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NOAH: A FLOOD OF GREAT GENES

The first description in the Torah of Noah is in *Breishit*, 5:9: “Noah was a just man [*tzadik*] and perfect [*tamim*] in his generations, and Noah walked with G-d....” There is a great deal of debate over the interpretation of this *pasuk*. This discription of Noah includes two words that seem similar: *tzadik* and *tamim*. Most commentators agree that the word *tzadik* refers to his spiritual characteristics, and some extend this meaning to the word *tamim*. Others apply the principle that the Torah does not have extraneous words, and, therefore, contend that *tamim* refers to a different aspect of Noah, specifically, his physical characteristics. The *Torah Temima* (*Bereishit*, 6:9) states that *tamim* alludes to the fact that Noah was born circumcised.¹ Rabbi Kasher, in his *Sefer Torah Sh’lema*,² brings a *midrash* which says that *tamim* comes to tell us that Noah had a complete body, and that the word *tzadik* is added so that we should not come to think *tamim* meant his actions. Both of these translations, therefore, introduce the possibility that the word *tamim* refers to physically desirable traits that Noah possessed.

This manuscript proposes that Noah, the second “Adam”, the man from whom the earth was repopulated, was lacking any lethal mutations, and that the physical characteristics included in the term *tamim* can be extended to his genetic makeup. This idea can be best illustrated by considering the opposite situation, in which Noah had deleterious genes. Genetic disorders are primarily recessive, allowing the deleterious mutant genes to persist in the population among carriers. Such genes would have caused a founder effect on an unprecedented scale. The founder effect refers to a situation in which a genetic disorder is disproportionately represented in an isolated population, due to an initial presence of the disorder in a specific individual who founded that population. Although the population may subsequently grow in size, and later consist of a large number of individuals, the gene pool of the population is derived from the genes present in the original founders.

A number of studies have investigated specific undesirable mutations that were initiated with a 'founder' and subsequently passed on to his descendants. Epidemiologists look for a high rate of a specific disease among an isolated population and then work backward to determine its origin. For example, researchers discovered that almost all of the Yemenite Jews in Israel have a phenylketonuria (PKU) mutation that is different from the mutation that produces the PKU syndrome in most of the world's populations.³ Research into the genetic origins of this mutation used genetic testing, and consulted memories, family, and religious records to trace the mutation to two families with PKU in San'a, Yemen. Extrapolation of the data indicated that the mutation originated prior to 1800 in one specific person. Because the Yemenite Jews were an isolated population with very little genetic influx, the mutation spread to a large portion of the population.

Even more strikingly, Migdal⁴ recently looked for the genetic source of Familial Mediterranean Fever (FMF), and found a common mutation in Jews, Armenians, Turks, Druze, Arabs, and other small ethnic groups living to the north of the Dead Sea. This mutation was found in Jews from many diverse geographic locations, from Ashkenazim to Iraqi Jews, to Jews from South Africa. Because these Jewish populations have been separated for so long, the authors suggested that the mutation may go back at least 2600 years. The fact that this mutation is found in other ethnic groups located in the Middle East indicated to Migdal⁴ that this mutation may extend even further back, perhaps to the sons of Shem: Elam, Ashur, Arpakhshad, Lud, and Aram (*Bereishit*, 10:22). Both the Arabs and the Jews come from Arpakhshad (*Bereishit*, 11:10-21), and according to the *perush* cited in Migdal,⁴ Lud and Aram settled to the north and northeast of the land of Canaan (Israel), which correlates with the location of the Turks and Armenians.

The entire future world population would necessarily inherit the genetic traits of Noah. Any initial genetic disorders that Noah possessed would have presented the founder effect. Such deleterious mutations, even if they had been recessive or multi factorial, would have had the ability to seriously impair the functioning of the new world Hashem established. The possibility therefore exists that Noah lacked any serious genetic disorders and that this is indicated in the term *tamim*. The *MeAm Lo'ez* states that only animals that had never interbred with another species were allowed onto the Ark.⁵ Thus, even the animals that Hashem used to start the new animal populations were genetically pure specimens. The *N'tziv* suggests

further that in the generation before the flood, within each species there were several different subspecies that had resulted from interbreeding, and these genetically altered animals were not allowed on the ark.⁶ Hashem's care with the gene pool of the animal population supports the hypothesis that He was careful in His choice of the genes that would establish a new population of mankind.

One of the principles used to derive hidden meanings from the Torah is the concept that there are no extraneous words. As previously mentioned, the commentators apply this principle to the *pasuk* describing Noah and bring a number of possible explanations. The Aramaic translators, Onkelos and Yonatan ben Uziel translate the word *tamim* as *shlim*. Jastrow defines the word *shlim* as "complete, perfect, unimpaired,"⁷ and mentions other sources in *Tanach* where the word is used either in the text, or in Onkelos and Yonatan ben Uziel. For example, the word *shalem* is applied to Ya'akov (*Bereishit*, 33:18), after he returns from Lavan's house and meets with Esav. Rashi explains that the word "*shalem*" here means, "complete in his body, money, and Torah." This presents another indication from the Torah that the word *shalem* can be used to refer to a physical completeness.

A majority of the occurrences of the root words for *shalem* or *tamim* in *Tanach* occur in reference to the requirements for the sacrifices. Some examples are in *Vayikra*, 22:19, *Shmot*, 29:1, *Vayikra*, 4:28, and *Devarim*, 27:7. In each of these places, the word *tamim* or *shalem* is used in the physical description of the sacrifices. *Halacha* derives from these words that the *korban* (sacrifice) was not allowed to have any physical defects or blemishes. The concept that something must be biologically perfect in order to serve Hashem can be found in other places in Jewish law. For example, there are laws that require a kosher animal to be lacking certain physical defects. Furthermore, in order to perform the *Avodah* (service in the Temple), *Kohanim* had to be lacking in any major biological defect, such as lack of sight, hearing, or a major limb.

The *MeAm Lo'ez*⁵ states that "One of the causes of the wickedness of the generations before the flood was their abundant leisure." Prior to the flood, the earth gave forth such bounty that "a single crop would yield enough food for forty years. They did not have to make a special effort to harvest the crops; they could obtain what they needed merely by strolling through the fields." As a result, Hashem made post-flood conditions harsher, so that man would have less time to pursue amoral interests.

However, these conditions required the development of more advanced agriculture technology. There is another *midrash* which states that before Noah, all people were born with webbed (syndactyl) fingers, which were used as shovels. According to this *midrash*, Noah invented the plow because he was born with non-webbed fingers, and was therefore forced to devise a substitute in a society that used their syndactyl digits as shovels. However, in the post flood conditions, this “prosthetic” became a necessity due to decreased crop yields. The additional dexterity that Noah enjoyed due to his separated digits was an important contributing factor to the development of a tool making society.

A comparison between this trait of Noah and the *Torah Temimah*'s statement that Noah was born circumcised is of some interest. If, as the *Torah Temimah* suggests, Noah emerged from the womb circumcised, this must have been an acquired trait. If the circumcision were due to a genetic trait, then the majority of today's population would be born circumcised. In contrast, the lack of webbed fingers was passed to the future generations, thus indicating that it was a genetic, not acquired trait. A hint to the pre-Noah condition of syndactyl (connected) digits is indicated by the development of the human fetus. A human fetus initially develops with webbed fingers. However, lysosomal action eventually digests the connecting webs. It is this genetically determined lysosomal action which may have developed initially in Noah, and was subsequently passed on to his progeny.

If the hypothesis that Noah was genetically perfect is correct, then the deleterious genes that are currently in the human gene pool must be explained. To some limited extent, part of the answer may lie in the genetic contribution of Noah's wife and three daughters-in-law. It is plausible that the wives had recessive mutations, which they subsequently passed on to future generations. Furthermore, many of these genetic flaws may have risen from post-flood mutations. Even if one claims that significant mutations cannot occur in such a small amount of time, this answer remains a possibility. Several of the genetic diseases in today's population can be traced to a mutation of a single allele, and often to an alteration in one or two nucleotides in a single gene.

The new world was destined to be repopulated with a small founding population—Noah and his family. This small gene pool had the potential to cause deleterious results, especially if harmful genes were present. Hashem

possibly prevented a harmful founder effect by establishing the new world with individuals whose genes would avoid these detrimental health problems. Ramban and other commentators maintain that Hashem prefers to mask his actions within nature. Adam was created at the time when nature was being formed—every act was a miracle and there was no need to mask Hashem’s actions. However, by the time of Noah, the natural laws that were established could be used to directly interpret “natural” events. The ability of mankind to find a “scientifically plausible” way to explain the occurrences of the past and present is essential to the concept of *bechira chofshit* (free choice). Perhaps the traits of Noah postulated in this paper presented a method for Hashem to ensure the survival of the human race without open miracles.

NOTES

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3. Avigad S, Cohn BE, Bauer S, Schwartz G, Frydman M, Woo SLC, Niny Y, Shiloh Y. “A single origin of Phenylketonuria in Yemenite Jews.” *Nature* **344**: 168-170 (1990).
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