down the stairs at the age of fifteen and had weak ankles as a result. At sixteen, each had met at a local dance the man she was going to marry. The twins suffered miscarriages with their first children, then proceeded to have two boys followed by a girl. And both laughed more than anyone they knew. . . . Neither had ever voted, except once, when she was employed as a polling clerk.”

Scientists are working on the Human Genome Project recently finished mapping an estimated 100,000 genes in the human DNA. They have been able to identify genes responsible for a variety of diseases, including Huntington’s disease, Down syndrome, cystic fibrosis, Tay-Sachs disease, and a number of cancers. Genetic information about a particular disease constitutes a crucial milestone in the search for a cure. For example, phenylketonuria (PKU) is a disease caused by a recessive gene from each parent; PKU’s genetic basis is clearly understood. A child with PKU is unable to metabolize phenylalanine, an amino acid found in proteins. The phenylalanine build-up afflicts the central nervous system, causing severe brain damage. Because the genetic processes underlying PKU are known, scientists have been able to develop a screening test, and thus can quickly diagnose the afflicted children shortly after birth. When diagnosed early, PKU can be successfully controlled by diet.

While genetic research can determine the heritability of a some diseases, the genetic foundations of behavior are much more difficult to identify. From a genetic point of view, physical traits, such as the color of a person’s hair, have a much higher heritability than behavior. In fact, behavior genetics assumes that the genetic bases of an individual’s behavior simply cannot be determined. Consequently, researchers have focused their efforts on the behavior of groups, particularly families. However, even controlled studies of families have failed to establish conclusive links between genetics and behavior, or between genetics and particular psychological traits and aptitudes. In theory, these links probably exist; in practice, however, researchers have been unable to isolate traits that are unmodified by environmental factors. For example, musical aptitude seems to recur in certain families. While it is tempting to assume that this aptitude is an inherited genetic trait, it would be a mistake to ignore the environment. What is colloquially known as “talent” is probably a combination of genetic and other, highly variable, factors.

More reliable information about genetics and behavior can be gleaned from twin studies. When compared to fraternal (dizygotic) twins, identical (monozygotic) twins display remarkable behavioral similarities. (Unlike fraternal twins, who develop from two separate eggs, identical twins originate from a single divided fertilized egg.) However, even studies of identical twins reared in different families are inconclusive, because, as scientists have discovered, in many cases, the different environments often turn out to be quite comparable, thus invalidating the hypothesis that the twins’ behavioral similarities are entirely genetically determined. Conversely, studies of identical twins raised in the same environment have shown that identical twins can develop markedly different personalities. Thus, while certain types of behavior can be traced to certain genetic characteristics, there is no genetic blueprint for an individual’s personality.

Twin studies have also attempted to elucidate the genetic basis of intelligence, which, according to many psychologists, is not one trait, but a cluster of distinct traits. Generally, these studies indicate that identical twins reared in different families show a high correlation in IQ scores. No one questions the genetic basis of intelligence, but scientists still do not know how intelligence is inherited and what specific aspects of intelligence can be linked to genetic factors.
environments really are. Because adoption agencies screen applicants, families generally have certain shared socio-economic characteristics. In addition, little research has been conducted on “disconfirming evidence,” that is, to ask the question, “Are there twins who show no remarkable similarities?” The nature-nurture controversy is far from settled.

See also Jukes family; Kallikak family

Further Reading

Margaret Naumburg
1890-1983
American educator; founder of the Walden School and pioneer in art therapy.

Margaret Naumburg was not a psychologist, but her work as an educator and as a therapist influenced twentieth century ideas about creativity and mental illness. Her work with children and with the mentally ill was widely studied by psychologists and psychiatrists. She was able to achieve all this despite her lack of training as a scientist.

Naumburg was born in New York on May 14, 1890. She attended Barnard College (graduating in 1911) and continued with graduate studies at Columbia University. Later, she studied in Europe; while in Rome, she studied briefly with the educational innovator Maria Montessori. Part of Montessori’s educational philosophy was that children learn more effectively when they are allowed to explore ideas on their own rather than have information merely fed to them.

Naumburg, impressed by Montessori’s theories, returned to the United States and in 1915 opened the Walden School in New York City. The school began with two teachers and 10 students, and the educational focus was on letting children develop their own ideas and interests. In this way, believed Naumburg, children would not merely acquire knowledge but learn how to use that knowledge to their best advantage.

In 1916 Naumburg married the writer Waldo Frank. Through him she became acquainted with a literary and intellectual circle that included such artists Alfred Stieglitz, Van Wyck Brooks, Countee Cullen, and Jean Toomer. The couple, who had a son, divorced in 1924, but Naumburg continued her involvement in the artistic community. In the 1930s she began to develop art therapy programs for psychiatric patients. Naumburg believed that art gave emotionally ill people an opportunity to express themselves and reach into their unconscious; this in turn would give therapists a better idea of how to help them.

Naumburg continued her work with art therapy, writing several books on her theories. She remained active in the art therapy movement in New York until she moved to Massachusetts in 1975. She died at her home in Needham, Massachusetts, on February 26, 1983.

George A. Milite

Further Reading

Near-death experience

Intense, pleasant, and sometimes profound experiences that people report when they have “come back” from states close to death.

Tales of near-death experiences (NDEs) are not unusual. Out-of-body experiences, the sensation of moving through a tunnel toward a light, the review of the events of one’s life, and pleasurable glimpses of other worlds are relatively consistent features of people’s “near death” reports. In fact, research suggests that almost one fifth of Americans report having almost died, and a large proportion of them have recounted experiences like the ones mentioned above. The reported events are very vivid, seem completely real, and can sometimes transform people’s lives. How to explain these experiences is the subject of debate. Throughout history people have interpreted them as journeys toward the divine. The out-of-body experience was the soul or spirit leaving the body, the tunnel was the passageway, the life review was the time of judgement, and the light at the end of the tunnel was heaven (or the equivalent).

It appears that, rather than any spiritual journey or other world phenomenon, NDEs may be best understood by examining human physiology, neurochemistry, and psychology. At this time, there is strong research evidence to indicate that many of the symptoms of NDEs may be