

Most of these variations are mere fluctuations around a mean and are not necessarily repeated in the next generation. Some of them, which may be more marked, are undoubtedly due to varying environmental influences and also are not repeated in later generations unless these generations are reared under the same kind of environment.

But sometimes some of these variations reappear in the next and all the succeeding generations, even though the environment surrounding the development of these succeeding generations is not the same as that which surrounded the first generation in which the variations appeared. Such variations are inherited. They breed true.

Such heritable or fixed variations are called mutations, meaning that from one kind of plant or animal a new kind has been produced by a persisting change or sudden little jump. This is the production of a new kind of animal or plant. This is species-forming by mutation. It is the easiest kind of origin of species to observe. It has been observed by many naturalists. These naturalists have seen evolution actually happening.

A kind of little fly, called fruit-fly, which has been very carefully studied for several years by various naturalists, chief of whom is the American zoologist, Thomas H. Morgan of Columbia University, has given rise, under their eyes, to many mutations. These are new kinds of fruit flies. Most of them are not kinds better fitted for existence than the original kind of fly from which they arose. But some are sufficiently fit to persist. They can hold their own in the struggle for existence. They are new additions to the kinds of fruit-flies. They are visible evidences of the present-day evolution of animal kinds.

Similarly, botanists have seen new kinds of plants arise by mutations. The most famous cases of this kind are the mutations of the evening primrose, first carefully observed and described by the great Dutch botanist De Vries of the University of Amsterdam, and later observed and studied by German, English and American botanists. These new kinds of evening primroses, arising by fixed "jumps" or mutations from a species called Lamarck's evening primrose, are visible evidences of the present-day evolution of plant kinds.

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EVIDENCES FOR EVOLUTION

No. 4

TOOLS OF OLD STONE AGE PROOF OF MAN'S CULTURAL EVOLUTION

Early Progress of Human Invention Extended Over Several Hundred
Thousand Years, says Anthropologist

By Dr. George Grant MacCurdy,
Curator, Anthropological Collections, Yale University,
Author of "Human Origins", etc.

The evolution of human culture is well exemplified by a study of the artifacts of the Old Stone Age in Europe. This Age covered a period of several hundred thousand years. It is commonly divided into two periods - the Eolithic and the Paleolithic; the latter is subdivided into Lower, Middle, and Upper Paleolithic. Cultural evolution has its parallel in organic evolution, and, like the latter, its pathway is strewn with extinct forms. Of the two, cultural evolution is subject to more rapid changes, its chief basis being human inventiveness. One invention leads to others by a system of budding and branching; so that a single invention may give rise to a whole cluster of related activities forming what

might be called a culture-complex unit. The oldest clusters of human activities, of which we have definite knowledge are the lithic and fire complexes; the lithic complex was superseded in part and supplemented by the use of such organic materials as bone, ivory, and reindeer horn, which characterized the game-animal complex.

In a comparative study of the industrial remains of these various periods there are certain broad distinctions to be drawn. Eolithic industry consisted largely of improvisations - of primary tools or implements such as the hammerstone and the flint chip with utilizable edge or point. Secondary tools were few and simple, consisting largely of artificial chips; during the Lower Paleolithic period, the number of secondary tools was increased by the addition of the cleaver, a pointed implement chipped on both faces. A primary tool is one ready to hand - furnished by nature; a secondary tool is one which requires the use of a tool in its manufacture; tertiary tools are those, which in their shaping require the use of primary and secondary tools and whose ultimate purpose is not the shaping of implements.

The Neandertalians of the Middle Paleolithic Period made no great advances over their predecessors. They possessed an improved technique, which is seen in the character of their nuclei and well formed scrapers and points with carefully retouched margins; but so far as can be ascertained, they did not go beyond the making of secondary tools - that is to say, their secondary tools served directly an ultimate purpose, were not used for the manufacture of tertiary tools. The technical processes from Pliocene times to the close of the Middle Paleolithic Period (well along toward the close of the Pleistocene) remained relatively simple.

It was reserved for the Upper Paleolithic Cro-Magnon races to inaugurate a new era. This was made possible through improvement in the preparation of nuclei, from which long slender blades could be struck. The next step was important additions to their stock of secondary tools (various forms of the graver, microliths, small knives and awls) which enabled them to make extended use of bone, ivory, and reindeer horn, leading to two capital results - the invention of a set of tertiary tools and the dawn of the fine arts.

Upper Paleolithic or Cro-Magnon culture was very early transformed through the addition of the secondary shaping tools produced from bladelike flint flakes, without which it would not have been possible to make an array of tertiary tools, such as the bone needle, the javelin point of bone, ivory, or reindeer horn, the javelin shaft, the dart or javelin thrower, and the harpoon of reindeer horn; nor would the Cro-Magnons have been able to embellish their dart throwers and satisfy a rapidly developing artistic sense by producing various objects of art and of personal adornment.

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DOGS DECLARED DISEASE CARRIERS

Homes where the heart is opened to the dog may have the doors opened to diseases of many kinds, was the warning issued by Dr. Minas Joannides, of Minneapolis, Minn., at the American Medical Association meeting recently. Stressing the importance of treating the dog as a dog and not as a human being, Dr. Joannides explained that dogs may carry tuberculosis, diphtheria, scarlet fever, measles, smallpox and rabies. They are particularly the only primary host of tapeworm, and often carry fleas, ticks and lice.

"Don't allow your dog to sleep in your bed or eat off your plate," he advised. If a man likes his dog well enough to make a member of the family out of him, Dr. Joannides advised that he keep the animal clear and train him to avoid contact with infected materials.