POPULATION CONTROL: EVIDENCE OF A PERFECT CREATION

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All animals have the ability to increase their numbers at an astonishing rate. In spite of this fact, animal populations remain relatively constant. The Bible teaches that before the Fall creation was perfect and without predation. This implies an intrinsic population controlling factor. Perhaps this intrinsic population control is still present and working today, and maybe Darwin's checks are unneeded. If so, this is another reason why scientists should turn from evolution to creation in seeking to account for living things.

Casual observation reveals that animal populations are relatively stable. Rodent populations may fluctuate yearly but always between seemingly fixed limits. Each year approximately the same number of robins nest around our homes. The relative numbers of various insects changes little from year to year also.

Where little environmental change has occurred scientific investigation has shown populations to have a relatively constant average value. In England, the herons *(Ardea cinerea)* have been counted since 1928, and only minor fluctuations from an average have been detected. In years following severe winters the population quickly returned to previous levels.[1] Concerning birds, Dr. Welty says,

> Unless environmental conditions change abnormally, most bird populations remain remarkably constant despite the potential which all species possess for almost unlimited increase. This stability can only mean that birth rate equals death rate; that natality matches mortality.[2]

It is generally assumed that animals produce as many offspring as they are capable and their numbers are kept in check by negative outside forces such as disease, starvation, and predation. Overproduction is thus said to provide natural selection with its necessary raw materials. (Overproduction is here defined as occurring when an adult pair of animals produces more than two offspring in their life time, e.g. producing a surplus of its kind.) A closer look at the apparent hand-in-glove fit of birth rate and death rate reveals exciting evidence of a perfect creation and may weaken the persuasiveness of natural selection.

Control of Animal Populations Before the Fall: The Bible teaches that the original creation before the Fall was complete and without error. The phrase, "And God saw that it was good" appears seven times in the first chapter of Genesis[3] and refers to the things God created or made. Verses 21 and 25 refer specifically to the Animal Kingdom, and verse 31 summarizes God's opinion of the things that He had willed into existence, "And God saw every thing He had made, and behold, it was very good. . . ." Certainly an all wise Creator would not have called something good if it contained errors or inadequacies

In addition to bringing all living things into existence, God distinctly commanded the animals saying, "Be fruitful and multiply" (Genesis 1:22), "fill the waters" (Genesis 1:21), "and replenish the earth" (Genesis 1:28). The same words were spoken after the Flood to Noah (Genesis 9:11), and the animals that survived the Deluge (Genesis 8:17). This in itself is a good Biblical argument against evolution, theistic or otherwise, for certainly if any "higher" group evolved, the earth would already have been filled with "lower" forms and these words would lose their meaning.

The principle of no death before the Fall certainly applies to the warm-blooded vertebrate animals. In the life cycle of these creatures the adult is the main and substantial stage. Thus these vertebrates were apparently designed to live in close companionship with man. Perhaps also fish and other cold-blooded vertebrates were designed originally for continuous life in that the adult is the obvious end form of the life cycle.

Yet butterflies and certain other invertebrates have a very ephemeral adult stage. Even without being attacked by predators the scales of their beautiful wings wear off, and there is no apparent provision for replacement. At the end of the summer season a butterfly is a rather bedraggled, worn out creature. This is true of many groups of insects. In one family, the Ephemeridae, the adults are very short lived!

In view of their complex metamorphosis from caterpillar to chrysalis to a mature form, it is doubtful if butterflies were originally created any differently. Thus the remarks in this paper concern primarily the vertebrates although striking mechanisms for population control among invertebrates will also be discussed. The concept of invertebrate longevity before the Fall may deserve separate analysis.

It is likewise true that God designed plants to serve as food for animals. Thus comments in this paper deal only with possible population control mechanisms for *animals* before the Fall, as well as possible residual tendencies toward population control operating today.

Implied in the teaching of a perfect or good creation in the idea of no starvation, disease, or

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death of any kind. Only after sin entered into the newly created world did predation and death appear. According to Whitcomb and Morris:

> One of the clearest texts in the Old Testament on the transformation of animal characteristics after the Fall is that which describes the diet which God ordained for animals before the Fall. Before the Edenic curse, this was God's provision for the food of animals: "to every beast of the earth, and to every bird of the heavens, and to every thing that creepeth upon the earth, wherein there is life, *I have given every green herb for food:* and it was so" (Gen. 1:30). Under such conditions, there could have been no carnivorous beasts on earth before the Fall; for the animals to which God gave "every green herb for food" included "every beast of the field" and "every thing that creepeth upon the earth, wherein is life."[4] (Emphasis added)

This is in direct contrast to the conditions described after the Fall immediately following the Flood:

> And the fear of you and the dread of you shall be upon every beast of the earth, and upon every fowl of the air, upon all that moveth upon the earth, and upon all the fishes of the sea; into your hand are they delivered. Every moving thing that liveth shall be meat for you; even as the green herb have I given you all things.[5]

If Adam and Eve had not sinned or, if many years separated the creation from the Fall, what would have controlled the population of the various vegetarian animals? According to modern theories animal populations are held in check largely by negative outside forces. Some have argued that, without predators, no balance of nature could exist; without the sparrow hawk sparrows would overpopulate the world. How then could animal numbers be controlled before the Fall?

Intrinsic Mechanism for Population Control before the Fall: We believe the Bible to be the infallible Word of the infinitely wise God; therefore, animals must have had an intrinsic mechanism for controlling population density. The pre-Fall situation can be represented:

$$\text{Recruitment} + \text{Immigration} = \text{Emigration} \qquad \text{Eq. 1}$$

In obeying God's commandment to "be fruitful and multiply," recruitment or birth rate would have begun at or near the physiological maximum level. At first with the earth largely empty, obeying God's commandment to "fill the waters" and the entire earth would have meant that for any one populated area emigration would have exceeded immigration, that is, animals would be dispersing to the distant portions of the globe.

After a while (a short time for highly fecundant forms, longer for others) the earth would have been filled and emigration would equal immigration. In order to avoid overpopulation and consequent starvation, the recruitment rate would have had to taper off eventually to zero. All animals must have had a built-in mechanism for controlling their recruitment rate; a population density dependent reproduction rate. The command of God was simply to fill the earth not to reproduce at the highest rate possible indefinitely.

Population Control Today: The paradise did not last. Sin entered into the world and because of sin the Curse. This Curse was not limited to the Serpent and Adam and Eve, but to the entire created world. "Cursed is the ground for thy sake; in toil shalt thou eat of it all the days of thy life; thorns also and thistles shall it bring forth to thee; and thou shalt eat the herb of the field; in sweat of thy face shalt thou eat bread, till thou return unto the ground. . . ."[6] The New Testament teaches that this fallen state still exists for the entire world. "For we know that the whole creation groaneth and travaileth in pain together until now."[7]

The Fall certainly brought about modifications to the living world. Animals began to prey upon one another. Death, fear, and disease entered into the world but the Fall and Curse do not imply a re-creation. If animals were created with the ability to regulate their own numbers it is only logical that they still retain that ability. Woman's curse, in part, was increased pain in child birth, not a new mode of reproduction.[8]

It appears that two truths are evident from the Scripture concerning the regulation of animal numbers:

(1) A perfect creation prior to the Fall would necessitate animals capable of limiting their own rates of reproduction and,

(2) This mechanism may be working today, perhaps partly masked by other consequences of the Edenic Curse, which include predation, etc.

Population Control and Modern Evolution: From Darwin to the present time over-production has been a cornerstone for the entire superstructure of evolution. To better appreciate the emphasis given superfertility and its relation to evolution consider Julian Huxley's summary of Darwinism:

> By Darwinism I imply that blend of induction and deduction which Darwin was the first to apply to the study of evolution. . . .
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> Darwin based his theory of natural selection on three observable facts of nature and two deductions from them, the first fact is the tendency of all organisms to increase in a geometrical ratio. . . . The second fact is that in spite of this tendency to progressive

> increase, the numbers of a given species actually remain more or less constant.
>
> The first deduction follows. From these two facts he deduced the struggle for existence. For since more young are produced than can survive, there must be competition for survival. . . .
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> Darwin's third fact of nature was variation: all organisms vary appreciably. And this second and final deduction, which be deduced from the first deduction and the third fact, was Natural Selection. Since there is a struggle for existence among individuals, and since the individuals are not all alike, some of the variations among them will be advantageous in the struggle for survival. . . .[9]

According to Huxley the fact of overproduction or potential of "geometric increase" is still unquestioned. Darwin's second fact, the "constancy of numbers of any species," is also considered true today. Thus the first deduction based on these facts is said to be true.

Notice that the very basis for evolution is overproduction. Without overproduction there would be no struggle for survival and no natural selection.

While modern evolutionists pay homage to the advances in evolutionary thinking, made by Darwin, few want to be identified as holding Darwinian or even neo-Darwinian theories. Today's breed of evolutionist claims to have merged the best of past school into the Synthetic Theory,[10,11] or the Modern Synthesis.[12]

Most of the "improvements" in evolutionary thinking have dealt with what has been learned about genetics. Mutation and recombination are thought to be involved in the formation of new species today. "Recombination, thus is by far the most important source of genetic variation."[13]

To produce favorable recombination many recombinations must be tried, thus the need for high fertility. Mayr included fertility, fecundity, and sexual vigor as characters that are of the greatest evolutionary importance.[14] Conversely, Mayr says that in animals that reproduce slowly "natural selection is considerably curtailed when so few genotypes are available for choice."[15] Overproduction thus stands as one of the necessary elements in modern evolutionary theory.

The fact remains that animal populations remain constant. How is this correlated with the potentially wide open reproduction rates? Natural selection is thought to be effective not only in eliminating the weak, diseased, and poorly adapted; but also it is thought to be density dependent. This density dependent mortality,[16] is thought to regulate animal numbers automatically. If this view is correct certainly the argument for a perfect creation without death is weakened. Is there a scientifically acceptable alternate view?

Creationist view points: How can we as creationists view the phenomena of population control? The fact remains that animal numbers are regulated. Is "tooth and fang" competition the only answer? Without regulation all animals in time would either become extinct themselves or cause the extinction of virtually every other living thing. Prior to the Fall, population control was necessary to avoid "over-grazing" the earth and thus bringing about mass starvation. Today population control is necessary for the earth to support its multitude of individuals and species. The problem is summarized by V. C. Wynne-Edwards:

> It is self-evident that in every population remaining at a constant density, or returning each year to the same density at the same season, the rate of recruitment must be equal to the rate of loss of the constituent members. As most animals are seasonal breeders, this implies in the simplest imaginable case that a stable population requires each breeding season to make good the losses of the preceding twelve months: that is to say, the number of recruits must equal the number of members lost.
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> This simple equation that recruitment and loss are numerically equal, is generally true wherever population-density (when averaged over a suitable period of time) remains constant, no matter whether the numerical value is great or small. Some animals reproduce faster than others and this is frequently true even of different populations of a single species living in different circumstances; yet their several population-densities can each remain constant over the years. This is possible because those that reproduce faster also die correspondingly quicker: the whole equation is given a higher numerical value, but both sides nevertheless remain balanced.
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> To preserve the balance, the two sides of the equation cannot be allowed to vary independently: a state of adjustment must exist between them; and the question immediately arises, which side is the independent and which the dependent variable? Are the losses somehow influenced so that they automatically match the number of recruits coming forward? Or is the reverse true, namely that however the losses vary, within manageable limits, recruitment can be adjusted to compensate for them?[17]

Dr. Wynne-Edwards accepts the latter view and makes a good case for it in his book, *Animal Dispersion in Relation to Social Behauior*, review-

ed in a previous *Creation Research Society Quarterly.*[18]

Admittedly his viewpoint is upheld by a minority of biologists today; however, it seems that his view is more compatible with what the Bible teaches concerning population control than an alternate point of view. Could it be that in trying so hard to provide evolution with a mechanism, e.g., overproduction and natural selection, modern biologists have blinded themselves to an objective look at the entire population controlling mechanism? As creationists we need to evaluate the facts very carefully. It could be that here lies not only very strong supporting evidence of both a perfect Creation and a subsequent Fall, but possibly the key to understanding some vastly important and basic biology—that of population control.

To restate the problem briefly: Animal populations remain constant year to year. From the Biblical teaching of a perfect creation, an intrinsic population density control of reproduction can be deduced. Most evolutionists seem to believe that population control is extrinsic, that is, negative outside forces such as disease, starvation, and predation limit animal numbers.

Protagonists agree that the following relationship exists:

$$\text{Recruitment}+\text{Emigration}=\text{Death}+\text{Immigration} \qquad \text{Eq. 2}$$

Apparently most biologists consider death to be density dependent and thus the controlling mechanism for population constancy. Modern evolutionary theories often depend on natural selection which entails unbridled fertility. Wynne-Edwards and others have amassed a great deal of evidence supporting the theory that population control is an inherent part of each animal population, hat animals regulate their own recruitment rate. The latter viewpoint seems more acceptable to the creationist. Our problem is to identify the independent variable of Equation 2.

Evidence Supporting Intrinsic Population Control in Animals: A great deal of experimental work has been done demonstrating the relationship between fertility and population density with a wide spectrum of animals. A review of the literature is neither intended nor necessary. A brief sampling will suffice to illustrate the point.

Working with the fruit-fly, *Drosophila melanogaster,* Pearl[19] showed that in a milk-bottle "universe" containing a superabundance of food, population increases rapidly as long as the density is low. Later the population tapers off to a definite population density. This situation is affected by reduced egg production of the females as crowding increases. He found that females confined under alternating high and low density situations responded immediately with corresponding low and high egg production. He concluded that egg production must be regulated partly at least by collision or interference action of the flies to each other.

Robertson and Sang[20] continued Pearl's work later and proved that food abundance as well as density control population. This kind of population control involving feedback from both population density and available food is perhaps the most common.

The "confused flour-beetle," *Tribolium confusum,* illustrates an intrinsic population controlling factor even more dramatically. R. N. Chapman in 1928 demonstrated that, in a closed system with a nutrient medium of two cm. deep layer of flour, a steady ceiling-population would always be reached. This virtually constant density of individuals per gram of flour was reached regardless of original quantity of beetles or total volume of flour used. Chapman believed the density-limiting factor was cannibalism due to adult beetles eating eggs and immature stages in quantities proportional to the population density.[21]

Subsequent workers found this to be only a partial answer. MacLagan found that egg production was inversely related to density. MacLagan referred to the regulating mechanism as "psychological" and concluded that natural populations (just like experimental ones) "automatically check their own increase, by virtue of this density effect, and that the organism itself imposes the ultimate limit to its own abundance when all other factors (biotic and physical) normally inhibiting population increase have failed."[22]

Park later showed that "conditioning" of the nutrient media by metabolic wastes and secretions reduced the reproduction rate. Length of larval life and larval mortality both increased with contaminated media.[23] Concerning secretions it was found by Alexander and Barton that ethylquinone is produced by odoriferous glands of both *Tribolium confusum* and *T. constaneum.* The secretion is produced in largest quantities under conditions of cold or crowding.[24]

It was found that ethylquinone causes the pinkish discoloration of conditioned flour, and is lethal to first-instar larva and induces developmental abnormalities in late larva and pupae.[25] It is also thought to be depressing on adults and perhaps is the substance wholly responsible for the demonstrated intrinsic population control these insects exhibit.[26] Apparently one of the functions of the odoriferous glands is to control population.

The next two examples introduce a new factor—that of harvesting part of the population as

any of Darwin's natural selection agents might do. The first experiment was performed by Nicholson[27] in Australia with the sheep blow fly, *Lucilia cuprina.* Four populations (A, B, C, and D) were established under predetermined environmental conditions for about a year. Newly emerged adults were removed as follows: A—0%; B—50%; C—75%; D—90%, Without exception, remaining adults of the population tried to compensate for these losses. The result of destroying adults was to cause more adults to be recruited.

In the control group A, an average of 573 new adults emerged daily compared to 712, 878, 1,260 for B, C, and D. The adult population suffering 50% mortality remained at 2,335 compared with 2,520 for the control group. C and D were progressively less.

Again to compensate for lost flies, adults from C and D had longer life spans (4½ to 7 days) and recruitment rate per adult per day was much larger. This experiment indicated how limited natural predation must be in dictating population size. It is seen from those experiments that "intrinsic population control" clearly operates in the world of invertebrates aside from the question of whether or not these creatures faced possible death before the Fall.

A great deal of population control interest has been sparked by the fishing industries. In order to obtain the maximum sustainable yield each year from fishing, a certain limit must not be exceeded. Overfishing at first provides a higher catch but eventually will result in a reduced annual crop. The following experiment by Silliam and Gutsell[28] was performed to test a mathematical model invented by exponents of the overfishing theory.

Four identical aquaria under the same uniform conditions were stocked with guppies, *Lebistes reticulatus,* two kept as duplicate controls and two used as duplicate experimental populations. All were provided with a superabundance of food and were allowed to increase in numbers until a ceiling of about 32 grams of live fish per 17 liters of water was obtained after 40 weeks. This research substantiated earlier work.[29] The third and fourth tanks remained "unfished" and the population varied only slightly for 174 weeks. The first and second tanks, however, were subjected to harvesting every three weeks (this period representing average generation time for guppies).

At first 25% by weight of the fish were removed. The numbers of adults and young dropped however by the sixteenth week and a new stable ratio of young to adults was established. After the seventy-ninth week the harvesting rate was reduced to 10% and the biomas increased to nearly the level of the controls. From weeks 121 to 150 harvesting was increased to 50% and the proportion of juveniles increased sharply with a progressive decline of biomas. That is, overfishing was occurring. Finally from week 151 to the termination of the experiment, harvesting rate was increased to 75% which lead to extinction.

Several things can be gained from this excellent experiment. First, from the control tanks it was found that with a superabundance of food and none of Darwin's checks such as predators, starvation, or disease (save senility), the population was limited to a constant "healthy" value. The proportion of adults to young became high. The production and survival of young was low and cannibalism common. The effective recruiting rate was just enough to replace natural mortality of senile fish. As exploitation increased recruitment increased proportionately. Silliman and Gutsell considered a harvest rate of 30 to 40% would provide the maximum sustainable yields under these conditions.

Similar experiments with parallel results could be cited with the laboratory mouse, *Mus musculus*[30]; the vole, *Microtus agrestis*[31]; and other animals.[32,33]

In mammals and birds a social effect appears to predominate with some adults enjoying certain privileges (space and food) obtained only partially by less fortunate members of the population, but in all cases a ceiling density is reached and an attempt is made to hold it constant in spite of changing outside factors.

Concerning natural populations S. A. Barnett made a very interesting observation about rats:

> What controls the growth of a rat colony? When a few rats begin to breed in an area with plenty of food and cover, their rate of increase is slow at first, but it becomes rapid when there are plenty of fecund females; later it slows again. As density increases, several hostile forces can be expected to act progressively against still further increase. Predation by dogs, hawks, and man may become more intense; nest sites for rearing young will be less easily found; infectious disease may increase. Any of these (or shortage of food) could put a ceiling on further growth.
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> It is possible, however, that none will do so, and that social interactions will limit density before food and shelter fail, and before predators or parasites do more than kill the old, and the weak. D. E. Davis, then at Johns Hopkins University, reduced a rat population by half by a strenuous trapping operation. The pregnancy rate of the survivors doubled in two months. Crowding evidently interferes with breeding, but we do not know just how. Females with litters may be pestered by males, although ordi-

narily a parturient female can drive away intruders from her nest merely by making sounds and perhaps a snapping movement of her head.

It is possible that the regulating process is far more complex, and involves several factors, acting together.[34]

Mechanisms for Intrinsic Population Control: Several controlling factors have been mentioned thus far: cannabalism, fertility, and death-age of adults. Other factors considered important by Wynne-Edwards are: infant mortality, resorption of embryos, clutch size, and number of broods per year, and the size of the breeding population.

Many birds apparently avoid competing for food by the simple but effective method of holding territory, for at least part of the year. Birds without territory do not breed. This effectively limits not only the population for any one area but also controls recruitment rate.

According to Wynne-Edwards, communal breeding sites (common to many palagnic birds, eels, marine turtles, and certain seals) provide a parallel to more conventional territory holdings. Territory holding is common with insects,[35] crabs,[36] and lizards.[37]

These and no doubt many other mechanisms provide animals with the ability to regulate their own numbers, to ward off starvation and to enable them to co-exist with other animals. Each animal (be it vegetarian or carnivorous) must guard against "overfishing." For its own good it must not reproduce at its physiological limit all the time since this might lead to its own self extinction.

When God formed the first living things, He very possibly established a built in "balance of nature" without the necessity of disease, predation, or starvation. Available evidence appears to indicate that intrinsic mechanisms could have been sufficient in regulation of populations which developed shortly after the time of creation and may be a factor in the regulation of animal numbers today. This paper is intended as a stimulus to encourage study of what may become a new field of creation-evolution research:—intrinsic population control.

(Author's Note: I would like to mention my gratitude to John Stobbe, Lee Weems, and Dr. John C. Whitcomb, Jr., for reading and criticizing the manuscript. I assume full responsibility for the content, however.)

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