

FORECASTING THE FUTURE?

A noted astronomer takes issue with some of the "dire prognostications" of Sir Charles Darwin

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READERS OF Sir Charles Darwin's challenging article, "Forecasting the Future" (*E & S—April 1956*), can scarcely avoid wondering whether any answer can be given to it. Indeed I suspect Sir Charles of deliberately trying to provoke us all into offering some answer to his dire prognostications. At all events this is the effect his cheerful pessimism had on me, so I resolved to set down what counter-arguments I could think of.

First, a brief repetition of the argument itself. It is convenient to group the ideas under several headings.

(1) Animal populations are governed by food supplies, the number of animals of a particular type that are alive at a given time being just the number that can be supported with the food supply available at that time. Let the food supply increase and the number of animals increases. Let the food supply decrease and the number of animals decreases, starvation being the controlling factor.

(2) During the last 6,000 years or so, and particularly during the last few centuries, human knowledge has developed in an astounding degree. With increasing knowledge have come improved techniques, and with improved techniques has come a sharp increase of food production. Always accompanying the increase of food production there has been an increase of human population. Indeed, the rise of human population has followed the availability of food so consistently and closely that one cannot avoid the unpleasant suspicion that the human animal is responding to biological conditions in a manner not a whit different from that of other animals.

(3) The argument that improvements of technique will always keep pace with the rising human population is arrant nonsense. The human population is rising so rapidly today that *if the rate is maintained*, the amount of standing room on the surface of the Earth will be reduced in about 1100 years to a ration of one square yard per person; in 5,000 years the mass of humanity will exceed the mass of the Earth itself; while in about 11,000 years humanity will exceed the mass of the whole universe visible with the 200-inch Hale telescope.

(4) The rate of increase of the human population must therefore decline. The word 'must' is unqualified. What will cause the decline—starvation or a voluntary decrease of the birth rate?

(5) Decline through starvation is a natural process, the natural law whereby animal populations are governed. A decline through a voluntary decision by the human species will require some powerful basis in emotion and logic if it is to compete in strength with natural law. It is to be doubted whether any such strong basis will be found.

(6) Even if a voluntary limitation of the birth rate were seriously considered, it is doubtful whether it would be accepted by the whole of humanity. Those who accepted it would limit their numbers, while those who were unwilling to accept it would increase their numbers. The effect would be that those who refused limitation of numbers would automatically swallow up the others, so that in the result there would be no controlled check at all on the human population.

(7) The conclusion is that the human being is an animal and that at root he lives like an animal, controlled by exactly the same natural processes as other animals. The rise of food production occasioned by improved techniques cannot continue indefinitely. We live today in an exceptional age, a Golden Age, in which for a little time the inexorable march of natural law is not immediately apparent. Sooner or later, however, perhaps in a century, perhaps in half a dozen centuries, man will be forced to conform to the self-same conditions that the rest of the animal kingdom conforms to. Eventually he must return to a semi-bestial existence.

This is a powerful argument, but it seems to me that not all of its links are of the same strength. Points (3) and (4) are quite unassailable, point (2) is, I think, correct, point (1) I would accept with some reservation. On the other hand, point (6) seems to me to be a *non-sequitur*, while the last sentence of (5) seems open to serious question. Since the final conclusion turns on the acceptance of (5) and (6), I do not feel that the conclusion is logically compelling. It may, of course, turn out to be correct, nonetheless.

The ideas underlying point (6) would be correct under conditions of primitive technology but do not seem to me to be consistent with modern technology. A community that adjusts its population in a rational manner cannot nowadays be overwhelmed by sheer force of numbers, but only by a superior technology. And this is not likely to be possessed by an overpopulated community. Rather is the situation the other way round; an overpopulated community with large concentrations of humanity would be more vulnerable to modern weapons.

Starvation is not the only way

The reservation I have about point (1) is that I do not believe starvation to be the *only way* in which populations become adjusted to food supplies. I have read on good biological authority that certain species of songbirds automatically limit their populations without starvation's necessarily intervening. The territory available for food is divided not into a number of units equal to the number of contending birds, but into the number that can adequately provide enough food for the rearing of a brood of chicks. If the number of contenders exceeds the number of territorial units, then fighting takes place until the birds are separated into two groups, those with territory and those without. The ones with territory breed, while those without territory do not. In this way the birth rate is automatically governed to the availability of food, and this is done without the starvation of unsuccessful birds, since enough feeding grounds are left over to support the latter.

I mention this example at length because it comes

near the crux of the whole business. It must be granted that a feedback has to exist between food supplies and population, but this feedback need not involve starvation. Starvation is a crude form of control in which the feedback mechanism operates directly on the population. If the population gets too large, individuals die, thereby reducing the population. In the case of the birds, no individuals die. The feedback is a more sensitive system in which the food supplies operate on the birth rate, which then affects the population at one stage removed, as it were. Instead of the excess of individuals dying, they simply are not born.

Human feedback processes

Herein lies the root of my disagreement with Sir Charles. I think there is evidence to show that humans are susceptible to even more subtle feedback processes than are the birds. For instance, I think the fact that Sir Charles wrote his article, that I am writing this reply, that Harrison Brown wrote his book, *The Challenge of Man's Future*, are all examples of feedback. Once a man grasps the unassailable qualities of points (3) and (4), some sort of feedback along these lines becomes inevitable. Should this happen to men on a sufficiently large scale, Sir Charles will have the "strong basis" that he requires in point (5).

Of course the feedback may not happen on a large enough scale to produce important effects, but I think there are some considerable indications that it may. An appreciation of the seriousness of (3) and (4) is undoubtedly growing very rapidly; indeed, there is every reason to suspect that the growth has some similarities to a chain reaction. If this is so, then the feedback will almost certainly win out, for the reason that the characteristic multiplication time of the chain reaction (probably one or two years) is far shorter than the characteristic time of the rise of population (about 70 years).

An example of feedback can be given that has controlled the birth rate of a whole nation. During the last 30 years there has been a stability of the birth rate in Britain. This stability is not governed by starvation, but by the threat of a lowered standard of living—a far more subtle feedback than is required if points (3) and (4) are to exercise their influence on the world population.

In conclusion I would like to stress that nothing that I have said is intended to minimize the problems raised by Sir Charles Darwin. These problems are in my view far more important, and lie far deeper in the fabric of civilization, than are and do the Communist-Anti-Communist issues we hear so much about in the daily paper. Mankind in its public discussions seems to have a penchant for irrelevancy. Where I do not agree with Sir Charles is in the position that because the problems are severe they are well-nigh incapable of solution.