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These spectacular discoveries in biochemistry ran far ahead of the genetic study of the pneumococcus transformation, which relied on the capsule as a sole genetic marker. Until this study was broadened about 1951 with experiments on drug resistance and other markers [8, 9], a variety of opinions were forwarded (mostly on a purely speculative level) on the biological interpretation of Griffith's finding. They included the following versions of the transforming substance:

1. It was a specific mutagen with a special ability to direct a particular gene to mutate in a definite direction.
2. It was a polysaccharide autocatalyst (perhaps as a complex with DNA) that primed an enzymatic reaction for polysaccharide synthesis.
3. It was a bacterial virus, which on infecting the bacteria provoked capsular synthesis as a host reaction.
4. It was an autonomous cytoplasmic gene or a morphogenetic inducer.
5. It might be acting at a distance without penetrating the bacterium.
6. It was a fragment of the genetic make-up of the bacterium, the only one to have been tested to that time.
7. It was an element *sui generis* for which no general conception should be adduced.

Lederberg 1956.