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NOVELETTES

- NIGHTFALL** **Isaac Asimov** 9
If the stars appeared but one night in a thousand years-
- ELSEWHERE** **Caleb Saunders** 96
The students were gone- somewhere. And the answer was found in Time!

SHORT STORIES

- ADAM AND NO EVE** **Alfred Bester** 35
If the last living thing on an Earth made sterile by a cosmic fire were a lone and dying man- how could life start anew?
- SHORT-CIRCUITED PROBABILITY** **Norman L. Knight** 61
We suggest the reader consider this question along with that of the Spanish Barber paradox: Did this happen or didn't it?
- MISSION** **M. Krulfeld** 74
He had one specific task of sabotage to accomplish in a specific way, with death sure if he failed
- TEST OF THE GODS** **Raymond F. Jones** 85
Three men were accepted by the Venusians as gods—if they acted as gods should. But- what was a Venusian's concept of righteousness?

ARTICLES

- THE SEA KING'S ARMORED DIVISION (First of Two Parts)**
L. Sprague de Camp 46
The Sea King, two thousand years ago, attacked with heavy tanks, and was caught in a well-designed tank-trap!
- WE'RE NOT ALL HUMAN** **John W. Campbell, Jr.** 121
Mutation of human beings is neither for the future nor particularly rare: there are thousands of human mutants today!

SERIAL

- METHUSELAH'S CHILDREN (Conclusion)**
Robert Heinlein 133
Concluding a novel of an interstellar hegira forced on the long-lived people of the Families by the jealousy of the short-lived.

READERS' DEPARTMENTS

- THE EDITOR'S PAGE** 5
- IN TIMES TO COME** 132
- THE ANALYTICAL LABORATORY** 45
- BRASS TACKS** 128

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WE'RE NOT ALL HUMAN!

By John W. Campbell, Jr.

An article of speculation based on the known facts of modern mutation of human beings. Mutation is taking place today—both good and bad. The bad we recognize; the good—

ONE difference between the average science-fictionist and the average reader in general is his mental concept of evolution. It seems to work this way; Mr. Average General Reader thinks of evolution as the process whereby nature perfected animals till she achieved man. The science-fictionist is somewhat more willing to call it, mentally, the process whereby nature perfects animals—including man.

That implies that man either will be, or is being, worked on, that superior types will be developed—and raises the delicate question of whether we are all human. If man *is being* worked over, then there will be the usual symptoms of nature's evolutionary laboratory processes—mutants, variations from the norm of the species.

Man's fragile little ego tends to make really thorough investigations of that subject somewhat touchy. The strong protest that "I'm just as good as the next guy" generally rises from a deep and unalterable conviction that the speaker is not anywhere near as "good as the next guy," and doesn't want anybody to find it out. He has, in consequence, no desire whatever to have scientifically exact evidence worked up to prove that he not only is not "as good" as his neighbor, but a lot below the type that will be average in the future.

There's another factor. Evolution and mutation require that the off-

spring do not inherit exactly the characteristics of their parents. The children, in other words, are not "chips off the old block"—they not only are not true, genetic children of their parents any more than the neighbor's children are, they aren't as much so! They belong to a slightly altered species, a not-quite-human species.

Medical and genetic authorities have been interested in that subject for a number of years, naturally. The general public—who object still, somewhat, to the ego-deflating concept of descent from an apelike forebear—is more than disinterested. It would prefer not to consider the matter too closely.

Present human nature is a highly unsatisfactory combination of mulish obstinacy and monkey tendency to hunt each other in packs. A change to the better is (a) very possible, and (b) highly desirable. A change for the worse is possible, but, all things considered, not too easy to conceive. You can't change human nature, unfortunately; that seems to be bred in the beast. But you can change the race; *that is happening right now.*

What evidence of change is there?

FIRST, some conception of the type of data to look for is essential to finding it. Specifically, what we want to find is evidence of human mutation—changes of heredity tending to-

ward different types of human beings.

Evolution has—and therefore it's fair to assume does—progressed by trial and error. Van Vogt, in "Slan," was right in saying nature tries new-changed forms over and over again, never just once. Suppose a laboratory technician were attempting a biological experiment. A single trial might well—and usually could be expected to—give fluky results. The technician would take several dozen guinea pigs, try his experiment on one group of a dozen or so, try a variation on another dozen, and a third variation on a third dozen. Another group would be left unchanged for comparison.

Suppose nature created a mutant form of human with a highly desirable increase in quickness of mind—a mind that could make decisions in a tenth of the time modern man needs. When two years old, nature's single, untested specimen might quite well get in the way of a truck, have a mass of ice fall off a roof on its superior head, or break its neck falling down the stairs. The test comes to the conclusion: Subject died early. Survival value of new type very low. Actually, nature must, to get a test, try several thousand examples of each change.

Nature's been working on the same method for some two and a half billion years. As might be expected, all animals now extant have been so designed as to make that type of multiple-trial experiment simple. The characteristics of the adult animal are determined by the structure of the germ tissue from which it develops, by the way the genes and chromosomes of the egg cell were arranged. The genes serve as the blueprints for the finished animal. When nature makes an alteration in those blueprints, the animal

is altered and, further and more important, all its descendants are altered in the same way.

But generally, the gene structure will have certain characteristic weaknesses, points where it can be changed most readily. In actual fact—and not symbolic or allegorical language—the multiple-experiment trial and error of evolution arises from that circumstance. The gene structure of the old species tends to alter, at certain points, and tends to alter most easily in a certain characteristic way. The result is a series of mutants all having the same alteration.

Usually, at any given moment in the history of a race, there are several hundred or thousand different types of mutations which may take place fairly readily. The result is—allegorically speaking—that nature appears as a sloppy technician, allowing her various simultaneous experiments on several different lines to cross-breed and mingle indiscriminately. That makes finding the results of her meddling somewhat more difficult, but also suggests pitfalls for the investigator to watch for.

Another point to consider in our search for evidence of mutation in man is that you don't hear from the satisfied customers. Since the whole process is a trial-and-error proceeding, the successes are going to go quietly about their business, usually quite unaware that they are experiments, and successful experiments. That suggests that if we find any respectable amount of evidence, it will nearly all show that the race is running down, that bad breeding stock is being produced to make worse an already none-too-good race. The errors will have something to yell about, since they *are* errors, and will generally be very unpleasant about it.

ONE THING works against that trial-and-error proceeding. There is only one direction of flight that will make the bullet hit the bull's-eye, but an almost infinite number that won't. For every way of doing a thing, there are, similarly, thousands of ways of *not* doing the thing—including evolving a better form of man.

Nature has a check on that, though. If the bullet is off the target altogether, it doesn't count at all; if it hits the outer edges instead of the bull's-eye it gets a very low score. In evolution, if the new type is a very complete error, a total miss, it doesn't count at all either. It never gets born. The worst errors prove to be nonviable, and are cast away before developing very far. Bad mistakes that aren't quite as severe as those tend to die very young, long before contaminating the race. If they aren't too far off, if they hit the edges of the target, so to speak, they may live themselves—but will not be able to obtain mates, which, from the race viewpoint, amounts to the same thing as immediate death.

These considerations suggest that our best evidence on human mutation will be in hospitals, sanitariums, and State institutions for the defective. We'll see only the errors, because the successes will never appear there. That's why they are successes.

We won't spot more than the tiniest fraction of successes by physical appearance. Six-fingered hands represent one type of successful but unimportant mutation that can be detected; it happens to involve a visible body structure. Most mutations, the really important ones, will involve a change in the metabolism of tissue cells, a different organization of neuro-muscular co-ordination, a new and better type of intercell ac-

tion in brain tissue, or some shift of that order.

Cancer, for instance, could be eliminated from the race by a slight change in the characteristics of cell metabolism, producing a variety of human being that was totally immune to cancer. That would be a highly successful mutation—and an absolutely undetectable one. It would never bring its bearers to hospitals, and no possible test could tell an examining technician that here was a man whose more finely organized tissues could not develop the cell madness known as cancer.

Most mutations are confined to one thing at a time. It is perfectly possible that the mutation producing cancer immunity happened also, by pure coincidence, to produce orange eyes. The probability is remote; short of some such fortuitous linkage of two fundamentally unrelated characteristics, mutations won't show physically. A man with an intelligence quotient of four hundred or so instead of the normal one hundred would need no larger brain—he'd simply need better organization of the tissue present-day man has, plus a slightly greater degree of convolution of the brain surface. Van Vogt's tendriless Slan represented a perfectly credible picture of a superman immensely different in every organization beneath the skin—yet undetectable from outside.

In that connection: a recent newspaper item reported the death of a man of about eighty who had never been sick a day of his life. He died of heart failure while pitching hay somewhere in the Midwest. Finally in the hands of a doctor—the satisfied customer never has reason to complain—it was discovered that he had gone through life with two complete and functioning hearts.

There was an instance of a major

physical alteration of type—one easy to detect by a reasonably close examination—that was found only by accident after a long life. He'd never had to go to a doctor; why should he? If the alteration had been an improved, clearer, more swiftly functioning mind, he'd never have gotten into the hands of a psychiatrist capable of detecting it; why should he? But if the alteration had produced a poorer type of mind, one tending to blockages, he'd have shown up, all right. He'd have been driven insane by inability to make decisions. The psychiatrist would have spotted that one.

WHAT HAVE the researchers in human mutation detected—and, more interesting, *how many mutants are born?* How fast is our race being altered?

There are over one hundred different pathological conditions—they can't be called diseases—which are well recognized as representing errors of the trial-and-error process of evolution. Bad mutants. Some are quite rare, some comparatively common.

To be classified as a mutation, and not merely an abnormality, a freak birth caused perhaps by mechanical or chemical injury to the developing embryo, the change of form must be inheritable, but not inherited. That is, for complete proof, at least a few cases of the fault must be found in which: 1. The patient shows the characteristic symptoms of the condition. 2. There is no record of this fault in the ancestry for several generations back—the more the better—and at least two or three generations must be proven. 3. The patient marries, has children, and the children show inheritance of the condition.

Some conditions strongly sus-

pected as mutants cannot be proven so because the sufferers never are capable of mating. The mutation is too powerfully unfavorable.

The conditions necessary for proof of mutation are stringently limiting; we will find only the sour notes. And yet—

One of the most famous of all bad mutations is hemophilia. *All the true hemophilia in the world today is directly traceable to mutants.* Consider the chances of a victim of this "bleeder's disease"—a man so subject to hemorrhage that the greatest efforts of modern medicine can barely keep him living—in the world of 1200 A. D. He wouldn't have lived a dozen years. Hemophilia has been very carefully and very thoroughly investigated. Its exact cause in the gene structure has been determined, and its effects to the germ tissue is very well worked out.

On the sufferer, the results are even better known. Even when the victim does not die of hemorrhage, he is crippled by arthritis. Slow leakage from tiny capillaries in the joints gradually paralyzes his knees, ankles, all his limbs. Frequently the sufferer is sterile. Usually, hemophilia, like many another error mutant, wipes itself out within three generations.

Perhaps nature is trying to develop a better form of blood—one that will prevent the deposition of calcium in the arteries with consequent hardening of the arteries and death by stroke or heart failure.

She might work on cancer, too, developing that tumor-proof tissue, where cell anarchy is impossible. Successes, of course, we wouldn't find, but the failures—What would they be like? Tremendously susceptible to cancer, to every and all forms of tumor conditions.

That's known, too. Most of the

cases known are the original mutants; they don't ordinarily live long enough to produce children in turn. Only because occasional cases are so mild—the mutation almost buried under more favorable, counteracting genes—that a fairly normal life is possible have scientists been able to determine that it is a true, heritable condition.

The mildest cases, those capable of a reasonably normal life, simply show the symptoms of epilepsy. The average case is feeble-minded, usually blind, deaf, or both, and dies of tumor of the brain, liver or heart before adolescence. The skin, heart, every organ is subject to tumors, and it is tumor of one vital organ or another that causes death. An average severe case dies before reaching two years, blind, deaf, almost mindless because of tumors of the brain.

When the trial and error produces errors, they can be terribly tragic errors. Most of the bad mutation results are less severe, but a large percentage of them lead to very real and very bitter tragedies to the individual. For they are clearly, by their very nature, beyond hope of cure; it is as hopeless to seek a cure for them as to seek a "cure" for the human characteristic of producing red blood instead of the blue copper-based blood of the lobster. Such "errors" are not truly distorted human beings; they are properly developed unhuman beings.

THE CATALOGUE of detectable and detected variations from the human type is long, and—because only the dissatisfied customer complains—tends to be unhappy. Some are mutations without much effect, but which are detectable, and hence listed. There is one mutation known which produced a piebald human, with skin varicolored in patches as

is common enough in other mammals, but happens to be unusual in man. The six-fingered hand is another unimportant but discoverable mutation. A fully developed mutation to six fingers, incidentally, is not to be considered a deformity in the slightest degree. The resultant hand is perfectly formed, perfectly functioning, with five capable and useful fingers, plus one thumb. Added to a tendency toward musical interest and ability, it would be a highly successful mutation; a six-fingered pianist or violinist would have real advantages.

The unfavorable mutations are important in only one way; they give us definite and unequivocal proof that mutation of man is proceeding—and at an astoundingly rapid pace. Statistics show that *thousands of these mutant humans are born every year.*

Mutation of man is *not* a rare, almost legendary thing—it's a common, but little discussed, thing. The lack of discussion devolves mainly from the fact that nearly all the direct evidence is on the black side. The tragedy is evident—and the only apparent evidence. The triumphs—are satisfied customers.

Unfavorable mutations are probably much more common than favorable ones. (There are more ways of not doing a thing than of doing it.) But the powerful offsetting factors at work are many and, as the history of two billion years of evolution shows, adequate. First, unfavorable mutants leading to nonviable types are never born—and that accounts for tens of thousands of mutants. Second, unfavorable mutations will, by the fact that they are unfavorable, reduce the chances of the mutant individual mating and reproducing the unfavorable property. Third, many unfavorable mutations

lead directly or indirectly to physical inability to reproduce.

Against that set of factors, all tending to a short period of existence for the unfavorable mutant property, consider the status of the favorable mutation. Being advantageous, by definition it will make the possessor better able to secure a mate, and maintain children under favorable conditions. Sterility will be minimized. And all embryos possessing the characteristics will be viable forms, making better the chances for the new and improved type.

New unfavorable mutants will, in any given generation, exceed in number the newly occurring favorable mutations. But the favorable mutations, because their characteristics are self-maintaining, will continue to accumulate indefinitely, save as still further mutations in turn change them. Thus in a given generation, the total of new and previous favorable mutations will exceed the total of new and previous unfavorable mutants.

The process of accumulation of favorable traits must have been going on steadily since the beginnings of the race; in the brief period since the fall of the Roman Empire mutations numbering in the thousands must have occurred; mutant humans carrying those newly "invented" characteristics numbering in tens of millions have appeared. The favorable, and hence persisting characteristics, spreading through the race, make it highly *improbable that any man of today is a true racial descendant of the people of Roman times*. The accumulation of minor mutations in that length of time and number of generations would probably mean at least some degree of change in most of the population.

THERE IS, of course, another type of accumulation of mutant strains—individual accumulation. Since there must be several hundred minor

but useful, favorable mutation strains floating about in the race, what effect would be produced by the accidental but inevitable confluence of all, or nearly all of them? Since some two billion human beings are born each generation, the statistical probability that an occasional individual will appear with nearly all the favorable mutations compounded is reasonably good.

He would, in a very genuine sense, be a superman. In many ways he would approximate A. E. van Vogt's "tendriless Slan"—a man of human appearance, and fundamentally human in most ways. But his brain would work perhaps two or three times as swiftly and accurately as a normal or true human's. He would probably have extremely high immunity to most diseases, complete freedom from cancer, a slightly altered metabolism that prevented hardening of the arteries.

But he would not realize that he was—not human. Brought up by and among human beings, with the complete conviction that he was also an ordinary human being, there would be no reason for him to doubt a self-evident fact. That he was somewhat brighter than his friends and associates would be evident, but then, there is variation between men, of course. Such a man would naturally gravitate to a quick-thinking, clear-headed group of friends, men he found interesting. That those not-quite-so-brilliant friends represented, in fact, lesser accumulations of favorable mutations, that they in turn were not entirely human, would not obtrude itself, probably would not be recognized.

The mutant-accumulation-man would, in all probability, fit himself

smoothly—he's enormously adaptable, of course; adaptability is one of the favorable characteristics man needs—into business as a top-rank executive. His outstanding value—his most useful mutant quality—is the ability to make quick, accurate decisions. That same quality, incidentally, protects him against nervous breakdown; most insanity devolves fundamentally from inability to make a final decision, and, abiding by that decision, cease worry.

But modern business and industry pay—for value received—extremely high wages for people who make accurate, rapid decisions. Judgment—and the decisions which are its product—is the most valuable commodity in the world. Our superman, having the advantages inherent in his slightly inhuman inheritance, will find his business work easy, enjoyable, and profitable. In winning a mate, his adaptability and brilliance will make it possible for him to select at his choice; his inheritance will make that choice worthy.

The chances are that no perfect synthesis of all the favorable mutations of mankind has taken place—but it is as certain as the laws of probability that many accumulations approaching the maximum have appeared. All men may be born with equal opportunities—in America, at least—but they definitely aren't all born equal. They aren't even all born true human beings.

There's a lot of inevitable logic in the set-up Van Vogt proposed in "Slan." The supermen were the most intelligent beings on Earth. Where would you expect to find them if not running things on the planet?

And that's sound logic, whether you call them Slan or something else.