

INSTINCT AND HEREDITY.

The auditorium of the Tabernacle was well filled Sunday by a quarter after eight o'clock, the time appointed for Dr. G. Stanley Hall's lecture on Heredity and Instinct. The lecturer was introduced by President Benjamin Cluff, as one of the leading educators of the United States, and president of the Clark university. He has just completed a course of lectures before the students of the B. Y. Academy summer school, on subjects drawn from the study of biology as related to education.

Dr. Hall began his lecture by an acknowledgment of gratitude for the many courtesies extended to him since coming to Utah. The insight he had gained to the character, social customs, religion, and philosophy of the Latter-day Saints, had been a revelation that had surprised and delighted him; while the boldness of thought which he had come in contact with during one week's summer school in Provo, had thrown wonderful light upon many of the perplexing questions of science.

Dr. Hall is a very engaging speaker. His voice is not loud, but remarkably well modulated; and his articulation is so distinct that he made himself heard with ease in every part of the Tabernacle. For one hour he held his audience with an attention that betokened unusual interest. The following is a resume of the ideas he set forth, but given in the language of the reporter:

Should a student of science be asked to name one thing more than another in which mechanism has contributed to the enlargement of our mental horizon, he would undoubtedly say, the invention and perfection of the microscope. This little instrument has made possible the development of half a dozen sciences, which without it, we should have known absolutely nothing about. It has enabled us to begin our investigations with the beginning of the phenomenon of life—at least the physical beginning—which is the individual cell. Growing to a certain size, it must choose between death and division into two or more parts each of which, complete to itself, must again divide, until the most complex and highly organized body is the result. The brain of man, for instance, is composed of 4,000 million of such cells, and the body of fourteen billions cells—which sufficiently illustrates the miracle of the unfolding of life.

For it is a miracle—the most stupendous miracle that can engage the mind of man—this tendency to push on and up, till what was a mere nucleus of life becomes a man.

A curious fact is that this life from the time of its conception and during the period of gestation recapitulates the biological history of life on this planet but with intense rapidity—what corresponds to the evolution of a thousand years, being passed in a day, an hour, perhaps even a single second. Could the trained scientist watch the process, he would be able to tell at each stage what form of life was being unfolded, till at last he would exclaim mammal—biped—man—Caucasian—man!

It is in the transmission of the single

cell of conception that we have a physical basis for heredity. The old belief was that all traits of the father and mother were transmitted to the offspring; but modern investigation does not fully justify the conclusion. Heredity has its limitations. For instance Chinese children continue to be born with normal feet, in spite of the national custom during thousands of years of cramping and deforming them. Lambs are born with long tails from generations of ancestors whose tails have been cropped.

There is, however, a modicum of truth in the old claim. The traits transmitted are now known to be those which have passed out of consciousness into the realm of pure habit or instinct. In psychological terms, we transmit what has been committed to the spinal cord or automatic centres of activity. To illustrate:

A man whose spinal cord had been absolutely severed from the brain was observed to stroke his mustache, an action not possible under such circumstances, unless we consider it purely automatic or instinctive. If automatic it must have passed out of consciousness since he came to have a beard; if instinctive it was the awakening of some ancestral trait. At any rate the illustration suffices: he would be able to transmit this characteristic to his offspring.

This ability to transmit the likeness of parent began with the lowest forms of life, the infusoria, of which the coral builders are examples. They illustrate what might be called a kind of immortality; each cell divides and subdivides by fission, increasing in geometrical ratio, and the life principle growing wider and higher and leaving the dead forms behind. The living forms at the edge of any coral growth may thus be said to be as old as the life history of the planet.

This principle of transmission does not differ essentially even in the higher forms of life, the only distinction being that instead of the whole organism being reproductive, this characteristic is confined to a single part, all other parts having lost the power. A remnant of this power is seen in the ability of the body to heal a scratch or a wound; but this power does not extend to the growing of a limb, nor to the reproduction, by mere division as in lower forms, of a complete duplicate of itself.

Death scientifically defined is, therefore, restricted reproduction. Those parts which have lost the power to reproduce might be called excrements or by-products of the life principle. They live on by reason of association with the vital or reproductive part, but death is there and the day comes when the life principle transfers itself to other abodes, and the old habitations become lifeless shells—corpses—just as truly as the outgrown houses of the coral polyp.

Life is therefore seen to have a physical immortality, to be a continuous chain of being, whether looked at from the standpoint of the lower animals or of human beings; and the continuity is not of vibration alone, as was once supposed, but of actual matter. From careful scientific comparison we are led to the discovery of the law that this life principle

lingers in any individual organism only long enough to insure its own perpetuity, the time varying from a second or two in some microscopic organisms, to two hundred years in the elephant. The length of life is thus found to be inversely according to the number and frequency of the offspring. Length of life bears also a definite relation to the length of the period of gestation and infancy, though it is not the same in every species.

What, then, are the moral conclusions we must draw from these facts? They are directly opposed to selfishness. Every man is the connecting link between the past and the future. He has two parents, four grandparents, eight great-grandparents, sixteen great great-grandparents, and thus going back 1,000 years it may be shown that he has twenty millions of ancestors, whose lives, by heredity are merged into his own.

He is partly—let us not say wholly—what they have been. In the future a similar relationship remains to be worked out. He will transmit his characteristic to two (or more) children (let us say), four grandchildren, eight great-grandchildren, etc., so that in a thousand years his posterity at a conservative estimate will be twenty millions. Will they be better for his having been their father? It is a momentous question.

We are the bearers of the torch of life. What are we doing to keep it brightly burning? Are we consuming it ere its time by burning it at both ends? Is it flickering, and has it become uncertain in our hands? It is so the whole world must suffer for our sin and neglect. The moral of such reflections is that the individual is nothing, the race everything. We have no right to steal selfish indulgence that which is necessary to the glorious fruition of the race.

Love is therefore the great law of life, the supreme law of existence. And a time comes when love blossoms in the human race. It is a time when the selfishness of prehistoric times ceases to operate in the child, and the altruism of a higher life awakens in the youth; when the cravings of the individual give way to the impulses of the race.

This is the period of adolescence, the most glorious epoch in the life of man; the period when there is a breaking up of the merely animal, and the infusion, the insatiation of the divine. This is the time when the betterment of the race heritage is made, a period so rich in opportunity as to astonish the imagination; a throwing open of the avenues to the soul for race changes. These avenues will close again, close upon whatever has been added to the individual life, be it good or bad—and it will be transmitted to the next generation.

What an opportunity is here given to him who will fulfill the duties he owes to mankind! How paltry in comparison are the illigitimate pleasures which gratify the individual at the expense of the race!

Adolescence covers a period of ten years in our own country. It begins with puberty, and continues to maturity. The longer it is, the greater