

19th Anniversary Billings  
Dr. Leslie Norman

SCIENCE AS  
SOURCE OF HAPPINESS  
& SATISFACTION  
IN INTELLIGENCE

NEUTRINO CURSITY  
CF 254  
Normal  
1966

Mol. Str  
HUMAN  
BODY  
DNA

H.S.  
MODELS  
GORILLA  
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SCIENTIFIC FACTORS BEARING ON WORLD PROBLEMS

Linus Pauling

Abstract of Address before the California State Psychological Association Convention, December 14, 1962

During recent decades science has become a more and more important part of the world. It is probably justified to say that there is now no world problem to which science is not related in a significant way.

The rapid increase in the world population that is now occurring is the result largely of the progress in science that has led to greatly decreased infant and child mortality and increase in longevity. Further progress along these lines is certain to occur, if civilization is not destroyed by nuclear war. The molecular structure of the human body is now being investigated with great vigor. The nature of the molecules of DNA that carry the units of heredity, the genes, has now been discovered, and the way in which these molecules can manufacture duplicates of themselves is believed to be known. The molecular basis of some diseases, called molecular diseases, is now known. Patients with the serious disease sickle-cell anemia manufacture a kind of hemoglobin molecule that is slightly different from those hemoglobin molecules manufactured by other people. The difference amounts to only one part in 300 in the structure of the hemoglobin molecule; but even this small difference is enough to produce the serious manifestations of the disease. As further knowledge about the molecular basis of disease is obtained, it will be used to improve the methods of treatment of the diseases and to decrease their incidence. This progress in decreasing the amount of human suffering will accentuate

DECREASE MORTALITY. POP - PRO

WE LOOK TO SCIENCE TO SOLVE THE  
the population problem

Also, we must look to science for the solution of this problem, both by the development of reliable and cheap methods of prevention of conception and by the discovery of ways of achieving increased production of food.

It is in the field of war that science has had its greatest impact on world problems. During the Second World War the standard weapon was the one-ton blockbuster, in which the explosive was one ton of TNT or similar molecular explosive. About three million tons of high explosive was used in bombs exploded during the Second World War, in which about 40 million people were killed. In modern nomenclature, the war was a three-megaton war.

Seventeen years ago, as a result of scientific discoveries, atomic bombs were developed and exploded at Hiroshima and Nagasaki. These bombs, each of which involved only a few pounds of nuclear explosive, had the explosive energy of 20,000 tons of TNT. They killed about 100,000 people apiece.

The present-day superbombs have explosive energy about 1000 times greater than that of the Hiroshima and Nagasaki atomic bombs. A 20-megaton superbomb has explosive energy seven times that of all the explosives used in the whole of the Second World War. One of these bombs exploded over New York would destroy it nearly completely, and might kill 10 million people.

Scientists have estimated that 2000 megatons of bombs exploded over the United States would probably kill half of the American people, and 4000 megatons exploded over the Soviet Union would kill half of the Russian people. 10,000 megatons exploded over the United

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States and 20,000 exploded over the Soviet Union would kill or seriously injure all but a few million people, perhaps two million people, in each country.

U.S.  
200,000 MT  
USSR  
50,000 ?

LAPF  
25X  
OVERKILL

The stockpile of nuclear weapons possessed by the United States is now estimated to be 200,000 megatons. This is 50 times the amount estimated to be needed to kill half of the Russian people, and ten times the amount needed to kill practically all of them. The stockpile of the Soviet Union can only be guessed at; it may be 50,000 megatons.

Possessing a larger stockpile of bombs than is necessary to kill everybody in an enemy country is described as having an overkill capability.

WAR &  
THREAT  
WAR MUST  
BE ABANDONED

The existence of these nuclear weapons and of the means for delivering them requires that war be abandoned as the method of settling disputes between great nations. The threat of nuclear war as an instrument of national policy also must be abandoned, and replaced by a

NY Times

rational alternative. In its editorial of October 30, 1962, The New York Times referred to the imposition of the Cuban blockade as "a crisis that had brought the two great nuclear powers as close to annihilative war as they had ever been."

There is essentially unanimous agreement among scientists that unless disarmament is achieved and a system of international law is instituted to permit the solution of international problems in accordance with principles of justice, the world will ultimately be destroyed in a nuclear war. But the problem of achieving disarmament is essentially a scientific problem. It is necessary that there be satisfactory international controls and inspection, and, because of the nature of

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nuclear weapons and of the vehicles for delivering them, the problem of designing the system of controls and inspection is mainly a scientific problem. It involves, of course, not only physicists, chemists, seismologists, and other scientists in the physical field, but also psychologists and other social scientists.

An example of the way in which scientists make contributions to the solution of this is provided by the Pugwash Conferences, ten of which have taken place so far. A proposal about zonal disarmament made at one of the Pugwash Conferences was later incorporated into the American proposals. Another proposal, about the use of sealed seismic stations as a means of detecting underground nuclear tests, was unanimously approved at the Tenth Pugwash Conference. The London Times on September 10, 1962, said "There is probably no other subject on which people in all countries are so nearly unanimous as the need to put an end to nuclear testing. . . . The Tenth Pugwash Conference-- composed of scientists from 35 countries--has endorsed a proposal which they rightly describe as novel and which has all the simplicity of a new idea. If one nation, they say in effect, cannot trust another, let them both trust automata. . . . The world will wait with the more anxiety on their decision (the decision of the statesmen) because of the new warning that has been given. The words 'a plague on both your houses' were spoken only when the damage caused by obduracy had already been done. Statesmen of today will risk the same epitaph if they cannot agree."

PUGWASH

ZONAL  
DISARMAMENT  
(7th PUG)

The Soviet government, fearful of spying under the guise of inspection of a nuclear test ban, has approved the Pugwash suggestion of inspection by the sealed seismic stations. The American government

has not accepted this proposal, as yet, in part, as one spokesman said, not because they would necessarily be ineffective, but because we do not want to give up the general principle of on-site inspection of disarmament.

It is the seismologists and physical scientists whose discoveries and developments in instrumentation are fundamental to progress in the solution of this problem. But the psychologists may also play a most important part in achieving disarmament. In the article in the

Saturday Evening Post for December 1, 1962 describing the interview of Secretary of Defense Robert McNamara by Stewart Alsop, it is stated

that Premier Khrushchev had told the British Ambassador in Moscow that Americans were not "crazy" enough to "sacrifice 30 million people for 3 million people in Berlin." Mr. Alsop then states that "Khrushchev must be persuaded that we are 'crazy' enough to do just that."

I myself am working in the field of the chemical basis of mental disease, and I am deeply interested in the question of the nature of cerebral mechanisms. I feel, however, that I have to call upon you, members of the California State Psychological Association, to help me to understand why Mr. Alsop felt that he could make such a statement, one that seems to me to be completely irrational, in an article that may have been read by several million people. There is presumably an explanation, along psychological or perhaps psychiatric lines, of the sort of irrationality illustrated in Mr. Alsop's statement. The solution of the greatest of all world problems, that of preventing the destruction of a major part of the world in a nuclear war, would without doubt be aided by the thorough analysis of this sort of irrationality.

I THINK GOV'TS are SCHIZOPHRENIC.  
EXAMPLE: KENNEDY - 25 Sept. 1961  
EISENHOWER - 6 JAN 1960  
K. McNAMARA - 10 JAN 1960  
1961 "5 MIST OF THE world 100"

Another example is provided in the same article. Mr. Alsop asked the question "What do you think about the proposition that the price of any kind of nuclear war is so high that the nuclear weapon is not a rational instrument of national policy?"

In his answer Secretary McNamara said "No sane man wants nuclear, or any kind of war. But war has to be conceivable in support of vital national interests. Otherwise you have no real national power."

As scientists, we may ask why Mr. McNamara made the statement in the second of his sentences. His third sentence is not an explanation.

Mr. McNamara, apparently without even considering its possibility, rejects the alternatives to his thesis, in particular the alternative, that a system of international law based upon the principle of settling disputes in accordance with justice to the nations and the people concerned might be developed.

IDEAL.

In his answer Mr. McNamara also said "We have today sufficient nuclear power so that we could take a full surprise attack and respond in such a way that we would literally destroy the aggressor." We are forced to accept the conclusion that a great war might lead to the complete destruction of both the Soviet Union and the United States. Under these circumstances, how can we say that to retain the institution of war, to retain the concept of war, as Secretary McNamara says is necessary, would in any way support vital national interests?

The time has now come when the physical scientists and the social scientists, the physicists, chemists, and psychologists and psychiatrists, must join together in analyzing the scientific factors that bear on this most important of all world problems, the problem of preventing the suicide of civilization.

Linus Pauling

DEFAMATORY  
TO SAY THAT  
SOMEONE  
SUGGESTED A  
RATIONAL  
SOLUTION TO  
CUBA PROBLEM.