

## *Survey of Recent Halakhic Periodical Literature*

### GENETIC ENGINEERING

#### I. PERMISSIBILITY OF GENETIC MANIPULATION

Genetic engineering has made it possible to manipulate the DNA of microorganisms, animals and plants in order to satisfy human needs. Science has developed bacteria that ingest petroleum in order to alleviate the environmentally devastating effects of oil spills, bacteria to produce insulin, sheep whose milk contains a drug used in treatment of cystic fibrosis and a host of genetically modified foods. One third of the harvest of corn, soybeans and canola in the United States is genetically modified to make the crops resistant to insects. At least in the laboratory, it is possible to remove from a salmon DNA that keeps the fish from freezing and to introduce it into strawberries in order to produce a freeze-proof strawberry. It is also possible to introduce animal genes into plants. A small company in Syracuse has contracted with a scientist at the University of Connecticut to develop a genetically engineered cat that will not cause allergies, an effort that may prove to be highly profitable, since it would allow countless numbers of people who cannot now do so to keep cats as pets. Scientists at the University of Florida have patented a method of implanting a silkworm gene into grapevines to make the vines resistant to Pierce's disease, a blight currently menacing vineyards in California. The silkworm gene kills the bacterium responsible for the blight.

There is, of course, reason to be concerned with regard to possible deleterious effects of genetically modified foods upon humans. There is evidence that corn that has been genetically modified to produce a toxin that kills a caterpillar called the European corn borer may also kill monarch butterflies. Genetically modified crops may produce unfamiliar proteins that might prove to be allergenic, toxic or carcinogenic. These concerns are appropriately addressed both by the scientific community and by government regulatory agencies.

The theological and religious question is whether man has the right to intervene in the natural order by mixing and mingling the genetic material of diverse species. There is no reflection in Jewish tradition of a doctrine that establishes a global prohibition forbidding man to tamper with known or presumed *teloi* of creation. There are, however, indeed individual thinkers who have explained the rationale underlying particular *mizvot* in a manner echoing such a concept. Biblical commandments prohibiting interbreeding of species and the mingling of diverse agricultural species certainly lend themselves to such an interpretation. Although Rashi, in his commentary to Leviticus 19:19, regards those restrictions as *hukkim*, i.e., arational statutes not subject to human inquiry, Ramban, in his commentary on the same verse, takes sharp issue with Rashi and opines that interbreeding and prohibited mingling of species are forbidden as constituting illicit tampering with creation. Ramban states that every creature and every plant is endowed by God with cosmically arranged distinctive features and qualities and is designed to reproduce itself as long as the universe endures. Interbreeding and cross-fertilization produce a reconfiguration of those distinctive qualities and also compromise reproductive potential. By engaging in such activities man usurps the divine prerogative in producing a new species or entity with its own novel set of attributes and, presumably, a species less than optimally suited to fulfill the divinely ordained *telos* associated with the original species.

Ibn Ezra has been understood as presenting the matter in a somewhat different light in declaring that the Torah prohibits crossbreeding of species because the act thwarts propagation of the species and hence represents an injustice to the animals who are prevented from fulfilling the divine purpose of propagating their respective species.<sup>1</sup> Ibn Ezra has similarly been understood as explaining the prohibitions against the mixture of agricultural species as well as the combination of linen and wool in the cloth of a garment as violative of the natural order decreed by the Creator.<sup>2</sup> R. Samson Raphael Hirsch had no difficulty in explaining the prohibition regarding *sha'atnez* (the mixing of linen and wool) in similar terms. Indeed, R. Hirsch understood all *hukkim* as being reflective of the principle that man should not interfere with the order and harmony—and hence the *telos*—of creation.<sup>3</sup> According to R. Hirsch, such laws are distinguished from *mishpatim*, or so-called rational commandments, only because our duties toward our fellow men are more intelligible to us by virtue of our recognition of our own needs

and aspirations. That particular purposes are similarly assigned to animals and even to inanimate objects is not immediately grasped by the human intellect and hence *hukkim* are depicted as arational. It is noteworthy that, although R. Hirsch regards these commandments as designed to prevent interference with divinely ordained *teloi*, unlike natural law theologians, he regards the *teloi* themselves as not being readily apparent to human reason. That understanding of the nature of *hukkim* is certainly confirmed by the fact that no natural law philosopher has ever asserted that the manufacture of linsey-woolsey or even agricultural hybridization is intuitively perceived as interfering with the divine plan for creation.

Were it to be assumed that tampering with the ostensive or presumed nature of animal species is always forbidden, most forms of genetic engineering would be illicit. No bacterium is designed by nature to clean up oil spills by metabolizing petroleum or to excrete human insulin for use by diabetics. In the absence of evidence in rabbinic sources to the contrary, it must be assumed that, even accepting Ramban's explanation of the prohibition against interbreeding or R. Hirsch's broader analysis of the rationale underlying *hukkim* in general, biblical strictures must be understood as limited to those matters explicitly prohibited.<sup>4</sup>

There is, to be sure, a perceptible tension between the concepts enunciated by Ramban and R. Samson Raphael Hirsch and the many midrashic sources indicating that man is an active partner in the process of creation and, as such, is charged with bringing creative processes to completion. Indeed, the biblical charge to Adam exhorting him to "fill the earth and conquer it" (Genesis 1:28) seems to give Adam *carte blanche* to engage in any form of conduct that is not specifically proscribed. The problem is readily resolved if it is understood that, in general, the functions and *teloi* of the products of creation are not immutable; that the Creator did not intend to bar man from applying his ingenuity in finding new uses and purposes for the objects of creation;<sup>5</sup> and that there is no injustice to animal species or inanimate objects in doing so. Immutability of function and *telos* is the exception, not the rule. Thus, for example, it has never been suggested that manufacture and use of synthetic fibers in the making of clothes is in any way a contravention of either the letter or the spirit of the law.<sup>6</sup> The exceptions were announced by the Creator as formal prohibitions. It is precisely because human reason cannot intuit, or even comprehend, when

and under what circumstances contravention of the natural order is inappropriate that these commandments are in the nature of *hukkim*.

More generally, man's creative power, at least to the extent that it does not involve creation of novel species, is extolled in rabbinic sources. The divine appellation "*Shaddai*" is understood in rabbinic exegesis as an acronym "*she-amarti le-olami 'dai*" — "Who said to My universe, 'Enough!'" Thus the verse, "I, the Lord Shaddai" (Genesis 17:1) is rendered by *Midrash Rabbah* 46:2, "I am the Lord who said to the universe 'Enough!'" R. Jonathan Eibeschutz, *Tiferet Yonatan, ad locum*, followed by R. Joseph Ber Soloveichik, *Bet ha-Levi, ad locum*, explains that, in His creation of various artifacts, God arrested their development before completion. Man plants a seed, the seed germinates, a stalk grows and kernels of wheat develop. The Creator could well have made it possible for the kernels to crumble into flour, for the flour to absorb rain or moisture from the atmosphere, for the wind to churn the water-drenched flour so that dough be formed and for the heat of the sun to bake the mixture in order to yield a product that might literally be termed a "breadfruit." Instead, the Creator arrested the process long before its completion and ordained that grinding the wheat, mixing the flour with water, kneading the dough and baking the bread be performed by man. Similarly, the flax plant could have been endowed with properties causing strands of flax to separate and intertwine themselves in a cloth which might grow in the shape of a cloak. Instead, the process is arrested and brought to completion by man. Indeed, the Gemara, *Shabbat* 30b, declares that in the eschatological era the Land of Israel will yield "cakes" and "linen garments." *Bet ha-Levi* explains that the import of that statement is simply that, in the end of days, God will allow the processes of creation to reach their destined end by modifying the natural order in a manner that will permit the creative process to become complete and thus spare man any travail. In the interim, however, He has declared, "Enough!," i.e., He has precipitously interrupted the process of creation and co-opted man, who must complete the process, as a collaborator in fashioning the universe.

It is abundantly clear that human intervention in the natural order is normatively interdicted only to the extent that there are explicit prohibitions limiting such intervention. Moreover, there is no evidence either from Scripture or from rabbinic writings that forms of intervention or manipulation not expressly banned are antithetical to the spirit of the law. Quite to the contrary, Jewish tradition, although it certainly

recognizes divine proprietorship of the universe, nevertheless, gratefully acknowledges that while “The heavens are the heavens of God” yet “the earth has He given to the sons of man” (Psalms 115:6). In bestowing that gift upon mankind, the Creator has granted man dominion over the world in which he lives and over the living species that are co-inhabitants of that world. Man has been given license to apply his intellect, ingenuity and physical prowess in developing the world in which he has been placed subject only to limitations imposed by the laws of the Torah, including the general admonition not to do harm to others, as well as by the constraints imposed by good sense and considerations of prudence.

The tension between the role of man as the agent of completing the work of creation and biblical prohibitions against certain forms of interference in the natural order is elucidated by R. Judah Loew, popularly known as Maharal of Prague, in his *Be'er ha-Golah*, chap. 2:3, *s.v. Masekhet Pesachim*. The Gemara, *Pesachim* 54a, states that the creation of a number of entities was planned by God before the first Sabbath but they were not actually created until the conclusion of the Sabbath. Upon the conclusion of the Sabbath “the Holy One, blessed by He, bestowed understanding upon Adam and he took two stones, rubbed them one upon the other and fire emerged; [Adam] brought two animals, mated one with the other and from them emerged a mule.” Clearly, this statement reflects the notion that the potential for both fire and interspecies is the product of divine creation and that the potential became actualized through the intermediacy of human intelligence, which is itself a divine gift.

Maharal notes that, although interbreeding of diverse animal species was clearly interdicted by the Torah, the Sages certainly regarded the breeding of mules by Adam as a fulfillment of the divine plan. Maharal boldly declares that the fact that God has prohibited a certain act does not necessarily mean that God has renounced the effect of that act. Thus crossbreeding of animal species was prohibited to Israel at Sinai but was not forbidden to Adam because the breeding of mules was incorporated in the divine blueprint for creation. Thus a distinction must be drawn between act and effect. And, if disdain for the effect is not the rationale underlying the prohibition of the act, there exists no basis for expanding the prohibition to encompass any act that is not formally within its ambit.

Man’s role is “completion” (*hashlamah*) of the process of Creation. Insofar as “completion” of creation is concerned, it is the divine plan

that such development take place. Maharal asserts that it is the divine will that even interspecies such as the mule come into being, although not in circumstances that involve violation of Torah law. Thus crossbreeding was permitted to Adam because emergence of interspecies is integral to “completion” of the universe. According to Maharal, crossbreeding by a person who is not commanded otherwise (or in situations in which the prohibition does not apply) does not constitute a violation of the divine will or of the divinely ordained *telos* because “the way of Torah is one thing and the way of completion is another matter entirely.”

Genetic manipulation involving even the introduction of a gene of one species into the genotype of an alien species does not constitute a violation of the prohibition against crossbreeding. *Hazon Ish, Kila'im* 2:6, notes that violation of the commandment occurs only in directly causing copulation between two living animals. *Hazon Ish* declares that artificial insemination designed to produce an interspecies is not forbidden just as an *inter vivos* organ transferred from one species to another is not forbidden. It is thus quite obvious that genetic manipulation, since it does not entail a sexual act involving partners who are members of different species, cannot be regarded as forbidden.

A similar principle applies to genetic manipulation of agricultural species. R. Shlomoh Zalman Auerbach, *Minhat Shlomoh*, II, no. 97, sec. 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 *mizvah* 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 *mizvah*. 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 Halakhah, introduction of foreign pollen<sup>7</sup> 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.

## II. KASHRUT IMPLICATIONS

The major halakhic issue with regard to non-human genetic engineering is the identity of the resultant genetically engineered entity. It seems entirely obvious that a tomato modified to prevent freezing by insertion of a salmon gene is a plant and not an animal. Accordingly, the blessing to be recited before eating the genetically modified tomato remains identical to the blessing pronounced over unmodified tomatoes. But what is the status of a cow whose genotype has been modified by splicing in genes derived from a pig? Does the *kashrut* status of an animal depend upon the status of the gestational mother or upon its own genetic make-up? If the latter, is species identity determined by the source of the majority of the animal's genes or, if its genes are derived from animals of two or more species, is the genetically engineered animal regarded as a hybrid to be treated as a member of each of those species? Another ramification of that issue lies in the area of interbreeding: If genes of a sheep are introduced into a cow does the genetically modified animal remain a cow that may legitimately be bred with a bull or does it acquire at least the partial identity of a sheep that may not be crossbred with a bull? For that matter, may two such cows genetically engineered in an identical manner, but one a male and the other female, be bred with one another?

These issues began to receive scholarly attention due to rumors that circulated in B'nei Brak several years ago concerning genetically engineered poultry. The reports were quite vague in nature and told only of genes of non-kosher birds being introduced into poultry which, according to one rabbinic writer,<sup>8</sup> "led to offspring with odd changes in the shape of their necks and the manner in which they stand on their feet." Another writer<sup>9</sup> describes those chickens as sporting feathers on their legs and further asserts that, when perched on a pole, rope or wire, those chickens separate their toes by placing two digits on either side of the object on which they are perched. The latter phenomenon is recorded in *Shulhan Arukh, Yoreh De'ah* 82:2, as one of the defining criteria of a non-kosher species. One observer claims that he has observed one such chicken seizing its food with its feet,<sup>10</sup> a phenomenon that, in the opinion formulated by Rashi, *Niddah* 50b,<sup>11</sup> is denoted by the term "*doves*" employed by the Mishnah as descriptive of the primary criterion of a non-kosher bird. The fear expressed by these rabbinic scholars is that similar genetic manipulation may have occurred with regard to other commercially available poultry but that those genetic changes may have

yielded no recognizable anomalies. There are also reports<sup>12</sup> of commercially slaughtered chickens of unknown provenance that lack feathers on their necks and whose skin in the area of their necks turns red when the chickens are frightened. A series of responsa dealing with this issue were collected by R. Hizkiyahu Yosef Cohen for inclusion in his as yet unpublished *Teshuvot Arnei Hen*.<sup>13</sup> Among those items are responsa authored by R. Yisra'el Ya'akov Fisher and R. Moshe Sternbuch, both of the Bet Din of Jerusalem's *Edah ha-Haredit*, R. Nathan Gestetner, author of the multi-volume work, *Le-Horot Natan*, R. Samuel ha-Levi Wosznner, author of *Teshuvot Shevet ha-Levi*, as well as Rabbi Cohen's own comments. Rabbi Fisher's responsum has been published in his own responsa collection, *Teshuvot Even Yisra'el*, VIII, no. 55.

In a communication to a colleague, a copy of which is in the possession of this writer, Dr. Lawrence Shore, a member of the Department of Human Research of the Kimron Veterinary Institute in Bet Dagan, advises that transgenic poultry were never offered for sale but that such reports gained currency as a result of extremely interesting research that he had conducted. Dr. Shore reports that he successfully crossed a chicken with a jellyfish by inserting a gene from a jellyfish into a chicken. The gene thus transferred is responsible for the green pigmentation of jellyfish. The result was a green chicken. Dr. Shore further reports that the transfer procedure he employed is patented, that all research specimens were destroyed and that such chickens are not commercially available.<sup>14</sup> Accordingly, the rumors represent little more than a halakhic tempest in a scientific teapot. The aforesaid does not at all imply that halakhic discussions of the issues involved are irrelevant. We live in a world in which yesterday's science fiction is today's laboratory experiment and tomorrow's commonplace reality.

A discussion of the halakhic ramifications of the issues involved must begin with one well-established point. As noted by R. Moshe Sternbuch in his responsum, the halakhic issue is quite similar to one posed by grafting a branch of a newly-grown sapling onto a mature tree. The fruit of the mature tree, i.e., a tree more than three years old, is no longer subject to the prohibition of *orlah*; the fruit of the young sapling is subject to that prohibition. Nevertheless, for purposes of *orlah*, the branch of the younger tree acquires the identity of the older tree and, accordingly, its fruit is permitted. In effect, the identity of the sapling becomes submerged in the identity of the tree onto which it has been grafted. Presumably, the same provision would apply to an individual gene that is "grafted" or spliced into the germ cell of another species.



However, in his responsum, Rabbi Nathan Gestetner, ignores this consideration with regard to rules governing *orlah* and hence fails to discuss its applicability or non-applicability to products of genetic manipulation. Instead, Rabbi Gestetner simply assumes that the transferred gene does not lose its halakhic identity as a particle of a forbidden entity. Nevertheless, he finds grounds to permit at least the progeny of the genetically altered bird on the basis of a principle of Halakhah applicable to the product of multiple causes. That principle is formulated, *inter alia*, in association with the prohibition against deriving benefit from any deified object. This prohibition notwithstanding, *Shulhan Arukh, Yoreh De'ah* 142:11, rules that, during the summer, even in climes in which vegetables need shade in order to grow, it is permitted to plant vegetables under a tree that has been made the object of pagan adoration. The halakhic principle reflected in that ruling is “*zeh va-zeh gorev muttar*,” i.e., the product of two causes, one permissible and one forbidden, is permissible. Germination and growth of the vegetables in question are attributable to two causes, *viz.*, 1) nutrients provided by the soil which are entirely permissible and 2) the shade provided by the prohibited tree.

Similarly, the Gemara, *Hullin* 58a, declares that eggs laid by a bird suffering from a congenital anomaly or which has sustained a trauma such that it has the status of a *treifah* may nevertheless be eaten. As Rashi explains, that is so because, according to the talmudic principle, eggs are the joint product of both the father bird and the mother bird.<sup>15</sup> Although, in the case of a *treifah*, the meat of the mother may not be consumed, nevertheless, since the father is not a *treifah*, the resultant egg is permissible on the basis of the principle of *zeh va-zeh gorev*, i.e., it is the product of two separate causes. Accordingly, argues Rabbi Gestetner, a genetic complement containing genes from both a permitted species and a non-permitted species should have the status of *zeh va-zeh gorev* and hence all progeny should be permissible. Even more significantly, if only one of the progenitors of the chicken was the product of genetic engineering, but the other was not, the offspring are certainly the product of two separate “causes” and hence permissible.

However, as Rabbi Gestetner observes, that conclusion is not compatible with the position of Ramban, *Avodah Zarah* 49a, cited by *Bet Yosef, Yoreh De'ah* 142, who asserts that the principle of *zeh va-zeh gorev* is applicable only in situations in which two elements, one permitted and one forbidden, combine to generate a single cause, e.g., foliage which acts as fertilizer that combines with permissible nutrients

found in the soil, but is not applicable to situations involving two distinct causes such as shade and soil. The Gemara, *Niddah* 31a, declares that each parent is the source of different parts of the body: the father produces the “white” portion that forms bones, sinews etc, while the mother contributes the “red” portion that becomes skin, flesh etc. If so, in the case of poultry, since each parent is a separate cause producing a unique effect, the causes are distinct and separate. Hence, according to Ramban, the principle of *zeh va-zeh gorem* would not apply.

Rabbi Gestetner takes note of the fact that, in apparent contradiction to Ramban’s thesis, the Gemara, in two separate instances, *Temurah* 30b and 31a, applies the principle of *zeh va-zeh gorem* to an animal born of a prohibited mother and a permitted father. It is quite possible that Ramban assumes that the talmudic statement indicating that the father contributes the “white” while the mother contributes the “red” establishes a principle with regard to humans but not with regard to animals. In any event, *Shulhan Arukh, Yoreh De’ah* 142:11, rejects Ramban’s position in ruling that *zeh va-zeh gorem* is permissible even in the case of two independent causes.<sup>16</sup>

Nevertheless, the principle of *zeh va-zeh gorem* may not be applicable to genetic manipulation that yields recognizable physical characteristics of the forbidden cause because of an entirely different reason. Rabbenu Nissim, *Avodah Zarah* 48b, asserts that *zeh va-zeh gorem* is not an independent halakhic principle; rather, he argues, it is an application of the general concept of nullification (*bittul*), i.e., just as a forbidden substance loses its identity when it becomes submerged in a quantity sixty times as great, so also does a causal agent fail to preserve its identity in the effect it has produced in instances in which another identifiable cause is also present. Yet, as recorded in *Shulhan Arukh, Yoreh De’ah* 98:4, a forbidden substance that has become mixed with a quantity of a permitted substance sixty times as great but which nevertheless remains recognizable is not nullified. The applicable principle is that a recognizable substance never loses its identity. Genes that are responsible for particular physical characteristics do not lose their identity by reason of nullification, argues Rabbi Gestetner, because they remain recognizable in the physical characteristics for which they are responsible. Thus, since *zeh va-zeh gorem*, according to Rabbenu Nissim, is naught but a form of nullification, the principle cannot be invoked in situations in which the effect of a gene derived from a non-kosher source is perceivable.<sup>17</sup>

R. Yisra’el Ya’akov Fisher points out that, if *zeh va-zeh gorem* is indeed predicated upon the principle of nullification, any foodstuff pro-

duced by dual causes, one kosher and one non-kosher, is permissible only *post factum*. It would, therefore follow that it is forbidden purposely to employ that principle in engaging in transgenic procedures in order to breed animals or poultry for consumption by Jews just as purposeful adulteration of a forbidden food is forbidden.

There is yet one other factor to be considered that is relevant only to the *kashrut* of genetically engineered fowl but not to mammalian species. The *kashrut* of any particular animal species is determined on the basis of whether or not the species is endowed with split hoofs and whether or not the animal chews its cud.<sup>18</sup> Once the *kashrut* status of an animal species is determined, individual animals born to members of the species are kosher or non-kosher depending upon the status of the parent animals. Accordingly, insofar as offspring are concerned, the presence or absence of the physical criteria of kosher species is irrelevant in determining their *kashrut*. Thus, hypothetically, a piglet born to a cow as the result of genetic mutation would be kosher; conversely, a calf born to a mare would not be kosher. The applicable principle as formulated by the Mishnah, *Bechorot* 5b, is: "A pure animal that gives birth to [what appears to be an animal of] an impure species, [the offspring] is permitted for eating; an impure [animal] that gives birth to [what appears to be an animal of] a pure species, [the offspring] is prohibited for eating, for that which emerges from the impure is impure and that which emerges from the pure is pure."

The situation with regard to avian mutations is more complex. Scripture does not distinguish between kosher and non-kosher birds on the basis of anatomical or physiological criteria. Instead, Leviticus 11:13-19 and Deuteronomy 14:12-18 enumerate twenty-four species of non-kosher birds; all others are declared to be kosher.<sup>19</sup> Nevertheless, the Mishnah, *Hullin* 59a, does present a number of physical criteria that serve empirically to assist in distinguishing between kosher and non-kosher birds. The principle that that which emerges from the impure is impure and that which emerges from the pure is pure is to be understood simply as meaning that any creature that "emerges from," or is born of, another creature has the halakhic status of the creature from which it is born. An animal that gestates in the womb of the mother certainly emerges from the mother and hence has the selfsame halakhic status as the mother. However, unlike mammals, birds do not gestate their young; instead, they lay eggs. Eggs do indeed "emerge" from the female and hence have the same *kashrut* status as the mother. Eggs and milk are kosher or non-kosher depending upon the status of

the animal that gives the milk or lays the eggs.<sup>20</sup> Thus, without question, eggs laid by a non-kosher bird are not kosher. And since hatchlings emerge from the eggs, it might readily be assumed that the baby bird is also endowed with the same species identity and halakhic status as the egg from which it emerged. That is indeed the view of *Tosafot*, *Hullin* 62b, and of Rambam, *Hilkhot Ma'akhalot Assurot* 3:11, as understood by *Maggid Mishneh*, *ad locum*.<sup>21</sup> Thus, in line with the earlier discussed consideration of the fact that the gene contributed by the non-kosher animal is recognizable in physical anomalies it produces, it should be concluded that such a genetically engineered chicken should be regarded as non-kosher since the bird, at least in part, is the *yozei*, i.e., the derivative, of a non-kosher entity that has not been nullified.

However, Rashi and *Tosafot*, *Niddah* 50b, adopt an opposing view.<sup>22</sup> Noting that a hatchling does not gestate within its mother but emerges from an egg, *Tosafot* point to the fact that the Gemara, *Temurah* 31a, declares that, in the course of gestation, the egg putrefies and becomes “dust” unfit for consumption by man or beast. In the process the egg loses its status as either a kosher or non-kosher food. Since the egg is destroyed or rendered into “dust” in the course of gestation, the emerging bird, declare *Tosafot*, is not the *yozei* of any entity or, to put the matter somewhat differently, the bird is halakhically deemed to be *sui generis*.<sup>23</sup> As such, each bird that emerges from an egg is tantamount to the primordial bird that served as the progenitor of a species whose halakhic status is determined entirely on the basis of the physical criteria that distinguish one species from another.<sup>24</sup> According to that opinion<sup>25</sup>—and that opinion alone<sup>26</sup>—genetically engineered poultry would always be kosher provided that they exhibit the physical criteria of an identifiable species of kosher fowl.<sup>27</sup> Citing this statement of *Tosafot*, but without citing the conflicting statement of *Tosafot*, *Hullin* 62b, or of other authorities who concur in the latter view, Rabbi Sternbuch dismisses the halakhic problem out of hand and rules that transgenic poultry are kosher provided that they do not manifest the criteria of non-kosher birds.

Rabbi Sternbuch asserts that, even if some individual transgenic chickens are in the category of animals that are “*doves*,” the species is nevertheless kosher. Presumably, that is also the case if some individual chickens separate their digits when placed upon a pole, rope or wire which is an indication that the bird is “*doves*.” He asserts that those criteria serve only to establish the status of a heretofore unidentified species but are irrelevant in determining the status of individual mem-

bers of a species whose status has already been established. In response, Rabbi Cohen points to the statement of *Shakh*, *Yoreh De'ah* 82:6, declaring that, if a single bird is found to manifest criteria of a non-kosher species, any previously existing tradition establishing the *kashrut* of the species is thereby abrogated.

However, it seems to this writer that *Shakh's* ruling is not applicable to the case at hand. Evidence that a member of a species is *dores*, for example, is presumptive evidence that the entire species is not kosher. That characteristic, however, is not the factor that renders the bird non-kosher; it is only evidence establishing that the species is one of the twenty-four biblically enumerated non-kosher species. When the presence of that characteristic can be cogently explained in some other manner, e.g., by virtue of genetic manipulation that lacks halakhic significance, it ceases to be evidence that the species to which the bird belongs is non-kosher.

Rabbi Sternbuch does, however, express reservations with regard to use of such poultry for an entirely different reason. Rabbi Sternbuch cites Rema, *Yoreh De'ah* 60:1, who forbids consumption of the meat of an animal that has been fattened primarily by being fed forbidden foods and tentatively suggests that if an animal has been subjected to growth stimulating genes of non-kosher origin it may have the status of an animal fattened by forbidden foods. However, Rabbi Sternbuch candidly concedes that the latter case can be distinguished from the subject of Rema's ruling.

The comparison of genetically modified animals to animals fattened on forbidden foods is tenuous to say the least. The Gemara, *Menahot* 69a, discusses the status of objects such as wheat, barley or utensils consumed by animals and subsequently excreted. One example is the suitability of kernels of wheat that have been eaten by an animal for subsequent use in a meal-offering. The Gemara concludes that if the swallowed wheat remains whole it retains its status as wheat. However, once the kernel of wheat begins to be digested it loses its status as wheat and becomes an integral part of the animal that has consumed it.

*Tosafot*, *Temurah* 31a, understand the Gemara's conclusion as pertaining only to the issue of ritual impurity. Living animals are not susceptible to impurity. Accordingly, once an animal has begun to digest an object and it becomes part of the animal itself, it can no longer be subject to impurity. Nevertheless, at least at that point, the object has not lost its own identity and hence, if it is a non-kosher foodstuff, it may not be eaten. However, *Tosafot*, *Menahot* 69a,<sup>28</sup> Rash and Rosh,

*Oholot* 11:7, as well as an earlier authority cited by Rosh, *Bekhorot* 1:8, maintain that in the course of the process of digestion any food product loses its previous identity with regard to all matters of Halakhah.

Rema, *Yoreh De'ah* 60:1, follows the view of *Tosafot*, *Temurah* 31a, in ruling that the meat of an animal raised exclusively on forbidden food may not be eaten because it is a *yozei* of a forbidden entity. If the animal has been fed both kosher and non-kosher food it does not acquire non-kosher status by virtue of the earlier discussed principle of *zeh va-zeh gorev*. As discussed earlier, an animal whose progenitor had received genes from a non-kosher animal is, at worst, the product of *zeh va-zeh gorev* and hence is permitted for food, at least when there is no manifestation of the physical characteristics of the non-kosher donor of the transformed gene.

Moreover, *Shakh*, *Yoreh De'ah* 60:5, as well as numerous other authorities disagree with Rema's ruling and permit consumption of the meat of an animal that has been fed forbidden food exclusively. *Shakh* maintains that the early-day authorities who serve as the sources for Rema's ruling maintained only that forbidden foods do not lose their identity or status simply because the digestive process has commenced and therefore remain prohibited. However, argues *Shakh*, once digestion is complete and those forbidden foods are assimilated by the host animal's body, the meat of an animal raised in such a manner is permissible because the forbidden food is completely destroyed in the process of digestion before its nutrients are absorbed by the animal's body. Hence, an animal raised in such manner is not to be regarded as the *yozei* or derivative of a forbidden food. Therefore, according to *Shakh*, since even an animal fattened on exclusively forbidden foods is permissible, there can be no analogy to transgenic animals or poultry.<sup>29</sup>

Rabbi Sternbuch raises yet another concern. He reports that he has been informed that rodent genes may be implanted in poultry to stimulate growth but that such genetic manipulation would give rise to no other recognizable physical characteristics. Rabbi Sternbuch takes note of the statement of the Sages, *Yoma* 39a, declaring that forbidden foods are *metamtem*, or "stop up," the heart, i.e., forbidden foods dull the heart and cause the development of undesirable character traits and of the comment of Rema, *Yoreh De'ah* 81:7, who discourages use of the services of a gentile wet-nurse for the same reason as well as of a statement of Rambam<sup>30</sup> who asserts that partaking of forbidden foods causes intellectual deficiencies in those who consume them and may cause those

