

*Necessity That Is Non-mathematical.* In these notes at various times the term "necessity" has been used as if its meaning were identical with mathematical conclusions. This is perhaps its best modern meaning. Yet not all men now or in the past can follow mathematical arguments, still less perceive their importance. This does not of course lead them to deny to themselves the feeling of necessity. And so necessity has and has had other grounds than mathematical ones.

One of the most important of these in its effect upon social, philosophical and religious thought is the blind necessity of fate. This was known among early men after the fall as the fate of the gods—man ruled by relentless, autocratic dictates. Even the gods themselves often were ruled by fate. Later the early Christian church became governed by ideas that were essentially fatalistic. Protestantism promulgated the doctrine of predestination. And now some modern scientists entertain the idea that the statistical laws *are* the laws of nature.

E.F.A.

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### WHAT ARE PEOPLE SAYING?

A University of California scientist is working on a plan "to make Venus fit for human habitation." It was mentioned with very little detail in a recent news item. Presumably the scientist recognizes the magnitudes involved, so that his idea cannot be categorized as a quantitative monstrosity, along with such less professional suggestions as "Why don't they use hydrogen bombs to break up hurricanes?" or "Won't all these rockets deflect the moon from its normal orbit and affect the tides?"

Nonetheless, a scientist who makes such statements leaves himself open to a charge of colossal conceit. What are the conditions required for human habitation? We know what degrees of temperature, humidity, pressure, and a few other things make us most comfortable, and to some extent what variations we can tolerate. But what is the ideal level of magnetic flux, gravitational acceleration, gamma radiation, or percentage of xenon in the atmosphere? Could we live without the Van Allen belts around our planet? Their existence was not even suspected

before 1958. There may be a hundred features of our environment that have never been measured, but which affect our comfort or our very existence. And even such things as are known may be specifically adapted to life 93,000,000 miles from the sun. At 67,000,000 miles all of them might require changes. It seems rather probable that a cloudy atmosphere is best in the latter situation. Further from the sun, fewer clouds seem to be in order, but on giant planets at distances of half a billion miles and more, extremely deep, thick atmospheres may be ideal. They could not only absorb more energy from the sun, but might help buoy up the inhabitants against very strong gravity. In short, it is easier to believe that the various planets have already been carefully planned for human habitation than to confide in one man (or two billion men with government funds) who wants to ameliorate conditions.

The same sort of suspicion arises every time someone claims perfection or completeness in any endeavor. An artificial diet can provide "every nutrient known to man." If trusted completely, it might lead to such interesting results as a deficiency of an undiscovered vitamin. A material in which to grow plants might be expertly synthesized and still not measure up to mud. Indeed, the more is discovered about trace elements and their functions in many places, the more apparent it should become that the undiscovered may be far more important than the known.

Increasing consideration is being given to the construction of a "closed ecological system" for travel through space. Those who scoff at the idea apparently do not realize that we *are* traveling through space in a closed ecological system. But those who are seriously planning a smaller one would be well advised to take along great quantities of mud, sea water, unfiltered air, and other such "dross." Perhaps they would discover *en route* why they needed these things; possibly they would never discover why they needed them; but very probably they would need them!

K. R.