham was so adamant that his son not marry a woman from Canaan, it would be unlikely that Shimon would have actually married a Canaanite woman. It is therefore explained that the term *haKena'anit* refers to Dina, as Dina had refused to leave the city of Shehem after being raped unless Shimon agreed to marry her. This child is a product of that marriage. See commentaries of R. Eliyahu Mizrahi, *Reim*, ad. loc. And R. Yaakov ben Asher, *Ba'al haTurim*, ad. loc.
 93. Rambam, *Hilkhot Isurei Bi'a* 14:10.
 94. Although the author doesn't detail the analogy clearly, there is actually a double transplant, each person being both the donor of a fetus (and possibly uterus) and the recipient of a fetus.
 95. The *gemara* Bavli (*Berakhot* 60a) as well as the Yerushalmi (*Berakhot* 9:3) and *Midrash Tanhuma* (*VaYeitsei*, n. 8), claim that the fetus of Leah underwent a sex change from male to female, but none mentions any transfer or transplant between Rachel and Leah. Rashi quotes the *Bavli* in his commentary to *Bereishit* 30:21. The first mention of an actual transfer is in *Targum Yonatan ben Uziel* on this same verse. The author here quotes *Sefer Paneah Raza* as the source for this notion, as does R. Eliyahu Mizrahi (*Reim Bereishit* 46:10) and *Maharsha* on *Nidda* 31a, s.v. "ve-et." They were perhaps unfamiliar with the passage in the *Targum Yonatan*. *Maharsha* adds an additional textual support that a transfer actually took place from a line in the *piyyut* "even hug" which is recited on the first day of Rosh Hashana ("Complete Artscroll Machzor for Rosh Hashanah," Mesorah Publications, Brooklyn, 1985, p. 312). R. Moshe Margliot (d. 1781), in his commentary *Mar'e haPanim* on the aforementioned passage in the Yerushalmi acknowledges the conflict of sources and also mentions the support from the *piyyut* of "even hug." R. Meir Simcha of Divinsk explains two difficult biblical passages based on the notion that there was an inter-uterine transfer between Rachel and Leah. See *Meshekh Hokhma* on *VaYeishev*, s.v. "ve-yadenu" and on *VaYigash*, s.v. "benei Rachel asher." See also R. Yosef Patsanovski's *Pardes Yosef* on *VaYeitsei*, s.v. "u-veTargum" for similar examples of exegesis and further sources on this topic.

Some of the above sources are mentioned in the subsequent discussions on ovarian transplant (see below), as well as in contemporary discussions on maternal identity in the case of surrogate motherhood.

96. *Teshuvot haRabaz, Teshuvot miBen haMehaber*, n. 5.
97. R. Safran cites a passage from *Sefer Devash leFi* (letter *ayyin*, s.v., *ayyin hara*) of R. C.Y.D. Azulai, who applies this notion to interpret a rabbinic expression. R. Safran himself explains a phrase in *Bereishit* 37:27 based on this notion. R. Meir Simcha of Dvinsk explains the phrase similarly. See *Meshekh Hokhma*, loc. cit.
98. *Bereishit* 34:1.
99. On R. Kamelhar see C. Roth, ed., *Encyclopaedia Judaica* 10 (Jerusalem: Keter Publishing), 724; Y. Mundschein, *HaTsofe leDoro: Toldot Hayyav uPa'alo shel haRav Yekuti'el Arye Kamelhar* (Jerusalem: Reuven Mas Publishers, 5747).
100. (Lvov, 1928), 44-45.
101. Dr. F. H. Martin, Professor of Gynecology at the Post Graduate Medical School of Chicago, made a presentation at the American Gynecological Association's annual meeting in Atlantic City on May 24, 1911 (correlating to 5671) on the topic of ovarian transplantation which was subsequently published in *Surgery, Gynecology and Obstetrics* 13 (1911), pp. 53-63, and in the *Transactions of the American Gynecological Society* 36 (1911), pp. 337-359. (I thank Jeffrey Anderson, librarian of the American College of Physicians in Philadelphia, for the latter reference.) Dr. S. Leiman has suggested that this is the presentation referred to by Kamelhar, only he confused Martin's city of origin with the location of the conference. Martin only briefly makes reference to Morris' case report in his presentation, but does not report any other cases of pregnancy following ovarian heterotransplantation. In Taylor's history of the American Gynecological Society he mentions three conferences (in 1908, 1917 and 1922) where papers on ovarian transplantation were presented. His discussion of the conferences of 1910 and 1911, which correlate to the Jewish year 5671, do not mention any papers on the topic. However, Taylor merely addresses the highlights of the conferences, but does not give a comprehensive list of the presentations. See E. S. Taylor, *The History of the American Gynecological Society 1876-1981 and American Association of Obstetricians and Gynecologists 1888-1981*, (Mosby Publishers, Denver, 1985), pp. 22-23, 26-27, 94.
102. R. Kamelhar was also unaware of R. Safran's opinion. Although R. Safran's comments preceded 1928, the publication year of R. Kamelhar's work, they were only first published in the 1930's.
103. See above, end of section on *Va-yelaket Yosef*.
104. R. Kamelhar cites the *Tosafot* in *Avoda Zara* 49a, s.v. "*she-im*" that the conclusion of the *gemara* is sustained even by those who would normally hold *ze ve-ze gorev*, since in this case the original status of the grafted branch becomes completely nullified, as the term "*batla*" used by the *gemara* indicates. The original *orla* tree therefore has no contributory role whatsoever in the new entity. He also cites *Menahot* 69b that "*ha-kol holekh ahar ha-ikar*" (the status is determined by the major or predominating element of a mixture). This passage mentions a series of cases

- where plants of different halakhic status are grafted onto each other. The *gemara* does not conclude, as R. Kamelhar indicates, that “*ha-kol holekh ahar ha-ikar*,” rather, the passage ends with a *teiku* and the assumption is that one should take the stringent view in all cases.
105. This debate refers to animals, but R. Kamelhar applies it to human beings as well.
 106. On this belief in rabbinic sources see H. J. Zimmels, “*Ofot haGedeilim beIlan*,” in *Minhat Bikurim* (Vienna, 1926), 1-9; *Jewish Encyclopedia* 2 (New York: Ktav Publishers, 1964), pp. 538-540. For discussion of this notion in secular sources see L. Thorndyke, *History of Magic and Experimental Science* 2 (New York: Columbia University Press, 1923), pp. 200, 464-465. R. Kamelhar also gives tangential treatment to this topic on p. 44, *op. cit.*
 107. *Y.D.*, 84:15.
 108. R. Arik is the author of *Imrei Yosher*. R. Kamelhar mentions some of R. Arik’s comments on the topic of the barnacle goose.
 109. *Bereishit* 30:37-39.
 110. *Bereishit Rabba* 17:7 in the name of R. Hoshea.
 111. The *midrash* continues, stating that only the “*tsurat ha-vlad*” was lacking from this seed. This may be an allusion to the Aristotelian notion that the male provides the “form” and “principle of movement” of the fetus, and the female’s sole contribution is the substance or matter from which the fetus is formed. See A. L. Peck, trans., *Aristotle: Generation of Animals* (Cambridge: Harvard University Press, 1942), pp. 100-101 and 109-112. Perhaps this is the meaning of the *midrash*. The only thing lacking from the seed was the physical formation of the fetus (i.e., “*tsurat ha-vlad*”), which would be provided, as usual, by the female.
 112. This may prove that in animals the male seed is irrelevant to the determination of halakhic status, but one cannot infer anything from here regarding the role of the female seed, as both the seed, gestation and parturition were provided by the female sheep in this case. In addition, one cannot derive halakha directly or exclusively from the *midrash*.
 113. He identifies the scientist by the name Weisner, and I have been unable to locate the particular citation. It is unclear whether the experiments he refers to were done with rats or insects, as R. Kamelhar uses the term “*sherets*,” which could refer to either; or if they were done with animals that underwent ovarian transplant; or if they were simply genetic experiments to determine which parent is responsible for color inheritance. The latter is possible. See S. Wright, “Color Inheritance in Mammals,” *Journal of Heredity* 8 (1917), pp. 224-235. Wright reviews the literature on this topic up to his time and makes no reference to anyone named Weisner. It is possible that Weisner’s experiments were published between 1917 and 1928 (the year of publication of *HaTalmud uMada’ei haTevel*). There is, however, an article published in 1907 in the *Proceedings of the American Physicians Society* in which Guthrie (cited by F. H. Martin, “Transplantation of Ovaries,” *Surgery, Gynecology and Obstetrics* 7 (1908), 20) describes a series of experiments on chickens to determine the influence of the foster mother on the offspring in cases of ovarian transplantation. He exchanged the ovaries of black and white leghorn hens and found that the

transplanted ovaries function in the normal manner, and that the color characteristic of the chicks is influenced by the foster mother. The experiment that Kamelhar cites, however, apparently found that the foster mother does not affect the color of the offspring. Morris, in his autobiography, op. cit., 217, mentions that Castle grafted ovarian tissue from a black guinea pig into a white guinea pig and obtained black progeny from a white mother and father. These results are consistent with the experiment mentioned by Kamelhar.

114. *Hullin* 79b. The discussion here is of the halakhic identity of an animal produced from two breeds (e.g., a mule), as it relates to the prohibition of slaughtering a mother and child on the same day (*oto ve-et beno*). Talmud Yerushalmi *Kilayim* 8:3 mentions, in the name of R. Yonah, that the size of an animal's ears reflect its parentage. If its ears are small, then its mother is a mare and its father a donkey; if they are large, then it is vice versa, and its father is of the equine species.
115. *Bereishit* 30:37-9.
116. *BaMidbar Rabba* 9:43. The *midrash* relates the story of an Arabian king who posed the following question to Rabbi Akiva: "Both I and my wife are black, yet my wife gave birth to a white son. Should I kill her for infidelity? Rabbi Akiva responded: Are the statues in your house white or black? The king answered white. Rabbi Akiva then assured him that when he had intercourse with his wife, she gazed upon the white statues and bore him a child of similar color." For more on the psychic maternal influences on the fetus see Preuss, op. cit., pp. 391-392.
117. For this notion he cites the commentary of *Hatam Sofer* to *Avoda Zara* 31 and *Tel Torah*, by R. Meir Arik, on *Nidda* 45a. It is predicated on the belief that since non-Jews ingest non-kosher foods, their bodies have a different physiological constitution. For further discussion on this topic see *Teshovot Hatam Sofer*, Y.D., p. 105; E. Munk, "*BeInyan Lismokh al Rofe Yerei Shamayim biZman sheYediotav Hen miSifrei Nituach shel Umot haOlam*," in *VeRapo Yerapei: Zikhron Yeshayahu* (Jerusalem, 1989), pp. 124-126; N. Gutal, *Sefer Hishtanut haTeva'im* (Jerusalem, 1995), pp. 134-135, note 116.
118. R. Kamelhar assumes that in ovarian transplantation the recipient provides the egg. Consequently, as she is the one who both "conceives and gives birth to the child," she is considered the halakhic mother. R. Avraham Yaakov Horowitz, after citing R. Binyamin Weiss' *Even Yekara*, independently applies the same logic to conclude that the recipient is the halakhic mother. See his *Tsur Ya'akov*, n. 28.
119. For the history of this journal see I. Lewin, op. cit., pp. 46-48.
120. Year 6, vol. 3 (Sivan, 5691; May/June, 1931), pp. 110-113. The section is entitled "*Mayyim Tehorim*."
121. This source is cited from what appears to be a printed work of R. Posek, but the citation is an acronym which does not correspond to any of R. Posek's known printed works. It is possible that the citation appears in *Piskei Eliyahu*, but I have been unable to consult this work.
122. R. Posek does not mention the prohibition of sterilization. Perhaps he holds like the *Turei Zahav*, *Even haEzer* 5:6, that while the prohibition of sterilization does not apply to woman, there may be a prohibition of

- havala* for removing the female organs. As both the donor and recipient in ovarian transplantation have their ovaries removed, this prohibition would apply equally to both of them. R. Shaul Yisraeli employs the principles of *havala* to permit accepting money for organ donation. See "Rav Shaul Yisraeli—Organ Transplants: Responsa," in *Jewish Medical Ethics* vol. 3, no. 1, pp. 14-17.
123. R. Posek points out that women often conceive after years of infertility.
 124. See above, end of section on *Va-yeLaket Yosef*, for discussion of R. Weiss' comments. Of note, R. Freidling does not reference R. Weiss' responsum where it initially appeared, in *Va-yeLaket Yosef*.
 125. Year 7, vol. 2, nos. 70-71 (*Shevat*, 5692; January/February, 1932), pp. 88-92.
 126. See above section on R. Safran.
 127. See *Minhat Hinukh*, *mitsva* 291.
 128. The same *Minhat Hinukh* that R. Weinreb quotes (*mitsva* 291) also postulates (end of letter *aleph*) that even passive sterilization might be prohibited. The classic example of a passive recipient violating a prohibition is the prohibition of cutting the hair of the corners of the head (*VaYikra* 19:27—"lo takifu pe'at roshkhem"). The *gemara* in *Makkot* 20b states that both the *makif* and the *nikaf* get lashes. Rashi s.v. "*de-amar lakh*" opines that one possible reason for this inclusion of the passive recipient in the prohibition is the plural language of the verse (*takifu*), which alludes to more than one person who is in violation of the prohibition (i.e., both the *makif* and the *nikaf*). Applying the same logic to the case of sterilization, since the verse is stated in plural ("*u-ve-artsekhem lo ta'asu*"), perhaps even the passive recipient is in violation. However, since no other authorities seem to mention or concur with this analysis, the *Minhat Hinukh* does not consider this opinion binding.
 129. It is interesting that none of his predecessors makes this suggestion. In the contemporary discussions on surrogate motherhood, the issues revolving around the use of unmarried or non-Jewish surrogates have been explored. The current Israeli surrogacy laws mandate that the surrogate be unmarried, so as to bypass the potential problem of *eishet ish*. The Israeli laws also require the surrogate and egg donor to be of the same religion.
 130. In a parenthetical note, R. Weinreb refers the reader to *Teshuvot R. Akiva Eiger* n. 172 and to *Tiferet Yisrael* on the Mishna in the sixth chapter of *Temura* for further discussion of this issue. The Mishna in *Temura* 6:5 states that even though an animal is prohibited from sacrificial use, its offspring may nevertheless be permitted. The commentaries qualify this statement as referring to a case where an animal, while still *bullin* (i.e., prior to being designated for temple sacrifice), mates with another animal and conceives. Generally, if a female animal has sexual relations with a male, she becomes prohibited from sacrificial use (Mishna *Temura* 6:1). The offspring in this case, a product of one animal prohibited from sacrificial use (the female), and one permitted for sacrificial use (the male), is nevertheless permitted based on the fact that this is a case of *ze ve-ze gorem* (i.e., both parties contributed to the production of the offspring), which in these circumstances is permitted. However, the commentaries add, if the female animal would have had sexual relations with a male animal

while she was already pregnant, then her offspring would not be permitted because since the fetus is part of the mother (*ubbar yerekh imo*, a matter of debate elsewhere), both the mother and fetus are considered to have had intercourse, a fact rendering both of them prohibited from sacrificial use. R. Eiger asks, based on this, why a man is not prohibited from having intercourse with his own wife while she is pregnant with their daughter; after all, since we say *ubbar yerekh imo*, then it should be considered as if he is having sexual relations with his own daughter. R. Eiger answers that sexual relations with a child less than three years of age (including a fetus) is not technically considered *erva*, and is only rabbinically prohibited because of *hashhatat zera*. Since in this case, the man is having relations with his pregnant wife, and *hashhatat zera* is not a concern, no violation at all is incurred. Both the commentaries on the *mishna* and the question of R. Eiger imply that one can theoretically violate the prohibition of *erva* even if the source of *erva* itself is deep within the body. *Tiferet Yisrael* on *Temura* (Boaz, letter *gimmel*) however, questions the premise of R. Eiger. R. Eiger assumes that we consider as if the act of intercourse was done with the fetus just as it was done with the mother. If this were the case, argues *Tiferet Yisrael*, then R. Eiger's answer is insufficient to solve other potential problems. For example, if the act of slaughtering is considered equally done to the fetus, then one could not slaughter a pregnant animal because of the prohibition of slaughtering a mother and child on the same day. *Tiferet Yisrael* therefore contends that we do not consider as if the act were done simultaneously to both the mother and the fetus. Rather, the notion of *ubbar yerekh imo* means that the fetus is subordinate to the mother and does not have independent status. If the mother becomes prohibited for sacrificial use, then so too the fetus, by virtue of its association with the mother, not by virtue of any independently committed violation. Similarly, when one has intercourse with his pregnant wife, the wife is permitted to the husband. The fetus, who is subordinate to the mother, is therefore likewise permitted. It is this logic of *Tiferet Yisrael* which I believe R. Weinreb relies upon in claiming that there is no issue of *erva* in ovarian transplantation. Since the recipient is permitted to her husband, and the transplanted ovary is subordinate to the recipient, there is no problem of *erva*.

131. See above regarding articles in *Tel Talpiyot* and *Va-yeLaket Yosef*, where the respondents actually believed that the external genitalia were transplanted.
132. R. Weinreb rejects the proof of R. Freidling from Adam, asserting that one cannot extrapolate from creation. In addition, as he believes the prohibition of *erva* to be inapplicable to this case, he dismisses the question of whether the child is blemished (*pasul*). He cites *Turei Zahav* (Y.D. 195:7) in the name of *Semak*, regarding the concern for a woman sleeping on another man's sheets lest she conceive from the residual seed, as proof that when no prohibition is violated the offspring have no blemish. For further explication of the statement of *Semak*, see E. Reichman, "The Rabbinic Conception of Conception: An Exercise in Fertility," *Tradition* 31:1 (Fall 1996), pp. 33-63, esp. pp. 44-50.
133. R. Weinreb responds to the factual doubts of R. B. A. Weiss by pointing

- out that other organs, including both upper and lower extremities, have been successfully transplanted. He raises the question of whether these organs retain their status of *tuma* after they have been transplanted, or whether the fact that the organ is restored to life in the recipient reverses their *tuma* status. This latter logic was used by R. Yehuda Unterman to permit cornea transplantation (*Shevet miYehuda*, 313-322), as well as by R. Waldenberg in his discussion on receiving money for organ transplantation. See Abraham Abraham, *Nishmat Avraham* 4 (Jerusalem, 1991), 222-223.
134. *Tsits Eliezer* v. 7, sect. 48, chap. 5, n. 16.
 135. M. Halperin, "Trumat Homer Geneti beTipulei Poriyut," in *HaKinus ha-Benleumi haSheini: Refua, Etika veHalakha* (Schlesinger Institute, Jerusalem, 1996), 321-327. R. Dr. Halperin concurs with R. Weiss' comments that successful ovarian transplant likely never took place because they would have been unable to overcome the problem of organ rejection. Even today, he says, there have been no successful ovarian transplants. In fact, those involved in ovarian transplantation observed that a heterograft was less likely to succeed than an autograft, and that an interspecies graft was even less likely to succeed. Although ignorant at that time of the immunology of organ rejection, they nonetheless made clear observations of failed transplants secondary to rejection. See articles of F. H. Martin above, for example, where he details these observations in his conclusions.
 136. J. D. Bleich, *Contemporary Halakhic Problems* 1 (New York: Ktav Publishers, 1977), pp. 106-109.
 137. R. Kamelhar's analysis of the concept of "*hosheshin le-zera ha-av*," and his contention that both positions in this debate would concur that the donor is not the halakhic mother, is predicated on the belief that the donor provides no material contribution to the offspring.
 138. A. Rosenfeld, "Human Identity: Halakhic Issues," *Tradition* 16:3 (Spring 1977), pp. 65-66.
 139. The issue of the halakhic definition of maternal identity has been reviewed elsewhere and will not be repeated here. See M. J. Broyde, "The Establishment of Maternity and Paternity in Jewish and American Law," *National Jewish Law Review* 3 (1988), pp. 117-158; E. Bick, "Ovum Donations: A Rabbinic Conceptual Model of Maternity," *Tradition* 28:1 (Fall 1993), pp. 28-45; J. D. Bleich, "In Vitro Fertilization: Questions of Maternal Identity and Conversion," in his *Contemporary Halakhic Problems* 4 (New York: Ktav Publishers, 1995), pp. 237-272. I wish only to point out that arguments similar to those mentioned in the halakhic literature on ovarian transplantation have been advanced in contemporary halakhic discussions.
 140. See Bleich, op. cit., note 125, pp. 247-248, and E. Bick, op. cit., pp. 31-32. R. Bick states that these sources were introduced into the halakhic literature concerning parenthood by R. Yisrael Minzberg in 5718, and R. Bleich mentions that this aggadic source was first cited by R. Menashe Grossbart in 5684. However, the article of R. Roth mentioned above, in *Tel Talpiyot*, Year 17, no. 21 (Tammuz, 5668-July, 1908), pp. 191-192, antedates both these sources.
 141. See Bleich, op. cit., pp. 251-257 and Bick, op. cit., pp. 30-31.

142. *ibid.*, 245-246. Rabbi Bleich states that "in point of fact, no halakhic writer has cited this text as a source for the definition of maternal identity." Although R. Sheftel Weiss, in his article in *Tel Talpiyot* discussed above, invokes this source in discussing *pidyon ha-ben* for the offspring in ovarian transplantation, he does not specifically use it for the halakhic definition of maternity.
143. *ibid.*, pp. 257-258.
144. K. Maurer, "Ovary Preservation Offered to Cancer Patients," *Internal Medicine News* (May 15, 1996), p. 15.
145. *ibid.* The Genetics and IVF Institute in Fairfax, Virginia currently advertises this service on their web page. Autotransplantation in mice with resultant live birth has been recorded. See K. T. Gunasena, et. al., "Live Births After Autologous Transplant of Cryopreserved Mouse Ovaries," *Human Reproduction* 12:1 (January, 1997), pp. 101-106.
146. See J. M. Berkowitz, "Mummy Was a Fetus: Motherhood and Fetal Ovarian Transplant," *Journal of Medical Ethics* 21 (1995), pp. 298-304. See also S. L. Cox, et.al., "Transplantation of Cryopreserved Fetal Ovarian Tissue to Adult Recipients in Mice," *Journal of Reproduction and Fertility* 107 (1996), pp. 315-322. Animal research is also being done in other aspects of ovarian transplantation. See R. G. Gosden, "Transplantation of Fetal Germ Cells," *Journal of Assisted Reproduction and Genetics* 9:2 (1992), pp. 118-123; S. Lee, et. al., "Transplantation of Reproductive Organs," *Microsurgery* 16:4 (1995), pp. 191-198. The halakhic issues of fetal ovarian transplant are briefly addressed in R. V. Grazi and J. B. Wolowelsky, "On Fetal Ovary Transplants," *Le'Eila* (September, 1995), pp. 36-38. Research is also being done with sperm transplantation, but as the halakhic issues of paternity are different than those of maternity, the halakhic chapter on ovarian transplantation would be less relevant. See D. Mann, "Frozen Mouse Sperm Stem Cells May Help Infertile Men," *Medical Tribune* (June, 20, 1996), p. 9. Mann cites studies from the journals *Nature* and *Nature Medicine*.
147. See J. D. Bleich, "Fetal Tissue Research: Jewish Tradition and Public Policy," in his *Contemporary Halakhic Problems* 4 (New York: Ktav Publishers, 1995), pp. 171-202.