



Mendel Actually Wants to Say: Genes Are Only One Element of the Hereditary Material

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Abstract

The individual comes from a fertilized egg, indicating that the individual's producer, namely the hereditary material, must be in the egg. "Modern genetics" includes the belief that genes are the hereditary material. Thus, the claim that "synthetic life" was created using a man-made genome has been made. However, molecular biology has proven that genes are only templates for individuals. The template has the controlling product's specifications, which guide the operator to produce an individual that conforms to its given specifications. The template cannot produce the individual. It means that genes are not a producer. This compels us to review Mendel's experiments and the original meaning of genes. This article reveals that the genes assumed by Mendel originally referred to the template rather than the producer, and that the truth regarding DNA revealed by molecular biology is identical to Mendel's assumptions of genes. That is, both Mendel's original literature and factual evidence show that genes are one, not all, of the elements of the hereditary material. "Modern genetics" is the product of misinterpreting Mendel, and four reasons for this historical misinterpretation are presented.

Subject Areas

Biochemistry, Genetics, Molecular Biology

Keywords

Hereditary, Gene, Genetics

1. Introduction

In 2010, J.C. Venter *et al.* reported that they had created a man-made genome and had used it to make "synthetic life" [1]. This suggested that the genome (genes) is the producer of an individual (cell), which is consistent with the mod-

ern genetics consensus: “germplasm: the hereditary material of the germ cells: genes” [2]. Such thoughts have been presented for 100 years. For example, T.H. Morgan said, “So long as a complete set of units is present, the power to produce a new whole is potentially given” [3]. Professor Shouyuan Zhao, a famous geneticist in China and the chairman of the 18th International Congress of Genetics, also said, “If the smallest genomic DNA is artificially synthesized, life can be constructed by adding other components needed for life activities, such as water, metal ions and organic molecules” [4]. This is only conveying the consensus of the “modern genetics” world, not his personal creation.

However, Dr. Gerald Joyce, an internationally renowned life scientist at the Scripps Institute in California, reported in the *New York Times* in response to people’s alarm in thinking that the synthetic cell was a new life form or an artificial cell, said: “Of course that’s not right—its ancestor is a biological life form”. The *New York Times* continued, writing: “Dr. Venter copied the DNA from one species of bacteria and inserted it into another. The second bacteria made all the proteins and organelles in the so-called ‘synthetic cell,’ ...” [5]. This reveals that the genome (genes) is not the producer of the individual (cell included). The Chinese scholar Fang also pointed out that copying a blueprint of a machine does not equate to producing a machine [6].

The antagonism between the two views above exposes the crisis in modern genetics. The two views are diametrically opposed, and only one is right.

We have to go back to Mendel to determine which is true, because the creator of the definition of gene (what gene originally referred to) was Mendel.

2. Genes Postulated by Mendel Are Templates, Not Producers

To answer the questions raised by his experiments, Mendel proposed the following assumption about genes: “If the tall variety contains in its germ cells something that makes the plants tall, and if the short variety carries something in its germ cells that makes the plants short, the hybrid contains both; and since the hybrid is tall it is evident that when both are brought together the tall dominates the short, or, conversely, short is recessive to tall” [7]. The “something” above is what was later called a “gene”.

From Mendel’s assumption we cannot see that Mendel thought that the gene is the producer of tall or short or the producer of plants. What we can find is a surprising coincidence between Mendel’s assumption and the facts revealed by molecular biology today. The “something” assumed by Mendel can make the individual (plant) produced by the zygote conform to its specifications (such as tall or short). Namely, “the tall variety contains in its germ cells something that makes the plants tall, and the short variety carries something in its germ cells that makes the plants short”. Just as Mendel envisioned, the facts revealed by molecular biology prove that DNA (genes) is indeed a template that can guide the producing-operator (the egg’s transcriptional system [8]) to produce an individual (including its traits) that conforms to its given specifications.

Templates, drawings, molds, and design schemes are all elements that control product specifications during the production process, but they never produce any products. After all, a template cannot produce an individual, nor a drawing produce an aircraft.

Because DNA (gene) is not a producer, Venter is wrong and so is “modern genetics”.

3. Avery *et al.* (1944) Proved Experimentally That Genes Are Templates Rather than Producers

In 1944, Avery *et al.* confirmed that genes are made of DNA and stated: “DNA is capable of stimulating unencapsulated R variants of *Pneumococcus* Type II to produce a capsular polysaccharide” [9]. This suggested that DNA (gene) is not the producer of the capsular polysaccharide (trait), only a stimulator guiding *Pneumococcus* Type II to produce the capsular polysaccharide.

The experimental conclusions from Avery *et al.* are no less than a practical explanation of Mendel’s definition of genes. Thus, Mendel’s definition of the gene can now be described in more detail as follows: The tall variety contains a (tall) gene that stimulates the zygote to produce a plant that is tall, and the short variety carries a (short) gene that stimulates the zygote to produce a plant that is short. Mendel’s definition of the gene not only assumes the existence of the gene (template) but also implies that there is a producer operating element in the zygote that receives the template’s guidance to produce the plant (the individual). Thus, the producer of a tall (or short) pea plant (individual) contains both elements: template and producing operator.

4. Conclusions

1) Mendel’s definition of the gene and Avery *et al.*’s (1944) experimental conclusions are consistent with the nature of DNA as revealed by molecular biology. What they tell us is that genes are the template rather than the individual’s producer (the hereditary material).

2) Venter (claiming that he created “synthetic life”) is wrong and “modern genetics” is also wrong.

3) The producer of the individual, or the hereditary material of the germ cells, contains two elements: first, the template (genes) that controls the individual’s specifications; and second, the producing operator that receives the template’s guidance to produce the individual.

4) The foundation of genetics is the hereditary material capable of producing the individual. Thus, “modern genetics”, based solely on the template, only one of the components of the individual’s producer, is fundamentally flawed.

5. The Causes of “Modern Genetics” Being Born and Maintained for 100 Years

5.1. Misinterpreting Mendel’s Gene Assumption

The birth and continuation of “modern genetics” originated from the misinter-

pretation of Mendel's gene assumption by geneticists. The key mistake was to equate "make" with "produce". If a few similar sentences are read, then the mistake becomes evident. For example, "The aircraft factory contains drawings that make the aircraft large, and also contains drawings that make the aircraft small"; "The casting factory contains a mold that makes the head of the product arrow-shaped, but also contains a mold that makes the head spherical"; and "The decoration company contains a design scheme that makes my house European or Island style". The "drawing", "mold" and "design scheme" in these sentences are similar to the "something" (the gene) in Mendel's gene definition. They are not the producer of any product. They are the elements controlling the product's specifications. They guide the operator to produce a product that conforms to their specifications. The "makes" in these sentences does not have the meaning of "produces" but of "prompts", "guides", "leads" or "induces".

Mendel's thesis is historical literature, and his gene assumption has become historically irrefutable evidence. Any expert of German (the original), English (translation), Chinese (translation) or any other language may, at any time, read and translate this assumption again. However, it is impossible to think that the "something" (*i.e.* gene) in it is the producer of the plant or the producer of tall (or short).

5.2. Not Realizing That There Are Two Basic Questions in Genetics and So Confusing the Two [10]

There are two basic questions in genetics. The "first question" inquires about the germplasm that is capable of producing an individual. It asks "What material produces the individual?" Preformation, Darwin's pangenesis and Weisman's Germ-plasm theory are all attempts to answer the "first question", which is the most basic question of genetics. Its answer, of course, is the hereditary material.

Is Mendel's experiment an experiment to inquire about the "first question"? No. The questions raised by Mendel's experiment were posed after "he crossed a tall variety of edible pea to a short variety", as follows:

Why "the offspring or hybrids, F1, were all tall?" and "then, the F1 were allowed to self-fertilize". This time, **why** "their offspring, F2, were tall and short in the ratio of three tall to one short?" [7].

These are forms of the "second question". In daily life, when referring to the "second question", people will ask: "Why are the children of tall Tom and his short wife all tall?"; or "Why is Tom's oldest son tall like Tom, while the younger son is short like Tom's wife?"; or "Why is Tom's son's (or daughter's) nose similar to Tom's nose but his ears are similar to those of Tom's wife?"; or "Why do the noses of the Habsburg family seem to be produced from only one mold?".

The "second question" usually appears in sexually reproducing species. Because there are two parents (father and mother), questions arise about the single producer (germplasm), such as the following: which (of dad or mum) specification pattern would appear in the offspring? What is the law of inheritance for the specification pattern? It asks the germplasm "what thing stimulates you to

produce an individual having dad's (or mum's) pattern or a compromise pattern?" What Mendel provided is the answer to the "second question": There is an element, the gene, that carries the information of the individual's specification pattern in the hereditary material of the germ cells. There are two genetic laws of genes, namely Mendel's laws.

It is clear that believing the gene, namely the answer to the question raised from Mendel's experiment, is the producer of the individual (*i.e.* the hereditary material) fully exposed that "modern geneticists" lack the concept of two basic questions in genetics. This is another important reason why "modern genetics" was born and lasted for 100 years.

5.3. The Belief That the Hereditary Material Contains Only One Element

From the miniature of Preformation theory to the gemmules of Darwin's Pangenesis and Germ-plasm of Weissman's theory, the hereditary material of germ cells has historically been regarded as unitary not as binary. Thus, after Mendel found a hereditary element (gene), it was easy, but reckless, not to believe that the gene was anything but the hereditary material of germ cells. This is similar to the primitive belief that, after witnessing a baby's birth from a woman's body, the woman is the sole source of the baby.

5.4. Not Adhering to the Concept That the Hereditary Material of the Germ Cells Is the Producer

The hereditary material of the germ cells (hereafter, "the hereditary material" represents "the hereditary material of the germ cells") is the producer of the individual. This should be well known. All individuals come from a fertilized egg. This reveals that the producer of the individual, which is the hereditary material, exists in the fertilized egg (does anyone believe that the producer is a non-hereditary material?). It is because the hereditary material is the producer of the individual that it determines everything (including shape, structure and function) about the product (individual). When your TV set, washing machine or car is not functioning; don't you look for the producer or his agent? This is because everything about the product should be the responsibility of the producer. The hereditary material should be responsible for individual traits because it is the producer of the individual not because it is passed from parents to their offspring. It is called the hereditary material because, first, it is really passed from parents to their offspring, and second, it is believed to be responsible for hereditary phenomena. In fact, the hereditary material should be called "the material producing an individual" because this better reflects its nature, and "hereditary" is only the passage of what it transmits, which has nothing to do with its nature.

Morgan and Shouyuan Zhao (representing all geneticists) also believe that the hereditary material is the producer of the individual (including traits), but people do not always regard the producer as the fundamental nature of the here-

ditary material. For people to regard the producer as the basis for identifying the hereditary material, they should not assume that the gene (“something”) in Mendel’s gene assumption is the hereditary material because Mendel does not state that the gene (“something”) is the producer of any product. Next, after Avery *et al.* (1944) stated that “DNA is capable of stimulating unencapsulated R variants of *Pneumococcus* Type II to produce a capsular polysaccharide” people should realize that DNA (gene) is not the hereditary material, because here the experimentally-based statement clearly expresses that DNA (gene) is not the producer of a capsular (one trait). However, people still accept the idea that the gene is the hereditary material, even if it is not the producer. Thus, a contradictory concept eventually formed: the gene is the hereditary material, but may not be the producer.

DNA was accepted to be a (self) replicating substance after the publication of the molecular model of DNA by Watson and Crick (1953). However, there is no factual basis for DNA to be a (self) replicating substance; it is believed only because Watson and Crick stated: “It has not escaped our notice that the base specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material” [11].

Today, it is known that making DNA requires the creation of 3',5'-phosphodiester bonds, but people do not think that DNA, which does not build this bond, cannot replicate itself. This is nonsense. Blueprints require people or machines to perform copy operations to make replicas; therefore blueprints (DNA) are not self-replicating materials. DNA is only a substance or material having a natural mechanism to be copied, but people insist that it is a self-replicating substance or material. Here, the passive is confused with the active.

Because modern geneticists ignore the importance of building 3', 5'-phosphodiester bonds, the concept that the gene is “the hereditary material, but may not be the producer” was reinforced.

Such a contradictory concept of genes is certainly one reason why “modern genetics” was born and lasted for 100 years.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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