

Ripped From The Headlines, Week 4

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“Gene-edited food is coming, but will shoppers buy?”

-Lauran Neergaard, The Associated Press, Nov. 15, 2018

WASHINGTON—The next generation of biotech food is headed for the grocery aisles, and first up may be salad dressings or granola bars made with soybean oil genetically tweaked to be good for your heart. By early next year, the first foods from plants or animals that had their DNA “edited” are expected to begin selling. It’s a different technology than today’s controversial “genetically modified” foods, more like faster breeding that promises to boost nutrition, spur crop growth and make farm animals hardier and fruits and vegetables last longer. The U.S. National Academy of Sciences has declared gene editing one of the breakthroughs needed to improve food production so the world can feed billions more people amid a changing climate. Yet governments are wrestling with how to regulate this powerful new tool. And after years of confusion and rancor, will shoppers accept gene-edited foods or view them as GMOs in disguise? “If the consumer sees the benefit, I think they’ll embrace the products and worry less about the technology,” said Dan Voytas, a University of Minnesota professor and chief science officer for Calyxt Inc., which edited soybeans to make the oil heart-healthy. Researchers are pursuing more ambitious changes: Wheat with triple the usual fibre, or that’s low in gluten. Mushrooms that don’t brown, and better-producing tomatoes. Drought-tolerant corn, and rice that no longer absorbs soil pollution as it grows. Dairy cows that don’t need to undergo painful dehorning, and pigs immune to a dangerous virus that can sweep through herds. Scientists even hope gene editing eventually could save species from being wiped out by devastating diseases like citrus greening, a so far unstoppable infection that’s destroying Florida’s famed oranges. First they must find genes that could make a new generation of trees immune. “If we can go in and edit the gene, change the DNA sequence ever so slightly by one or two letters, potentially we’d have a way to defeat this disease,” said Fred Gmitter, a geneticist at the University of Florida Citrus Research and Education Center, as he examined diseased trees in a grove near Fort Meade, Fla.

Genetically modified or edited — what’s the difference?

Farmers have long genetically manipulated crops and animals by selectively breeding to get offspring with certain traits. It’s time-consuming and can bring trade-offs. Modern tomatoes, for example, are larger than their pea-sized wild ancestor, but the generations of crossbreeding made them more fragile and altered their nutrients. GMOs, or genetically modified organisms, are plants or animals that were mixed with another species’ DNA to introduce a specific trait — meaning they’re “transgenic.” Best known are corn and soybeans mixed with bacterial genes for built-in resistance to pests or weed killers. Despite international scientific consensus that GMOs are safe to eat, some people remain wary and there is concern they could spur herbicide-resistant weeds. Now gene-editing tools, with names like CRISPR and TALENs, promise to alter foods more precisely, and at less cost, without necessarily adding foreign DNA. Instead, they act like molecular scissors to alter the letters of an organism’s own genetic alphabet. The technology can insert new DNA, but most products in development so far switch off a gene, according to University of Missouri professor Nicholas Kalaitzandonakes. Those new Calyxt soybeans? Voytas’ team inactivated two genes so the beans produce oil with no heart-damaging trans fat and that shares the famed health profile of olive oil without its distinct taste. The hornless calves? Most dairy Holsteins grow horns that are removed for the safety of farmers and other cows. Recombinetics Inc. swapped part of the gene that makes dairy cows grow horns with the DNA instructions from naturally hornless Angus beef cattle. “Precision breeding,” is how animal geneticist Alison Van Eenennaam of the University of California, Davis, explains it. “This isn’t going to replace traditional breeding,” but make it easier to add one more trait.

Rules aren’t clear

The U.S. Department of Agriculture says extra rules aren’t needed for “plants that could otherwise have been developed through traditional breeding,” clearing the way for development of about two dozen gene-edited crops so far. In contrast, the U.S. Food and Drug Administration in 2017 proposed tighter, druglike restrictions on gene-

edited animals. It promises guidance sometime next year on exactly how it will proceed. Because of trade, international regulations are “the most important factor in whether genome editing technologies are commercialized,” USDA’s Paul Spencer told a meeting of agriculture economists. Europe’s highest court ruled last summer that existing European curbs on the sale of transgenic GMOs should apply to gene-edited foods, too. But at the World Trade Organization this month, the U.S. joined 12 nations including Canada, Australia, Argentina and Brazil in urging other countries to adopt internationally consistent, science-based rules for gene-edited agriculture. Are these foods safe?

The biggest concern is what are called off-target edits, unintended changes to DNA that could affect a crop’s nutritional value or an animal’s health, said Jennifer Kuzma of the Genetic Engineering and Society Center at North Carolina State University. Scientists are looking for any signs of problems. Take the hornless calves munching in a UC-Davis field. One is female and once it begins producing milk, Van Eenennaam will test how similar that milk’s fat and protein composition is to milk from unaltered cows. “We’re kind of being overly cautious,” she said, noting that if eating beef from naturally hornless Angus cattle is fine, milk from edited Holsteins should be, too. But to Kuzma, companies will have to be upfront about how these new foods were made and the evidence that they’re healthy. She wants regulators to decide case-by-case which changes are no big deal, and which might need more scrutiny. “Most gene-edited plants and animals are probably going to be just fine to eat. But you’re only going to do yourself a disservice in the long run if you hide behind the terminology,” Kuzma said.

Avoiding a backlash

Uncertainty about regulatory and consumer reaction is creating some strange bedfellows. An industry-backed group of food makers and farmers asked university researchers and consumer advocates to help craft guidelines for “responsible use” of gene editing in the food supply. “Clearly this coalition is in existence because of some of the battle scars from the GMO debates, there’s no question about that,” said Greg Jaffe of the food-safety watchdog Center for Science in the Public Interest, who agreed to join the Center for Food Integrity’s guidelines group. “There’s clearly going to be questions raised about this technology.”

Sustainability or hype?

Gene-editing can’t do everything, cautioned Calyxt’s Voytas. There are limitations to how much foods could be changed. Sure, scientists made wheat containing less gluten, but it’s unlikely to ever be totally gluten-free for people who can’t digest that protein, for example — or to make, say, allergy-free peanuts. Nor is it clear how easily companies will be able to edit different kinds of food, key to their profit. Despite her concerns about adequate regulation, Kuzma expects about 20 gene-edited crops to hit the U.S. market over five years — and she notes that scientists also are exploring changes to crops, like cassava, that are important in the poorest countries. “We think it’s going to really revolutionize the industry,” she said.

1. Rambam, Hilchot Kilayim 1:5-7 Chabad.org translation)

כלאי האילנות הרי הם בכלל מה שנאמר שדך לא תזרע כלאים כיצד המרכיב אילן באילן כגון שהרכיב ייחור של תפוח באתרוג או אתרוג בתפוח הרי זה לוקה מן התורה בכ"מ בין בארץ בין בחוצה לארץ וכן המרכיב ירק באילן או אילן בירק לוקה בכל מקום:

[Grafting] a mixture of trees is including in the prohibition: "You shall not sow your field with mixed species."

What is implied? When a person grafts a tree [of one species] unto a tree [of another species], e.g., he grafted a branch of an apple tree to an esrog tree or one from an esrog tree to an apple tree, he is liable for lashes according to Scriptural Law in any place, whether in Eretz Yisrael or in the Diaspora. Similarly, if a person grafts a vegetable to a tree or a tree to a vegetable, he is liable for lashes in every place.

ואסור לישראל להניח לנכרי שירכיב לו אילנות כלאים ומותר לזרוע זרעים וזרע אילן כאחד וכן מותר לערב זרעי אילנות ולזרוען כאחד שאין לך כלאים באילנות אלא הרכבה בלבד :

It is forbidden for a Jew to allow a gentile to graft different species of trees together for [the Jew].

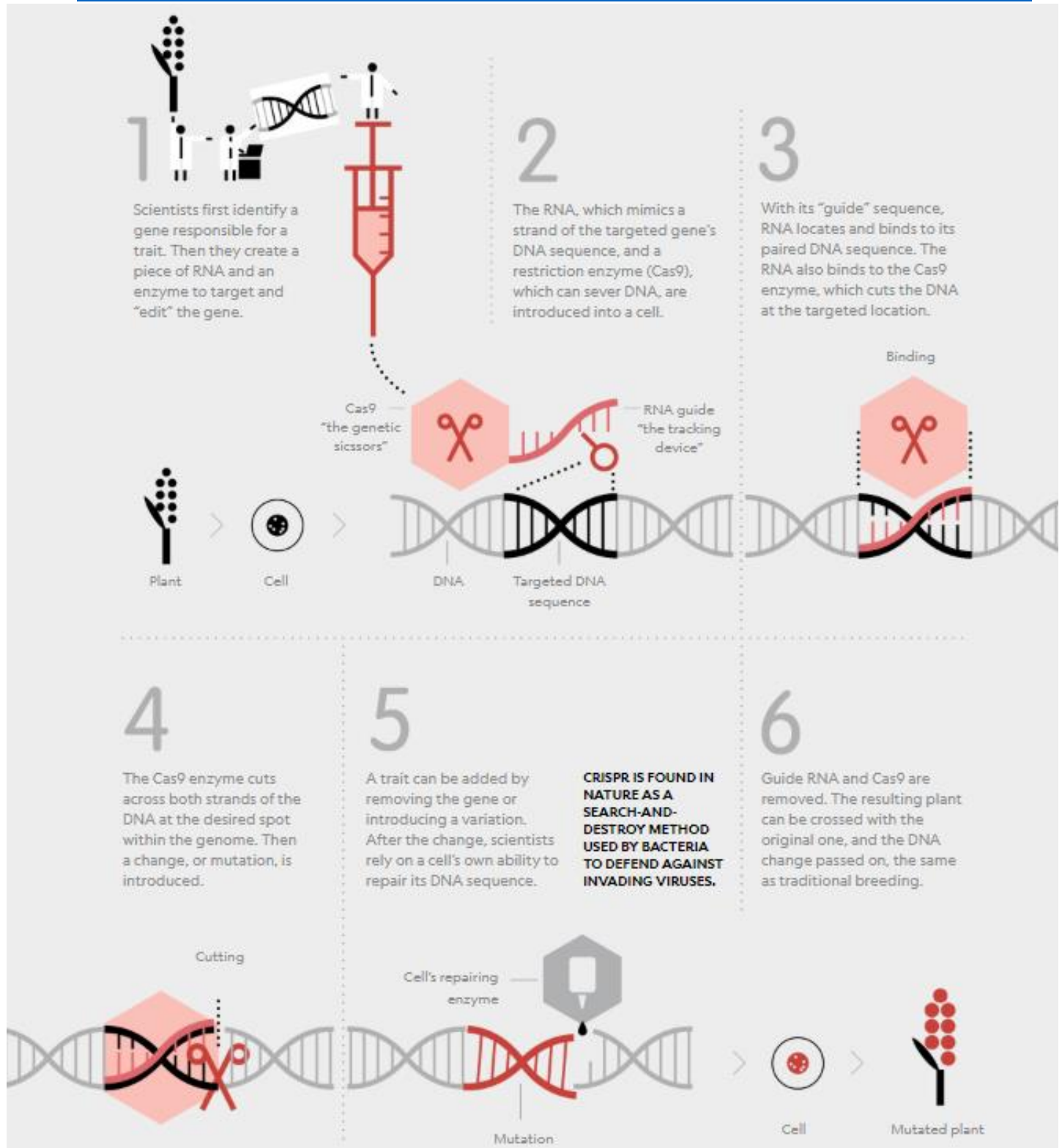
It is permitted to sow the seeds of produce and the seeds of a tree together. Similarly, it is permitted to mix seeds from different species of trees and sow them together. [The rationale is that] the only prohibition against mixed species that applies to trees is the prohibition against grafting [different species together].

הזרוע זרעים כלאים וכן המרכיב אילנות כלאים אף על פי שהוא לוקה הרי אלו מותרין באכילה ואפילו לזה שעבר זרען שלא נאסר אלא זרעיתן בלבד ומותר ליטע ייחור מן האילן שהורכב כלאים ולזרוע מזרע הירק שנזרע כלאים:

Although he is liable for lashes, when a person sows forbidden species together or grafts forbidden species of trees together, the produce that grows is permitted to be eaten, even by the person who transgressed and sowed it.¹⁷ For it is only sowing that is forbidden. It is permitted to plant a branch from the grafted tree or plant the seeds from a vegetable that was planted together with mixed species.

2. Why Gene Editing Is The Next Food Revolution,

<https://www.nationalgeographic.com/environment/future-of-food/food-technology-gene-editing/>



GRAPHICS: ÁLVARO VALIÑO AND KELSEY NOWAKOWSKI. SOURCES: SHING F. KWOK, NATIONAL INSTITUTE OF FOOD AND AGRICULTURE, U.S. DEPARTMENT OF AGRICULTURE; HEIKE SEDEROFF, NORTH CAROLINA STATE UNIVERSITY

3. Aruch Hashulchan 84:36

אמנם האמת הוא דלא אסרה תורה במה שאין העין שולטת בו דלא ניתנה תורה למלאכים דאל"כ הרי כמה מהחוקרים כתבו שגם כל האויר הוא מלא ברואים דקים מן הדקים וכשהאדם פותח פיו בולע כמה מהם אלא ודאי דהבל יפצה פיהם ואף אם כן הוא כיון שאין העין שולט בהם לאו כלום הוא

However, the truth is that the Torah did not prohibit that which the naked eye cannot see, because the Torah was not given to angels. If this were not so, behold, many of the scientists have written that the air is filled with many small living creatures, and when people open their mouths, they swallow many of them. Although it is certainly hot air coming out of their mouths, even if it would be so, since the naked eye cannot see them, it is not considered anything [sinful].

4. Ariel Caplan, Genetic Engineering in Halacha, KolTorah.org, Volume 19

However, this approach is directly rejected by Rav Shlomo Zalman Auerbach in Minchat Shlomo Tinyana (97:27) and Rav Yehoshua Neuwirth (quoted in Nishmat Avraham, English edition, vol.3 p.300), and other Poskim who address the permissibility of genetic engineering imply their rejection by admitting that the question exists. Rav Shlomo Zalman argues that one is actively involved in the genetic transfer, and this involvement is enough to make the transfer Halachically significant. Rav Neuwirth adds that the results of genetic modification are (often) visible, unlike the microbial presence in food, which goes unnoticed. Either way, the point seems to be that we can ignore microscopic entities only so long as we ignore them – that is, provided we do not deal with them directly and cannot perceive their impact. However, if we involve ourselves in the microscopic world, we have no choice but to acknowledge the presence of microscopic entities and deal with them on Halachic grounds.

5. Rabbi J. David Bleich, Survey Of Recent Halakhic Periodical Literature, Tradition 37:2

A similar principle applies to genetic manipulation of agricultural species. R. Shlomo Zalman Auerbach, Minchat Shlomo, II, no. 97, see. 27, declares that pollination of one species with pollen of another species does not result in a fruit that would be halakhically classified as a hybrid. Thus, although Rabbi Auerbach affirms that the fruit of an etrog tree produced as the result of grafting of a lemon branch may not be used on Sukkot for purposes of fulfilling the mitzvah of the four species, he nevertheless regards pollination as an entirely different matter. Accordingly, rules Rabbi Auerbach, if an etrog is pollinated with the pollen of a lemon tree the resultant fruit is an etrog and may be used for fulfilling the mitzvah. Rabbi Auerbach declares that the prohibition against hybridization of species applies only to the planting or grafting of vegetative material that might independently yield fruit or a seed capable of germinating independently. Pollen can never grow into fruit; hence, for purposes of Halakha, introduction of foreign pollen does not affect species identity. Again, it is quite obvious that such pollination conducted artificially by humans is not prohibited. Similarly, it follows that introduction of a gene of a foreign species is not forbidden as a form of hybridization since an isolated gene can never develop into a tree or into a plant.

6. Rav Shlomo Zalman Auerbach, Minchat Shlomo 2:100:7

בענין שאלתו בדבר הנדסה גנטית, שמכניסים חלקיקי תאים מבריה אחת לשניה, ובזה משנים את תכונותיה של השניה, ועי"ז להתיר איסור כלאים מכיון שאין חלקיקים אלו נראים לעין האדם, כיון שאנשים מטפלים בחלקיקים האלה ומעבירים אותם ממין אחד לשני הרי זה חשיב ממש כנראה לעינים ולא דמי כלל לתולעים שאינם נראים. אמנם בבעלי חיים נלעג"ד דאין בעצם העשיה שום איסור של הרבעה כיון שזה רק ע"י העברת "חומר" ממין אחד תוך מין בעל חי אחר, ורק בהרכבת עצים נראה דשפיר אסור אף אם ההרכבה היא רק על ידי זריקה של מיץ אשר אם היה זורע את המיץ באדמה לא היה צומח כלל, כי סוף סוף "השדה" זרועה משני מינים, משא"כ בהרבעה הרי התורה אמרה "בהמתך" ואין זו בהמה ואין זה שייך כלל לאיסור הרבעה דאסרה רק שתי גופות ממש.

About your question regarding genetic engineering, where they insert cell particles from one living creature into another, and through this, they change the properties of the second one. And through this, [the writer wanted to] permit the prohibition of Kil'ayim since these particles are not visible to the human eye – since people are handling these particles and transferring them from one species to another, this is considered as if it is visible to

our eyes, and is not at all similar to bugs which cannot be seen. However, for animals, it seems to me that there is no prohibition in these actions of Harva'ah, since this happens simply by transferring matter from one species of living creature to another, and only when it comes to grafting trees would this be prohibited, even if the "grafting" is only through an injection of "juice", which if it would be planted, would not sprout at all, because nevertheless, the "field" is planted with two species, unlike for Harva'ah, where the Torah stated "your animals [shall not be mixed]", and this is not an animal [being mixed, and therefore] this is not related at all to the prohibition of Harba'ah which prohibits only two "bodies".

7. Ariel Caplan, Genetic Engineering in Halacha, KolTorah.org, Volume 19

Rav Shlomo Zalman adds that a mixture of DNA within cells of one plant constitutes a violation of Kilayim. However, it is not clear if any amount would constitute a violation of Kilayim of animals or if there is some specific threshold that must be passed for the transferred genetic material to be significant.

8. Ariel Caplan, Genetic Engineering in Halacha, KolTorah.org, Volume 19

Based on the positions of these two towering giants, we may well understand the issues noted in the previous section. The comments of Ramban and others notwithstanding, we should likely build our perception of the ethical issues out of the Halachic principles, which – as noted – severely limit the Kilayim restrictions. Although Rav Moshe certainly leaves room for ethical principles, the ideas of building the world and benefiting humanity likely overshadow an ethical imperative to avoid tampering with nature. Considering that two major Halachic authorities of Eretz Yisrael of the previous century – the Chazon Ish and Rav Shlomo Zalman Auerbach – did not mention Hashkafic implications of Kilayim, and that two great American Halachic decisors – Rav Moshe Feinstein and Rav Soloveitchik – minimize the implications of Aggadic explanations of Mitzvot, it would seem that the combined trend of recent Torah authorities should limit the ethical restrictions of Kilayim and favor pursuit of genetic engineering.

9. Vayikra 19:19 (Alhatorah.org translation)

אַתָּה־תִּשְׁמָר׃ תִּשְׁמָר׃ לֹא־תִרְבֹּעַ כְּלָאִים שְׂדֵךְ לֹא־תִרְבֹּעַ כְּלָאִים וּבְגָד כְּלָאִים שָׁעֲטָנָו לֹא יַעֲלֶה עָלֶיךָ׃

“You shall keep my statutes. “You shall not crossbreed different kinds of animals. “you shall not sow your field with two kinds of seed; “neither shall there come upon on you a garment made of two kinds of material.

10. Rashi there (Alhatorah.org translation)

את חקתי תשמורו – ואילו הן: בהמתך לא תרביע כלאים וגו'. חקים הם אילו גזירת המלך שאין טעם לדבר.

YE SHALL KEEP MY ORDINANCES — These are they: "Thou shalt not cause two kinds of thy cattle to gender etc.", (and the other ordinances laid down in this verse), for by the term חוקים are meant those enactments of the King for which no reason is given and those that precede are not of this character.

11. Ibn Ezra there (Alhatorah.org translation)

וטעם להזכיר אחר אלה המצוות: בהמתך לא תרביע כלאים – להזהיר אחר היותך קדוש, לא תעשה חמס לבן אדם כמון, גם לא תעשה לבהמה, לשנות מעשה השם.

The reason for mentioning Do not interbreed different kinds of animals after the previous commandments, is to say to us: Just as the requirement to be holy implies that you must not do violence to other human beings, so also it implies that you must not do anything to animals which alters the work of G-d.

Wyoming man argues against death penalty in fetus death
-The Associated Press, November 20, 2018

JACKSON, Wyo. — A Wyoming man charged with killing his girlfriend in Idaho in July 2016 argues the death of her unborn baby does not qualify as a second murder that makes him eligible for the death penalty. Attorneys for 41-year-old Erik Ohlson of Jackson say it's "legal insanity" for Idaho law to protect a first trimester fetus under the homicide law but not under the abortion law. Ohlson is charged with killing 39-year-old Jennifer Nalley and her unborn baby. His trial is set for July 2019 in Bingham County, Idaho. "A woman and her doctors can kill an embryo or fetus in the first trimester without repercussions from the law," Ohlson's attorneys Jim Archibald and John Thomas wrote in their Nov. 9 motion to dismiss the murder charge related to the fetus. "To say a potential mother has protection from being prosecuted but a potential father does not have protections violates equal protection under law." They argue the 12-week-old fetus wasn't old enough to have a right to life. "Erik Ohlson was put on notice that a fetus in its first trimester could be killed," they wrote. "He knew this personally as two different women he had relationships with had aborted, or killed, their first trimester fetuses." The attorneys also argued the fetus didn't die because it was shot, but because Nalley was shot. There was no autopsy or death certificate for the fetus, meaning Ohlson can't be charged with a second count of murder. Prosecutors plan to use text messages apparently sent by Ohlson as evidence for premeditation in Nalley's death. "She seems to be interested in having this baby without me except for when it comes to money," investigators said Ohlson texted to a friend just before the shooting. "I want to strangle her and witness her last mortal moment." A motions hearing is set for Dec. 7, the Jackson Hole News & Guide reported.

12. Shemot 21:22-23 (Alhatorah.org translation)

וְכִי־יִנָּצוּ אַנְשִׁים וְנָגְפוּ אִשָּׁה הָרָה וַיֵּצְאוּ יְלָדֶיהָ וְלֹא יִהְיֶה אִסּוֹן עָנּוּשׁ יַעֲזֹב כְּאִשֶּׁר יִשִּׁית עָלֶיהָ בַּעַל הָאִשָּׁה וְנָתַן בְּפָלְאִים:
 "If men fight and hurt a pregnant woman so that she gives birth prematurely, and yet no harm follows, he shall be surely fined as much as the woman's husband demands and the judges allow.

וְאִם־אִסּוֹן יִהְיֶה וְנָתַתָּה נַפֶּשׁ תַּחַת נַפֶּשׁ:

But if any harm follows, then you must take life for life

13. Rashi there (Alhatorah.org translation)

וְאִם אִסּוֹן יִהְיֶה – באשה.
 וְנָתַתָּה נַפֶּשׁ תַּחַת נַפֶּשׁ – רבותינו חלוקים בדבר: יש אומר: נפש ממש, ויש אומרים: ממון אבל לא נפש ממש, שהמתכוין להרוג את זה והרג את זה, פטור ממיתה...
 AND IF THERE BE ANY FURTHER MISCHIEF – in the case of the woman,

THEN THOU SHALT GIVE SOUL FOR SOUL. Our Rabbis differ as to the explanation of the word נפש the first time it occurs here. There are some who say that it actually signifies "life" (i.e. life for life), others say that it means monetary compensation but not literally life, and they say that this must be so because he who intends to kill a certain person and inadvertently kills another instead, (as is the case here), is exempt from the death penalty...

14. Rashbam there (Alhatorah.org translation)

וְנָתַתָּה {נֶפֶשׁ תַּחַת} נֶפֶשׁ – ופטור מדמי וולדות.
 THE PENALTY SHALL BE LIFE FOR LIFE: And he is exempt from paying for the damage to the fetus.

15. Rambam, Hilchot Melachim 8:4 (Chabad.org translation)

בן נח שהרג נפש אפילו עובר במעי אמו נהרג עליו וכן אם הרג טריפה או שכפתו ונתנו לפי ארי או שהניחו ברעב עד שמת הואיל והמית מכל מקום נהרג וכן אם הרג רודף שיכול להצילו באחד מאיבריו נהרג עליו מה שאין כן בישראל:
 A gentile who slays any soul, even a fetus in its mother's womb, should be executed in retribution for its death. Similarly, if he slew a person who would have otherwise died in the near future, placed a person before a lion, or starved a person to death, he should be executed for through one manner or other, he killed. Similarly, one should be executed if he killed a pursuer when he could have saved the latter's potential victim by maiming one of the pursuer's limbs. These laws do not apply with regard to Jews.