# MIND AGAINST GENE ITS STRUGGLE FOR AUTONOMY

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#### Outline

## HEREDITY, FREEDOM, AND RESPONSIBILITY

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### Chapter

- 1. The Invisible Despots the genes, which control the form and functioning of our bodies without ever consulting our wishes. Their chief endeavor is to multiply themselves. A brief summary of the hereditary mechanism.
- Basic Freedom Control of passions for which the genes are ultimately responsible is the prerequisite of all freedom.
- 3. The Revolt against the Genes "cosmetic" alterations of the body; the ascetic's protest against sex and predation; the revolt against death.
- 4. Freedom and the Inheritance of Parental Accomplishments Contrary to the views of certain writers, we would lose
  rather than gain if acquired characters were inherited,
  as Lamarck believed. We might inherit our parents' bad
  habits and be deprived of the satisfaction of developing
  our own talents and skills.
- 5. Freedom of the Will This is interpreted to mean indeterminacy in the act of willing. Whether in the physical world or the mind, indeterminacy can neither be proved to occur nor rigidly excluded. Contrary to the common view, "free will" would destroy responsibility because it would remove our volitions from strict control by our character, principles, and steadfast purposes.
- 6. The Foundations of Human Freedom We owe our freedom not to indeterminacy (free will) but to a unique mode of determination, apparently restricted to man, whereby, before reaching a decision, we make an ideal excursion into the future and give it a voice in its own becoming.
- 7. Responsibility: Its Growth and Decay Responsibility includes duty but has wider scope. Although possibly only man is consciously responsible, many animals behave responsibly, notably by caring diligently for their young and providing for their own future, as in the widespread habit of storing food. Man's responsibility has sprung from these natural roots. By relieving parents of the support of their offspring and individuals of the need to make foresighted provision for their own future, the modern welfare state tends to erode the very roots of responsibility.

- 8. Responsibility and Punishment Neither the libertarian nor the determinist view permits us to impute radical responsibility to any one; the former, because it denies that our volitions are strictly controlled by what we are; the latter, because what we are and do is largely determined by our heredity, education, and environment. Although responsibility cannot be imputed to us by others, we can claim it for ourselves as an inalienable right, thereby asserting our dignity and establishing ourselves as ethical persons.
- 9. Mind and Body Complete freedom embraces both body and mind, Freedom is equally abridged when the mind is enslaved by passions of somatic origin, and when the body is overworked or abused by an ambitious or a sensual mind.
- 10. Ultimate Freedom Only acts that express our inmost nature are truly free. The most revealing manifestation of this nature is growth, in body and mind, which is a creative process whereby elements of diverse origin are united in a harmonious pattern of interdependent parts. "To act creatively, motivated by love of order, of beauty, of knowledge, of harmony in any of its aspects, is ultimate freedom, life's flowering."
- 11. The Continuing Conflict In comtrast to other animals, man's spontaneous impulses fail to conform to the patterns of his societies. His innate aggressiveness is exploited by callous, selfish leaders for their own aggrandizement. Contemporary permissiveness threatens the foundations of social life. Not ignominious surrender to blind biologic impulses but ever greater rational control of every aspect of behavior is the course we must take for our own salvation.
- 12. Freedom, Happiness, and their Prospects Although men shout and fight for freedom, what they most desire is happiness. The possibility of both is rooted in our genes or hereditary constitution. Both are threatened by soaring populations that cause shortages of essentials, pollution, crowding, and necessarily increasing regulation by the state. Man's future depends upon his ability to liberate himself from the genes' blindly insistent demand for their own multiplication. His alternatives appear to be a rapidly mounting population followed by a disastrous crash, or a reduced population in harmony with its environment, thriving through geologic ages with increasing quality and happiness.

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#### INTRODUCTION

Few words are so heavily charged with emotion and, therefore, so misunderstood and abused as "free" and "freedom." The slave imagines that, could be escape from his master, he would be perfectly free. In one sense he would be free, but he might still bear within himself multiple sources of bondage; he would hardly be free in any comprehensive or philosophically satisfactory sense of the word.

In the liberal democracies of the modern world, we are frequently reminded that we are born free, but this is only true in a restricted political sense. If to be free means to become, we aspire to be, to do what we desire to do, to liberate our minds from time-honored dogmas, all within the limits of the humanly possible and the morally permissible, then it is obvious that most of us are far from free. If to be in bondage means to have our growth and development, physical and mental, largely determined by agents unresponsive to our wishes, to be forced to conform to customs and practices that we may not approve, to be compelled by law to support arrangements that we believe to be wrong, then it is clear that, even in the freest countries, we live in bondage.

The sources of this bondage are many. In that which of all things most influences our future well-being, the choice of our parents, we have absolutely no voice; nor have they any means of selecting, from among the diverse hereditary potentialities that they bear, the genes that they transmit to us.

These minute entities that we never see control our lives, laying the indispensable innate foundation of all that we, by our utmost conscious efforts, can ever become. Whether we grow to be short or tall, handsome or ugly, healthy or ailing, intelligent or stupid, depends primarily upon the genes that our parents blindly pass on to us. And these mute arbiters of our destiny never consult our wishes; they are utterly unresponsive to our desires.

Less absolute than our subjection to our genes, but by no means negligible, is our dependence upon the environment, physical and social. Although in later life the stronger-willed or more fortunate of us enjoy considerable freedom in the choice of our surroundings, in impressionable childhood, when the environment so strongly influences our development, it is almost wholly beyond our control. And even after we mature, neither wealth nor intelligence ever succeed in making our surroundings, natural and human, exactly what we wish them to be.

Bondage to irrational beliefs and customs weighs heavily on many of us. Even the most acute and active minds rarely succeed in casting out all the clutter of superstition and dogma that has come down to us through the ages. The savage lives in thrall to many taboos, often devoid of rational foundation. Even in countries where science most flourishes, old customs difficult to defend frequently burden us. Before our minds are strong enough to criticise and compare, they are too often enslaved to religious dogmas or oppressive ideologies that they may never succeed in escaping.

For ages, nations lived under the absolute rule of irresponsible monarchs, who in some countries have been superseded by no less despotic governing cliques. Slowly, often at the price of much blood and travail, certain nations won a generous measure of political freedom, which now they are bartering for material benefits from the State. Those who expect a paternal government to take care of them, to support them when they are unable, or unwilling, to find work, to provide medical care when they are sick and assistance when they are old, to educate and help to nourish their children, must expect the State to assume increasing control over their lives. The despotism of the autocrat is being replaced by the despotism of the bureaucracy. Can a government that imposes upon citizens untrained in accountacy the annual ordeal of preparing a long, perplexing income-tax report be exempt from all imputation of tyranny? The modern welfare State offers material security at the price of independence.

Thus the freedom of which we proudly vaunt is subject to many limitations, some of which we are slowly mitigating, while others become more stringent in increasingly crowded world. The whole subject of freedom, of how men have conceived it in different cultures and philosophies, how it has increased during historic times, and how it is being lost, is too vast to be covered, even cursorily, in a single volume. In this book we shall say little about the political and social aspects of freedom, which are the concern of the historian and the sociologist, in

order to concentrate upon its internal or personal aspects, especially upon how the genes that control our heredity limit our freedom yet lay its indispensable foundations, the nature of this freedom, and how we may safeguard and increase it.

Even with these limitations, our subject is not only of philosophical interest but of great practical importance. Long ago, John Locke wrote: "As...the highest perfection of intellectual nature lies in a careful and constant pursuit of true and solid happiness; so the care of ourselves, that we mistake not imaginary for real happiness, is the necessary foundation of our liberty." Freedom and happiness are so closely linked that we commonly seek them together, and the more we understand of the one, the more solidly will the other be established. Such understanding should also contribute to the solution of the most pressing problem that now confronts man, the adjustment of his population to the planet's capacity to support it, not only next year or into the next century but through a long future. Unless this problem is speedily solved, freedom, happiness, and much else that we value, will all be lost together.

In the faith that deeper understanding of ourselves and the causes of Earth's alarming predicament will brace throughtful people to confront and perhaps correct the imbalances that threaten worldwideddisaster, I have written this book.

## THE INVISIBLE DESPOTS

What are the invisible despots that rule our lives? Where are they? How do they govern us?

They reside in each of the billions of living cells of our bodies. In each cell is a nucleus, containing forty-six chromosomes, that appear as minute, dark, elongate bodies in properly stained microscopic preparations of dividing cells, as in growing tissues. These chromosomes are composed of long skeins of deoxyribonucleic acid (DNA) in the form of a double helix that is sometimes called the "coil of life." These spirals contain the genes, numbering many thousands in every nucleus of a human body, which, as the bearers of heredity, govern its growth, form, and functioning. Each gene occupies a definite situation in one of the chromosomes and differs from all the others by the special arrangement of the atoms attached to the helix of DNA.

Since the government of a human body is not centered in a single capital but diffused through a huge number of separate seats, one might expect a multitude of petty tyrants, often quarreling with each other, as is the way of tyrants, rather than a single unified rule. However, barring accidents, the nuclei in every one of the billions of cells appears to contain identical sets of genes, all derived by successive divisions from the single nucleus of the fertilized egg. Although not cen-

tralized, the government is highly unified, as though a single

monarch ruled in person in every province, town, and hamlet of a far-flung kingdom - as doubtless many an autocrat, distrusting his ministers and agents, has wished that he could do.

Although all the cells of a single body appear to contain identical sets of genes, in no two human beings are these sets exactly the same, except in identical twins, who are derived from the fission of a single fertilized egg. To understand how this comes about, we must consider the methods of nuclear division. Every nucleus of the body contains two sets of corresponding, but rarely identical, chromosomes, one derived from each parent. When cells divide in growing tissues, each chromosome splits longitudinally, so that each half contains copies of all its genes and identical sets of all the forty-six chromosomes that are passed to each of the two daughter cells. In the formation of the reproductive cells, the spermatozoa and the ova, nuclear division follows a quite different course. At its outset, corresponding chromosomes lie side by side, then one whole member of each pair goes to each daughter cell, which, accordingly, has only twenty-three chromosomes. The double number is restored when the egg is fertilized.

How the recombination of genes creates the great diversity of individuals among humans and many other organisms becomes clearer when we compare it to a game of cards. Each individual player, male or female, holds two sets of cards (the chromosomes), every one of which bears a great many symbols (the genes), some of

which differ more or less from the similar symbols on the corresponding card of the other set. In the formation of the reproductive cells that may bring new players into the game, each prospective parent lays corresponding cards together in twenty-three pairs, each of which contains one card from his or her male parent and one from the female parent. Then the prospective male parent makes up a set of twenty-three single cards by choosing at random one card from each pair, and his female partner does the same. When, at conception, these two single sets are joined, the double set that the new individual receives is an unpredictable mixture of values, such as card players achieve by dealing from throroughy shuffled decks.

With forty-six cards bearing a total of many thousands of symbols, the number of possible combinations is astronomical.

With a double set of genes put together like a hand of cards dealt blindly to a player, each of us must play life's hazardous game from birth to death. Our parents could not choose, from among their diverse and often conflicting hereditary potentialities, the genes that they would give us; indeed, no one today has the skill to put together a set of deliberately selected genes, nor, could he do so, the wisdom to choose a genetic complement that would govern the development of an excellent human being. We can neither increase nor diminish the set of genes that was made up before we knew what was being done for us. Any attempt to alter these genes, as by exposing our tissues to radioactivity or the action of certain chemicals, would be more likely to produce cancer or some other affliction than to make them conform more closely to our desires. Moreover,

by the time we are old enough to wish to improve ourselves, each gene is represented by so many examples, in so many cells of our bodies, that it might be necessary to change multitudes of them, all in the same manner, to yield an appreciable effect.

without ever consulting us, the genes, by means of a great variety of enzymes synthesized under the guidance of the DNA, control the growth of our bodies and their functioning from minute to minute. By providing a favorable environment, we can help them to make us strong, healthy, and intelligent. With an increasing array of natural substances and synthetic chemicals, we can, in some measure, compensate for defects in their functioning. Nevertheless, they impose upon us physical and mental limits that we cannot exceed. They build the indispensable foundation of all that we can ever, by our utmost efforts, hope to become. They are the final arbiters of our destiny, wholly irresponsive to our wishes.

The obduracy of the genes to the desires of the animal that bears them, their frequent failure to respond appropriately to its predicaments, appears to support the views of evolutionists who hold that animals and plants are, primarily, expendable machines for the protection and multiplication of their genes.

However, in a Universe that strives to increase values that enappear to exist for themselves rich existence, organisms that can enjoy values rather than for the molecules, however complex, that they contain. In the evolutionary sequence, it appears that organisms nuclei, with their complements of genes, as the indispensable precursors of increase

ing size and complexity. Although primitive unicellular creatures, the akaryotes, lack nuclei and multiply by simple fission, animals composed of many cells and organs cannot reproduce in this direct manner. Only by condensing in small, detachable packages directions for building bodies like their own can large, complex animals beget progeny and survive as species. Such packages of directions are the gametes (sperms and eggs), each with many thousands of genes. Without the genotype, as such a collection of genes is called, life could not have advanced far beyond its primitive stages. Therefore, it is certainly as rational to say that genes exist for the sake of bodies as to contend that bodies exist primarily for the advantage of their genes. However, since bodies cannot live without genes, and the life of a gene outside a body, as in a sperm or egg cell, is typically brief and precarious, the two are so closely interdependent that whether we concentrate attention upon one or the other will depend largely upon our immediate interest. To say that the genes do this or that is, in many cases, tantamount to saying that the body does this or that.

We sometimes wonder whether the despotic genes act with a purpose, whether they have aims for themselves or for the creatures they shape and control. Do they seek happiness for themselves or for us, their creations? As far as we can tell, the long skeins of DNA are no more conscious or purposeful than other molecules, organic or inorganic; they act according to widespread physico-chemical laws. However, we must admit that the intimate nature of atoms, molecules, and crystals is hidden from us. Although we commonly suppose that they are wholly insentient, they may feel more than we suspect.

Nevertheless, the genes behave as though they had a purpose, which is to exercise in fullest measure their ability to make replicas of themselves, without which neither animals nor plants could grow and reproduce. Evolution, which on the superficial view involves the struggle for existence between whole organisms of diverse forms and varying fitness, is, at a deeper level, a contest among genotypes for numerical superiority. Viewed in this light, animal and vegetable bodies are the pawns with which the genes play their game. By multiplying the bodies that bear them, the genes vastly multiply themselves. To an evolutionist, the most successful genotypes are those that exist in greatest numbers. Whether, in measuring their success, we should count every whole organism as one, or every cell as one, is a debatable question. Perhaps a tree or a large animal, in which each complex of genes is represented in billions of cells, should count as an equal number of unicellular organisms, each with a single nucleus. Leaving aside mental and spiritual values, the truest measure of evolutionary success may be the weight of living tissue which each association of genes, in its myriad copies, occupies and controls.

That the large DNA molecules are highly stable is evident from the persistence, from generation to generation, of the organic forms whose growth they guide. Numerous kinds of plants and animals have flourished with slight change for many millions of years. Nevertheless, the arrangement of atoms in the genes is from time to time altered by the impact of hard radiation, thermal agitation, or the action of chemicals. Such a change in the con-

trolling bodies is revealed by an alteration, profound or superficial, in the form or function of the organism. These mutations,
occurring at random, without reference to the needs or the harmonious development of the animal or plant, appear most often to
be harmful, but sometimes they improve its adaptation to its environment or its ability to reproduce. The testing of these innovations in the rough-and-tumble of life is the process known as
"natural selection." Without mutation and the subsequent screening
of its effects, evolution could not have occurred and the living
world would remain at a very primitive level.

When a single gene is altered by a mutation, it comes into competition with the original form and with other modifications of the same gene, which can replace each other in a chromosome and determine different expressions of the same character, such as the abundance of hairs on the leaves of a plant, the color of an animal or certain of its parts, the size of a litter or brood, its more or less aggressive behavior, or its altruistic tendencies. The contest for numerical superiority by these alleles, as such mutually exclusive genes are called, is the prime mover in evolution, the basic competition that causes species to change, sometimes as a whole, perhaps more often by splitting, in different parts of an extensive range, into divergent races that may be the starting points of new species, genera, families, or orders.

Evolution is inveterately opportunistic. Mutations, as has been said, are accidental alterations of the genes; and the contest for perpetuation that follows such changes, commonly called natural selection, is not regulated by idealistic goals nor miti-

gated by any rules, moral or otherwise. The single objective, if so it may be called, is to survive from generation to generation, at any price. The fitness of which evolutionists speak means simply fitness to survive; it does not connote any moral, aesthetic, or intellectual excellence. As inventors make models that they alter or destroy if they fail to perform as required, so complexes of genes shape animal and vegetable bodies, which are ruthlessly eliminated if they fail to multiply their ruling genes. Such complexes have achieved great success by making animals that are well equipped with senses, swift, more or less intelligent, and capable of independent existence. Other complexes of genes, taking the contrary course, have been able to multiply exceedingly by rducing their bearers to flabby, repulsive parasites, with a minimal sensory equipment, and incapable of living, or of completing their life cycle, outside the bodies of other creatures. As far as we can tell, to the genes it is indifferent which course they take; their one imperative is to multiply themselves. They treat their vehicles, living and often highly sensitive bodies, with no more tenderness than a harsh, grasping slaweholder showed toward the slaves who created his wealth.

This brings us to our major problem, How can a mechanism directed primarily to the multiplication of hidden genes, by any course that proves successful, yield beauty, morality, loyalty, spiritual love, altruism, and all the higher values that we praise? How can animals, shaped and regulated from day to day by unseen despots impelled above all to replicate themselves, in any sense be free? How can man escape, or mitigate, the tyranny of his genetic heritage?

Whatever it may be today, morality was born as a handmaiden of the genes, as is clear to anyone who studies the mores of primitive peoples and some not so primitive. The rules and taboos applied to the tribesman's treatment of members of his own tribe and were, or were believed to be, such as promoted its solidarity and continuing prosperity; they did not regulate the tribesman's treatment of aliens. Children are taught the Decalogue as though the commandment "Do not kill" applied (except in wartime) to all men everywhere, and that to steal from any one, anywhere, is forbidden. This was certainly not the original intention of the Mosaic commandments. The lawgiver himself sent his followers against the Midianites. After these unfortunate people had been defeated by the Israelites, despoiled of all their possessions, and their cities burnt, Moses commanded the victors: "Now kill every male among the little ones, and kill every woman that hath known a man by lying with him. But all the women children, that have not known a man by lying with him, keep alive for yourselves." (Numbers 31). When we recall that in ancient times the female parent was widely regarded as the seedbed in which the male's "seed" was planted and developed, it is evident that Moses spared the Midianite virgins only because they would serve as fertile soil to increase the Israelite stock. His morality was wholly subservient to the genes' drive to multiply themselves.

Even altruism, in many of its instances, when carefully analyzed reveals the dominance of the genes. Although altruistic impulses may not be strictly determined by the genes, even in their highest manifestations, as in man, heredity must provide

an innate foundation for them, as for everything we are and do. When we help another person to survive and possibly reproduce, as when we save him from death by drowning, starvation, or some dangerous injury, we may not be promoting the multiplication of genes just like our own. It is almost certain that his genetic constitution will differ in important ways from ours, and he may even lack the capacity for altruism. The nonhuman animals that we help to live and reproduce may contain no single gene that matches one of ours. Evolutionists have difficulty accounting for such activities that contribute nothing to the perpetuation of the genes which we carry. They dissipate energy that, according to theory, should be employed for the multiplication of the genes that we bear within us.

Nevertheless, evolution lays the foundations of altruism.

Organic bodies, animal and vegetable, are but the transitory vehicles of the genes they bear. Unless they pass them on to a succession of similar bodies, these genes will be lost. Hence the imperative of reproduction. Many animals deposit their eggs or drop their young, then neglect them wholly. But a widespread trend in the animal kingdom, which evolution has supported because it increases the chances of survival, is to produce fewer young and take better care of them. Whatever its sentiments might be, the bird, mammal, fish, insect, or crustacean that nourishes and protects its offspring, perhaps feeding them from its own mouth and warming them with the heat of its body, often risking its life in their defense, bears within itself at least the germs of altruism.

But the genes that determine this innate or instinctive behavior can hardly be called altruistic. Through a long evolution, they have come to take this means to perpetuate and multiply themselves through the progeny of their temporary bearers. With some notable exceptions, the bird, mammal, or fish that devotedly attends its own offspring will do nothing for the young of some other parent of its own species; it may even devour its neighbor's progeny. Yet even the most narrowly restricted parental care has potentialities for unlimited expansion.

Only a few weeks after they leave the nest, the young of certain swallows, bluebirds, tanagers, and other birds may help their parents to feed their younger brothers and sisters of a later brood. In many permanently resident birds of mild climates, including species of kingfishers, woodpeckers, bee-eaters, jays, and wrens, yearlings, and more rarely older individuals, remain with their parents and assist in rearing the latter's broods. More seldom, they give such aid to breeding pairs other than their parents. Some of these helpers in their second or third year appear mature enough to raise families of their own. Such assistance, which is being reported in an increasing number of the hitherto little-studied birds of the tropics, seems to contradict the view that the road to evolutionary success lies in producing the greatest possible number of sturdy offspring of one's own. How could such seemingly unprofitable behavior as helping to rear other's progeny - even siblings - arise and persist? 1

The answer is that full brothers and sisters are likely to be

genetically very similar to the helpers who delay breeding while they serve them. Even half-brothers and their attendants will have many genes in common. Helpers have been found to increase the number of young fledged from the nests that they attend. Their practice of parental activities will make them more efficient parents in a later year. Continued association with experienced, territory-holding adults doubtless increases their own chances of survival. Delayed breeding helps to stabilize the population of a species resident in a fairly equable climate where adult survival is high, enabling it to maintain its numbers at a favorable level without the great annual fluctuations found in many birds of strongly seasonal climates, especially those at middle and high latitudes. Birds that help their parents to raise later broods do not thereby curtail the multiplication of the genes that support this activity. On the contrary, they appear to be helping to keep those genes as numerous as the environment will support. If altruism means aiding unrelated creatures to live more fully, it is not found in this context; yet these feathered helpers seem to have advanced a little closer to it than animals that nurture only their own offspring.

Rarely we find birds feeding, brooding, or otherwise serving unrelated nestlings, even those of a different species. Although such behavior is exceptional, it is so widespread that I suspect that individuals of every species have, over the years, brought food to nestlings or fledglings of every other species of similar size with which it has been long associated in natural habitats—there is even a well-authenticated record of a Cardinal feeding goldfish! Helpfulness that transcends specific limits usually

springs from accidental circumstances, as when parents who have lost their own brood are attracted by the begging calls of the young in a neighboring nest; it is never, as far as I know, the established, innately determined habit of any species. Natural selection would fall harshly upon genes that supported altruism at the price of their own multiplication.

Social animals, including primates, ungulates, and cetaceans, sometimes jeopardize and even lose their lives defending their group, especially when it includes helpless young. Such behavior is widespread in mankind and doubtless dates from the epoch when human ancestors lived in small groups of related individuals hostile to surrounding groups - the stage of internal amity and external enmity, to use Herbert Spencer's expressive phrase. In the frequent skirmishes between clans armed with primitive weapons, the casualties must often have been bold youths who had not yet become fathers. At a stage when the human stock was more closely controlled by the usual evolutionary pressures than in our present artificial societies, should not this tendency to jeopardize one's own life rather than preserve it for the sake of future reproduction have been sternly repressed by natural selection? Should not the clan's more timid members, who avoided the forefront of the battle, have been so much more successful in multiplying their genes that self-sacrificing behavior would be bred out of the stock?

This did not happen because the individuals who died defending the group were closely related to those that they saved. The youth killed in battle often left brothers and sisters, aunts and cousins, who shared with him many genes, including those that

made him a bold warrior. Thereby the capacity to fight fiercely was preserved in the stock. The individual passes but his genes are preserved; he was, after all, only a vehicle for their perpetuation. In the circumstances of primitive man, not peaceful, life-cherishing tribes, but those capable of producing many daring warriors, were likely to survive, until today a world that has become one great arsenal of the most destructive weapons pays the penalty for this situation.

The principle that reconciles with the general theory of evolution to phenomena so diverse as helpers among birds and self-sacrifice in battle by tribal humans is known as "kin selection." It recognizes that evolution is basically a contest for numerical superiority among genes, but that the bearers of these genes can contribute to the success of their own genetic type by means other than producing progeny of their own, so long as their activities favor the reproduction of related individuals of similar genetic constitution. Kin selection avoids the attribution of altruism to the genes; although their bearers may engage in seemingly altruistic activities, the genes that support these activities have, so to speak, arranged matters so that their own abundance will be promoted thereby. They stubbornly maintain their despotic control.

The outstanding examples of kin selection are honeybees and other insects of the order Hymenoptera, including other kinds of bees, ants, and social wasps. In these insects, as in the unrelated termites, sterile workers spend their lives providing for the queen mother and her multitudinous progeny, their sisters and

brothers. Ordinarily the workers do not, like helpers among birds, in due course produce offspring of their own. Nevertheless, these toiling Hymenoptera and termites are not neglecting the multiplication of their own genes. Indeed, the larvae and pupae that worker honeybees attend are more closely related to them, in the sense that they share more genes in common, than their own offspring, could they produce them, would be. This results from the fact that drone bees develop from unfertilized eggs and have only a single set of chromosomes in each nucleus, instead of the double set borne by the queen and her female progeny, who develop from her fertilized eggs. On her nuptial flight, the future queen, mates with a single male who gives her a lifetime supply of spermatozoa, all with identical complements of genes. Accordingly, all the bees in the hive, except the queen mother, receive from their male parent exactly the same genetic inheritance, as is probably seldom true of siblings among mammals, birds, and other animals whose fathers, being diploid, with double sets of chromosomes that are randomly distributed, produce spermatozoa of varying genetic potentialities. From their diploid queen mother, however, the female worker bees may receive slightly differing sets of genes. Although these workers may not be genetically identical with the younger brothers and sisters that they nurture, they are more similar to these dependents than they would be to their own if they had any. progeny, for, in this case, the parent and her female pffspring would necessarily have different fathers. In caring for the hime's young brood, including future queens and drones, the workers are toiling to multiply the genes that make them what they are.2

Another behavioral trait that has perplexed evolutionists is the failure of a male animal who has fought with and defeated a sexual rival to take full advantage of his victory by killing him. In many animals the individual who finds himself getting the worst of a contest for territory or a mate simply flees, and he is only exceptionally pursued with lethal fury by the victor. In a number of birds and mammals, however, the vanquished one does not retreat but remains on the spot, assuming a submissive attitude that may consist in exposing one of the most vulnerable parts of the body, the jugular vein of a wolf, the back of the head in a bird, to the victor. The latter, instead of taking advantage of such an excellent opportunity to finish off his rival, is inhibited from further attack by this innately determined, stereotyped behavior. These quadrupeds and birds display restraint toward the supplicating loser that has too often been conspicuously absent from men who have won battles or captured cities.

The restraint of the victor in these contests among animals for the means of reproduction is compatible with his immediate purpose of obtaining a female or a harem of them but exposes him to subsequent danger. The defeated one, who may be a younger individual who has still not reached his prime, may in some future encounter turn the tables and overcome his possibly ageing conqueror, preventing further reproduction by the latter. Should not natural selection favor individuals who kill, rather than spare, the defeated, thereby increasing their chances for transmitting their own genes to posterity?

Such ruthlessness could be self-defeating. The vanquished is probably not infrequently a son or nephew of the victor, who has

prematurely challenged his elder for mastery of the herd or flock, and may in a later encounter displace him. If the victor killed this ambitious member of the younger generation, he would remove from the stream of life genes which it is his biological purpose to perpetuate. His seemingly magnanimous behavior has been built into his lineage because it comports well with the genes! constant endeavor to multiply themselves. Evolutionists who insist that natural selection favors the individuals who produce the greatest number of healthy offspring, regardless of long-term consequences, often forget that any behavior injurious to the species, or the local population, as a whole, will, in the long run penalize the descendants of those very individuals who thereby gained a temporary advantage over their neighbors. Despite the rivalry among individuals of the same species to produce the greatest number of descendants, subtle interactions through many generations have tended to prevent this competition from running wild, to the detriment of the species.

Every instance of apparent altruism among nonhuman animals can be demonstrated by the evolutionist, at least to his own satisfaction, to be either an accidental occurrence, not strictly determined by the animal's heredity (as when a bird feeds nestlings of a different species), or else to be part of an innate pattern that conduces to the multiplication of its kin. But if the genes do not favor altruism, perhaps they exist to increase beauty. When we view the beauty of the living world, its vegetable and animal branches, on land and in the water, it is difficult to doubt that it is pervaded by some secret nisus or inclination to

create beauty for its own sake, regardless of its utility in the struggle for existence.

The loveliness of vegetable forms, from towering trees to humble herbs, appears to be incidental to the shape or symmetry that best fits them for their basic functions of photosynthesis, growth, and reproduction. Just as a vehicle streamlined to minimize the resistance of the air or water through which it moves is usually a graceful creation, so a leaf shaped to make the most efficient use of the materials that compose it pleases our sight. The form of the plant as a whole, the arrangement of its branches and foliage, is adjusted to the need to spread its leaves to the sunlight in the space available to it. Since plants lack eyes to see themselves and their neighbors, their evolution could hardly be influenced by a striving to become lovely. Utility rather than beauty governs their forms.

Flowers enchant us by their colors no less than by their shapes. Although we cherish them for their loveliness, they were certainly not evolved to delight us. Many small, inconspicuous flowers are wind-pollinated, but the largest and brightest blossoms depend upon animals to transfer their pollen. Competition for the services of pollinating birds, bees, butterflies, and many other kinds of insects has made flowers brilliant, fragrant, and rich in nectar. Horticulturists may select flowers for greater size or more exquisite shades, but nature fashioned them for more utilitarian ends. Their beauty is incidental to their effectiveness in producing cross-pollinated seeds.

For the beauty of animals, different explanations are available.

Their graceful forms are generally those that best fit them to run, leap, swim, or fly as they search for food or try to escape predators. Beautifully blended shades, and at times even strikingly bold patterns, make them difficult for their enemies to detect in their natural surroundings. Brilliant colors may warn predators that they are unpalatable or have effective means of defense, such as mephitic secretions, stinging hairs, poison glands, or lethal spines. But the most lavish adornments of birds and other animals with efficient color vision are generally attributed to sexual selection.

Among birds, a female's choice of a temporary or permanent partner is typically uncoerced. By voice and (or) displays of the most varied nature, the males advertise their availability; the female selects the one who appeals most strongly to her. Among species in which she nests in a territory that the male has already claimed and defends, the adequacy of his plot of ground for reproduction, the quality of its nest sites and its productivity of food for the young may strongly influence her choice. Such "territorial" birds include many species of which the male is both brilliantly colored and songful as well as many in which he is as plainly attired as his mate.

In many other species of birds, the males do not offer territories to the females and never take the slightest interest in their nests or young; their only contribution to the reproductive effort is fertilization. Often these male birds gather during the breeding season in assemblies or leks, where they vie with each other for the attention of the females who at intervals arrive

appears to be influenced by the brilliance of the male's plumage and the intensity of his displays, which reveal his maturity, health, and vigor. An especially attractive male may be chosen repeatedly by a succession of females and father many more off-spring than is possible for a monogamous male who faithfully attends his mate's nest and young, transmitting to his male descendants whatever qualities give him superiority in the contest for females. This situation has produced some of the most brilliant and lavishly adorned of all birds, including hummingbirds, manakins, and some of the cotingas in the New World, birds of paradise and pheasants in the Old. In these families the females, in many or all species who alone make and approach the nest, are usually protectively colored, in striking contrast to the ornate males.

Although sometimes more bizarre than lovely, the males in these families and others with similar courtship habits are often supremely beautiful, so that it is difficult to resist the conclusion that the demure females whose choices are responsible for their elegance have something difficult to distinguish from aesthetic sensibility. But how, we may ask, could the harsh struggle for existence, resulting from the genes' unremitting efforts to multiply themselves without limit, produce such luxuries as an aesthetic sense and the beauty that it favors? The answer to this question appears to be that the genes are not the prime movers in the creative process but instruments that it has made. They guide the development and functioning of living things, adapting them to their circumstances, but they do not determine

above all in man, their inmost nature, which sometimes expresses itself in ways that do not contribute to survival and multiplication. To understand this inmost nature, we must examine the larger world process that has given rise to life and the genes that govern it, as we shall do in chapter 10.

## BASIC FREEDOM

The human body is an immensely complex organism. Despite the researches over the centuries of thousands of anatomists, biochemists, and medical men, and the countless books and scientific papers that have been written on the subject, we are far from understanding it adequately. Not all the scientists in the world, working in the most excellently equipped laboratories, could put a human body together from the dozen or so elements of which it is composed. Yet, at conception, the nucleus of the fertilized egg, invisible to the naked eye, contains full directions for the development of such a body in every minutest detail, for its functioning as a whole and in every organ, for its progressive changes throughout the years, and for its final decline at an advanced age. Here, in a marvel of condensation or miniaturization, directions that we could convey only in mountainous stacks of blueprints and millions of words of explanation are packed into the microscopic bundles of DNA coils that contain the genes, all in a code based upon the arrangement of their constitutent atoms. Many millions of years of undirected experimentation, of trialand-error evolution, were needed to put this marvelously complete and compact set of directions together.

After about twenty years of development in a favorable environment that supplies all necessary materials, what was implicit in the fertilized egg stands before us in more or less finished form, a youth or maiden on the threshold of maturity. If one of the finer specimens of humanity, the young body will appear, in the sight of many, to surpass all other animals in grace and beauty. Our judgment on this point is not beyond dispute, because we are innately predisposed to prefer the form of our own kind; for all that we can tell, in the eyes of a crocodile a young crocodile may be the loveliest of animals. But even by more objective criteria, man is a very superior animal. Let us examine this assertion point by point.

An animal's prosperity, what it can know and do, depends largely upon its senses. The vision of many birds is keener than ours, better able to distinguish small details at a great distance. With them we share color vision (lacking in many mammals with the notable exception of our relatives, the primates), which is certainly a great aid in making visual discriminations and is one of our chief sources of aesthetic delight. Owls and many mammals appear to hear better than we do. Compared with that of mammals that find their food and detect their enemies by scent, our sense of smell is dull, but it appears to be better than that of most birds. Since what we commonly call taste is a combination of gustatory and olfactory sensations, animals with a superior sense of smell doubtless discriminate flavors as well, if not better, than we do. In the matter of touch, our nearly hairless skin gives us a great advantage; it might be argued that increased tactile sensitivity was one of the factors promoting the evolution of a naked body. Taken as a whole, I believe we may rate our natural sensory endowment as better than average among the vertebrates. With the aid of instruments that we can

make and use and other animals can neither make nor use, we raise the range and power of our senses to a level not remotely attainable by any of them.

Scarcely any other animal has a body so versatile as ours. We can walk, run, jump, climb, swim, and dive; of the modes of locomotion, only flight is absolutely beyond the range of our unaided limbs. To be sure, we can point to animals able to do any one of these things far better than we can — run or swim farther or faster; dive deeper; climb more agilely — but few can do all together. Thanks to the long ages that our remote ancestors dwelt in trees, we have, in our hands, the most versatile executive organs in the whole animal kingdom. Under the direction of the best minds in this kingdom, they are able to perform the gretest variety of manipulations. And this body of ours, so well equipped with brain, sensory organs, and versatile limbs, is built to last exceptionally long. Few mammals, including many much larger than ourselves, have a comparable potential longevity.

All this exceptionally fine organic equipment, for which few of us are sufficiently grateful, we owe to our genes. Without the slightest help fromour conscious minds, they guided its development; as a rule, they keep it in good working order from day to day. All that our parents, and, later, we ourselves need do is to maintain a favorable environment and provide enough building materials in the form of wholesome food. If we try to alter the course of growth, to make the body develop in ways not programmed by its genes or exceed structural or functional limits that they set for it, our blundering efforts may prove disastrous.

Since we lack means of communicating with them and they are inaccessible to any suggestions for our physical improvement or alteration that we would like to convey to them, their rule over our bodies is indeed despotic; but, on the whole, and for most of us, it is a benign despotism.

Of course, if we have the misfortune to be deformed, or afflicated by some congenital disorder, we may fiercely resent their rule. Nevertheless, they are probably doing the best they can for us. Although it may or may not be our parents' fault that we were born with a defective complement of genes, they could not avoid being what they and performing as they are programmed to perform. By means of surgical intervention, or the increasing array of pharmaceutical products now available, we can often correct or alleviate the malformation or malfunction for which our genes are responsible; but by no known means can we alterestheir structure to conform to our wishes.

Therefore, although our genes may not have made us as handsome, tall, strong, intelligent, or talented in some special way as we desire to be, to accept what we cannot alter is the better part of wisdom and the only road to mental tranquility. As far as our bodies are concerned, we must submit to the government of our genes, however arbitrarily despotic it may sometimes appear to us.

When we turn from their government of our body and its functioning to their influence on our emotions, thoughts, and conduct, we find a different situation. Here, for reasons that become clear when we examine the relation of mind to body, their absolute rule is unacceptable and their control should at times be resisted

with all our strength. To an evolutionist, it is evident that mind or intelligence evelved to support the genes' unremitting effort to replicate and multiply themselves without limit.

Within an organic body, especially in a warm-blooded body, and above all in a mammalian womb or an egg incubated at fairly constant temperature, the genes operate in rather uniform circumstances, automatically carrying on the functions that they are programmed to perform. They need no mind to direct them; indeed, it is doubtful whether on this planet there has ever been a mind capacious enough to understand the vast complexity of the full complement of genes in a multicellular body and supervise its operations.

The continued existence of any gene, its success in multiplying itself, depends upon the survival of the organism that bears it. To become aware of all the perils and opportunities that the surrounding world presents and to be able to react to each in an appropriate way, an animal needs sensory organs and limbs for movement. To assess all the signals that the senses bring to it, and to act as the situation demands, the animal needs a brain.

It is no accident that our principal distance receptors, eyes, ears, and nose, are situated as close as possible to the brain that receives their reports. The more complete and acute its sensory equipment, the more efficient its brain, the better the animal's chances of surviving and multiplying the genes that gave it these advantages. Although now many of us value our minds chiefly for other things, we cannot doubt that intelligence arose, in the first place, because it can promote individual

and racial survival.

In organic growth and development, and even in the daily maintenance of the body, the operations programmed by the genes typically proceed in fixed sequences. For dealing with the unpredictable courses of events in the external world, fixed sequences are often inappropriate. To do its work efficiently, the mind needs a degree of flexibility, of freedom from strict control by the genes, that it would be hazardous to concede to it in relation to the internal functioning of the body. The more highly developed a mind, the more it needs freedom from genic control in order to make the best use of its faculties.

Genetic adjustments to changing environments occur very slowly over generations. Embedded in the flesh, the genes are unaware of what is happening in the outside world. Although they have prepared the body to respond in certain stereotyped ways to external situations of frequent recurrence, as when it perspires in hot weather and produces heat by the muscular contractions that we call shivering when it is cold, they are incompetent to guide an animal through all the complexities of daily living. Accordingly, it has been advantageous to the genes to liberate the mind from strict control by themselves when dealing with the external world—as, when communication was much slower than at present, a wise monarch might allow his governor on a distant frontier a fair degree of independent action. Thus, an animal must depend upon its mind, not upon genetic control, to guide it to scattered, constantly changing sources of food. Since local—

aties differ in the sites they offer for nests and the materials available for building them, a bird needs, and frequently exercises, a measure of independence in choosing them; in the same neighborhood, some species place their nests from the ground to high in trees, and construct them with a wide range of materials. To deal with the vastly more diverse situations of human life, man has developed a high degree of the mental flexibility which is the foundation of the practical intelligence that helps animals to survive.

A mind is the child of its body. The structure of the brain, the mind's physical foundation, is predetermined by the genes and its development is guided by them. Its basic operations, veiled from our introspection, are controlled by them, Since these operations are little understood by us, and, in any case, many of us believe that they enable us to think clearly and effectively, we have no reason to quarrel with this basic control. Working obscurely in the brain's opaque depths, this mysterious process develops thoughts and aspirations that were evidently not genetically programed and occasionally are wholly new. Among these aspirations, in many minds, is that of greater freedom from the

body and its innate mechanisms. Just as a child, as he grows up, demands emancipation from parental control; so a mind, as it comes of age, struggles for emancipation from the body and the genic complex to which it owes its existence. And just as some parents grudgingly allow their children a degree of freedom that fails to satisfy them; so the genes stubbornly withhold the full measure of freedom that awakened minds desire.

The body exercises its dominion over the mind largely by means of the emotions. That these have long been regarded as states imposed upon the mind is evident from their designation, now chiefly philosophical, as the passions. (Originally, "passion" signified some inflicted pain or torture, a meaning that survives chiefly in the phrase "Christ's Passion," his suffering at the Crucifixion.) Long ago, Charles Darwin wrote that "Most of our emotions are so closely connected with their expression that they hardly exist if the body remains passive." We now know that certain emotions or passions are excited or intensified by hormones poured into the blood stream by endocrine glands, and to this extent they are products of corporeal rather than mental activity, imposed upon the mind rather than its own creations.

In the case of anger or rage, one of the most violent of the passions, the sequence is well known. When we are threatened, thwarted, or somehow thrown into an acute offensive or defensive attitude, the sympathetic nervous system stimulates the adrenal glands to release epinephrine (adrenalin) into the blood stream, thereby preparing the body for "fight or flight." The heart beats more quickly and the systolic blood pressure rises. Blood vessels

dilate, bringing a richer supply of blood to brain and muscles, and to the liver, which releases more sugar into the circulation. Breathing becomes deeper and more rapid. These are changes that prepare the animal for immediate strenuous exertion; while digestive and reproductive functions, which can wait until the crisis has passed, are inhibited. If the response happens to be fight, or at least confrontation of the enemy, rather than flight, these internal changes are accompanied by external changes of unmistakable meaning: carnivorous animals bare their fangs; a horse lays back his ears and retracts his lips; a man's face becomes unpleasantly red and tense, while his hands double into fists.

For an animal in the wild, such rapid preparation for strenuous activity is of obvious survival value. But in an orderly,
peaceful society, a man may pass his whole life with no occasion
to save it by violent action. In such a society, anger or rage is
far more often stirred up by a clash of wills, an affront to
vanity, an insult, an interruption of repose, or a threat, perhaps by legal means, to our property. In such circumstances, not
an emotional storm, but calm, deliberate consideration of the
causes of our trouble and possible remedies, is most likely to
solve our difficulty and is certainly less stressful to body and
mind.

Recently we have read much about aggression, which nearly everywhere has increased alarmingly in the last few decades.

Experiments with mammals, birds, reptiles, and fishes have demonstrated convincingly that aggressiveness, the internal disposition to aggression, is increased by the injection of male hormones,

especially testosterone. Such experiments provide the physiclogical explanation of what simple country people have known for
ages: that by castration pugnacious bulls, stallions, and other
male animals are converted into mild, docide oxen, geldings,
wethers, or capons. Aggressiveness, a major cause of the world's
ills, is not the mind's normal state but a change that comes over
it when certain bodily secretions affect the nervous system.

The aggressiveness of male animals reaches its maximum early in the breeding season, when the sexual organs are most active and pour most of their disquieting hormones into the blood stream. Then mammals and birds that for months have lived pacifically in herds and flocks become hostile toward erstwhile companions. In many species, each male seeks a territory, from which he vigorously expels all other males of his kind, and into which he may not even admit a female without an initial display of hostility. Although he may not be aware of it, his behavior at this season is regulated by the biological imperative to multiply his own genes and transmit them to posterity, and to accomplish this most effectively he must ensure that no other male fertilizes his mate or mates. After the breeding season, his reproductive organs regress and secrete less or none of their disturbing hormones; he throws off the Nessus! shirt of sexual excitability and joins others of his kind in peaceful companionship.

Since intelligence evolved to adjust animal behavior to the varying circumstances of the external world, one might expect that, whenever it attained adequate competence, the timing and intensity of the reproductive effort would be entrusted to it.

The logical arrangement would be for the animal to decide to beget offspring when living space became available for them and conditions for their nurture were favorable; to refrain from begetting offspring, or to produce fewer of them, when the available territory was becoming crowded or scarcity of food made their nourishment difficult. Long before the science of ecology was born or States kept vital statistics, primitive people, who lived much closer to nature than most of their modern descendants, realized the necessity to adjust their population to the resources of their territory, and they often made commendable efforts to accomplish this by regulating births. One might suppose that, from this point onward, man's reproductive functions would come increasingly under the control of his mind, that he would engage in sexual activity, not because he was driven by a blind organic impulse often too strong to be resisted, but because he desired a child and was convinced that circumstances for rearing himer her were favrable and that he would enter a world not so overcrowded that living would be extremely difficult - because he had found human life in favoring circumstances a precious experience and generously wished to give this experience to others. At the same time, the formation of the child's body would be left wholly to the genes, which alone are competent to direct it.

Unfortunately, the genes have never submitted to the ideal division of responsibility that would leave the formation of individual bodies under their control, while the timing and degree of the reproductive effort is entrusted to intelligence, whose

proper task is the adjustment of human life to its external circumstances. Perhaps it would be unrealistic to expect the genes to reduce the intensity of their most distinctive activity, that of replicating themselves indefinitely. It might help if we could make them understand that excessive reproduction may defeat its own purpose, in man as in other animals. The latter often raise more offspring, in the season when food is most abundant, than can find nourishment in the lean months that follow. During the inclement season, mortality falls most heavily upon the young, who are less experienced in foraging and, moreover, are often excluded from the most productive spots by dominant adults. Before they succumb, the unfortunate ones consume much of an essentially fixed quantity of available food that could have kept other individuals alive until the supply wis replenished in the next growing season; so that, if the animals were less prolific and entered the season of scarcity with fewer juveniles, it might maintain a consistently higher population. This was clearly demonstrated by R. K. Murton's studies of Wood Pigeons in England, in which the population is decimated during the winter months when the supply of fallen grain, weed seeds, and clover, on which they chiefly subsist, is at best renewed far more slowly than it is consumed. 4

Man, too, has repeatedly built high populations only to have them drastically reduced by famine. Humanity now faces the alternatives of continuing to multiply its billions until it crashes, along with the rest of the living world, in a widespread ecological disaster; or of reducing and holding its numbers within

reasonable limits, so that it may flourish, with steadily increasing quality and happiness, for many thousands, if not millions, of years.

In the interest of social harmony, the proper nurture of children, and often, too, of eugenics and the adjustment of the population to its resources, nearly every human society, including the most primitive, has endeavored to regulate the relations of the sexes, by tribal custom, by religious commandments, by civil law, by public opinion, or by some combination of these factors. Hardly any rules have been more difficult to enforce. The blind endeavor of the genes to multiply themselves, operating through bodily functions that they control, stubbornly opposes rational arrangements that might actually, in the long run, establish them more firmly in the living world. For many a conscientous adolescent and adult, the effort to make sexual behavior conform to social rules, religious precepts, or high personal ideals involves an almost lifelong conflict between the governing mind and mindless organic impulses. Many, even the wisest and strongest-willed, are overcome by the adversary within them; while the weak and the sensual follow their impulses with little regard for consequences.

As civilization advances, life becomes more secure, and populations can be maintained with a birthrate far lower than that required to prevent the extinction of a small primitive tribe existing precariously amid hostile neighbors, one might expect the strength of man's reproductive drive to be correspondingly reduced. Exactly the opposite appears to happen. Perhaps, if we

view the matter dispassionately, we must regard this as man's greatest misfortune. To have an organic function so greatly exceed its biologic utility is certainly a physical imperfection, as though some monstrous outgrowth disfigured the human body, or one leg grew much longer than the other. Moreover, the continuing strength of the urge to multiply the genes, its stubborn refusal to submit to rational control, is undoubtedly the greatest single cause of human misery, whether we measure its effects by the anguished conscience that often oppresses those who could not control their lust, by the unhappy lives of unwanted children, by social discord, by poverty, by the famines resulting from overpopulation, or by the wars undertaken to relieve population pressure. Whether we read the Iliad and learn how the infatuation of Paris and Helen brought on Troy's destruction, or survey the more serious novels of modern times, it becomes evident that man's failure to control his reproductive impulses is a major source of tragedy.

As the wise have long recognized, the oldest, most persistent form of human bondage is the domination of the human mind and conduct by passions rooted in the human body. Anger, aggressiveness, hatred, lust, jealousy have a somatic origin, or are at least intensified by hormones and organic tensions. Just as, at the command of his master, a cowering slave does what he does not wish to do, often what is most repugnant to him; so we, when incited by these passions, too often act in a manner contrary to our best interests and steadfast principles of conduct—in a manner that we shall soon regret. Like many paternal despots,

the genes that form us do some things well and other things not so well: they give us bodies of superior construction and the best minds in the animal kingdom; but, perversely, they try to withhold from these minds the freedom that they should have, for their own happiness and even for the long-term survival of the genes themselves. But the awakened mind does not tamely submit to this continuing tyranny; it struggles valiantly to be free, to govern the body rather than be governed by it. It realizes that freedom from domination by irrational passions is the basic form of freedom, upon which all others depend. Until we have won this basic freedom, true freedom of choice will be beyond us. Until we liberate our minds from oppressive passions, neither the most liberal political constitution, nor the most vigilant guardians of civil rights, nor the most felicitous social arrangements, can make us free, for the source of our bondage is within us.

The sensual and the base in vain are free, Slaves of their own dark passions.

Revelt against oppressive rulers of states has generally been sparked by fiery, passionate men, while calm, contemplative natures have bent all their efforts to liberate themselves from the despots within.

## THE REVOLT AGAINST THE GENES

All that we are, or have the possibility of becoming, we owe to our genes, which determine the form and functioning of our bodies and lay the foundation of our minds. Even the possibility of becoming dissatisfied with what they do for us, of rebelling against their rule, is ultimately attributable to them. Had they made us otherwise, we might not be capable of discontent with what we are; it might never occur to us that we could be different, and perhaps better, than they have made us. As far as we can tell, no animal other than man is dissatisfied with itself; none deliberately tries to alter its innate patterns of behavior or to make itself more beautiful than nature has made it. Although it was formerly believed that the lovely motmots of tropical America embellished their tail feathers by trimming them into the form of a racquet, with a terminal disc at the end of a length of bare shaft, actually this configuration is determined by the feathers' structure.

Of all the gifts that nature has given us, that of becoming dissatisfied with what we are is one of the most unique and precious, for it often goads us to build upon our genetic foundation to heights that we might not otherwise attain. Yet, like all precious gifts, it is not without danger. A misguided effort to improve oneself can have the opposite effect.

Perhaps the earliest manifestation of discontent with the form that the genes have given man is the practice, widespread among

savages and by no means absent from more advanced cultures, of mutilating or distorting the human body. Flattening the forehead by attaching a board in infancy, enlarging the ear lobes or the lips, perforating the nasal septum, cicatrizing the body by means of incisions in the flesh, binding a child's feet to keep them small, are examples of these harsh practices. Already at an early stage of culture we find the mind oppressing the body, with results that are often offensive to refined taste. It is easier to disfigure than to improve the form of a body that at its best, as when young, compares favorably in grace and beauty with that of any other animal. Every time we shave our faces, or remove hair from any part of the body, we perform an act of defiance to our genes, which persist in making it grow where it is not needed and often detracts from our appearance.

In certain of the earlier civilizations, long antedating the

Christian era, a new conception of the relation of soul to body changed men's attitude toward the latter. According to the new doctrine, soul or spirit is older and more enduring than the body that it temporarily inhabits, perhaps because it became infatuated with the lushness of matter, as in certain versions of Gnosticism, or from the karmic effects of earlier misbehavior, as in Hinduism. It may be reincarnated in a succession of bodies, as in Indian religions and Platonism. Or the soul may be no older than the single body that it occupies on Earth but capable of surviving it, as in Christianity. In any case, while in the flesh it suffers countless ills; but when finally released from body it will enjoy, if it has been righteous, everlasting bliss, perhaps along with vast knowledge and power, as in Jainism/

The belief that the soul is a stranger in its body, different in origin and destiny, led to a withdrawal from corporeal satisfactions; for the more one indulged in them, the more firmly he seemed to be bound to the flesh, the more difficult his final release from it appeared. The degree of this withdrawal varied from religion to religion and from individual to individual. For Plato, who was no ascetic, the important points were to live righteously and think high thoughts, especially about the changeless, eternal Forms or Ideas. The Buddha advocated a middle way, avoiding harsh extremes, yet far removed from our modern notions of a minimum standard of living, and even farther from our luxuries. But for the extremists and fanatics in many religions of emancipation, the will to win final release from the body and enjoy eternal bliss led to the most amazing practices. Among Christians, the desire to emulate Christ's sufferings, thereby becoming worthy of the eternal life that his sacrifice won for those who believed in him, prompted self-torture that was often excessive.

compared witch the abuses that the more fanatical or psychopathic ascetics showered upon their bodies, the "cosmetic"
alterations practiced by many savages were mild treatment.

The zealot abstained from food and drink to the verge of exhaustion; he exposed himself to extremes of cold and heat; day and night, he wore the harshest, most uncomfortable garments that he could devise, sometimes studded with sharp, inwardly pointed nails that pierced his flesh; he refrained from washing and endured all the resulting vermin; he slept on the most uncomfortable

bed; he made long vigils devoted to prayer; he flagellated himself with cruel scourges; he isolated himself from his fellows; he tried to make his life an hourly martyrdom; he did everything short of killing himself, for he was taught that by suicide he could not win heaven or release from the round of reincarnations. the ascetic Above all, especially in the Christian tradition, he abhorred and dreaded sex, and, as we learn from the life of St. Antony, the first known Christian anchorite, much of his anguished effort was directed to the suppression of the sexual impulses and suggestions that, to his dismay, continued to surge up within him, sent, as he believed, by the devil to tempt him. Thus he achieved the ultimate in his repudiation of the genes that formed him as a vehicle for their preservation and multiplication. Yet, paradoxically, if he accepted orthodox Christian doctrine, he believed that after the Final Judgment his soul would re-inhabit this now so despised and abused body, resurrected from the grave and endowed with blessed eternal life. For had not Jesus, his Savior, ascended bodily from the tomb?

The ascetic, as we learn from the writings of Walter Hilton, often averted his gaze from the external world, supposedly God's handiwork, as the embodiment of evil. Even to let imagination dwell with pleasure upon natural objects was sinful and perilous to the soul. Especially to view the naked human form was polluting, Sometimes, when advancing years, aided by a hard, unhealthy life, dampened the fires of passion, the ascetic might win a measure of the inner peace for which he so ardently struggled and mitigate

his cruel treatment of himself, as happened with the Blessed Henry Suso.  $^{L}$ 

Asceticism carried to such extremes is certainly not the road to freedom for either mind or body. The latter becomes the abused slave of a heartless master. The mind is enslaved to its fixed ideas and, in its zeal to chastize the body, more absorbed in it healthily than that of one engaged in useful work.

Although asceticism has too often been carried to absurd lengths, a modicum of it is indispensable for any religion that aspires to improve character and conduct; indeed, for any individual, of whatever beliefs, who tries to dwell in greater harmony with his fellow men and the natural world. Asceticism is essentially a revolt against some of the evils into which life has fallen in consequence of the genes' relentless efforts to multiply themselves. Evolution will favor any genotype that can reproduce more rapidly and successfully than its competitors, no matter how disastrously its behavior falls upon surrounding organisms. This harsh struggle for existence gave rise to a host of predators, which kill and devour their victims, and swarms of parasites, which sap the blood and strength of living hosts. What might have been a harmonious community of beautiful creatures living joyously has because been infected with hatred and terror, lingering disease and violent death. Man has not escaped involvement in this dreadful maelstrom; once a frequent victim of the more powerful predators, he has become, himself, the most destructive predator on Earth. As he has gained ascendancy in the animal kingdom and reduced his mortality, he finds himself with

a reproductive potential that greatly exceeds his needs, supported by sexual drives difficult to control, the source of many of his woes.

Asceticism is a standing protest against these two great evils, predation and excessive sexuality, as well as against many a lesser one to which our genes predispose us. In the life of a Christian saint, the struggle against the domination of sex was often primary, virginity the highest virtue. In Indian religions that make ahimsa or harmlessness to all creatures the foundation of holiness and the first principle of morality, one who aspires to sanctity is, above all, careful not to live as a predatory animal. The true ascetic kills no animal of any kind, for food or otherwise. No maiden is seduced by his lust; no unwanted child cast into a difficult life, no marriage disrupted, by his incontinence. His abstemious habits prevent the waste of food that others need. His vow of poverty saves him from envying other people's possessions, and other people from envying his. No rancorous disputes over property perturb his peace, waste his time, and estrange him from his neighbors. With the causes of contention largely removed, he has little reason to hate anybody or anything. He is more convivial, in the literal meaning of the word (from the Latin con vivere, to live with), than the jovial company at the festive board, eating and drinking to excess, for his frugality permits other creatures to live along with him. Dwelling in peace with all around him, he may meditate upon the mysteries of existence until his mind soars far above the pettiness of sectarian disputes. If he does nothing more for his neighbors than provide a living example of a good and holy life, he serves them in a way for which simple people are often grateful.

Sometimes, too, with few needs of his own, he finds more tangible means to aid them.

To be sure, the ascetic's abstinence from flesh causes no ecologically significant reduction in the predation that rages throughout the living world; yet many a creature owes its life to his forbearance. His example of restraint is not followed by enough people to solve the population problem; yet sorrows are avoided by his continence. A degree of asceticism that gains most of its advantages yet avoids its excesses need not be confined to the monk or nun, for it is not incompatible with family life. By restraint in diet and dress, by dominating our passions and limiting our possessions, we increase our fitness for whatever high endeavor engages us, improve our relations with our fellows, and diminish our often excessive demands upon the planet's productivity. We demonstrate our freedom from control by appetites and social pressures that cause excessive indulgence and wasteful Systems for spiritual emancipation with the most diverse

metaphysical presuppositions have been almost unanimous in stressing the necessity to subdue passions that are largely rooted in our bodily constitution. For the followers of the Buddha, the path to Nirvana was closed to one obsessed by desire and envy, anger or lust, or who injured living things. To the Stoics, fear, greed, grief, and even hilarity or jubilation were diseases of the soul, incompatible with the tranquil life to which the wise man aspired. For Spinoza, whose philosophy owed much to the Stoics, the emotions were the source of human bondage; reason sets us

free. Our spontaneous, genetically determined passionate reactions to life's contingencies, doubtless valuable at an earlier stage of human existence when survival depended upon swift responses to surprises, have persisted too stubbornly in our hereditary constitution and are a principal obstacle to our spiritual emancipation and happiness.

Nothing has incited more widespread revolt against the conditions of human life than the inevitability of death. The primitive mind cannot accept death at its face value, cannot believe that it is in fact what it appears to be, the termination of our conscious life and extinction of our personality. Just as, while one lies dreaming, his soul often leaves his body on an adventurous journey; so, when a person dies, his soul departs on a journey, but now it fails to rementer the body. However, it may appear to his survivors in a dream, perhaps bringing a timely warning or some valuable advice. Surely, the savage reasons, the vital principle of the deceased must live on in the mysterious land of the shades. More advanced cultures gave birth to religions that promised a blessed immortality to the faithful, whose survival as disembodied spirits seemed too obvious to require proof. So incredible has the total extinction of the human person always been to all but a few sceptical philosophers and scientists and those influenced by their views!

Why do we become senile and die? Some think that an animal body simply wears out like a piece of machinery, which even when constructed of the finest materials does not run for ever. However, organisms have a capacity for self-renewal such as no

artifact of lifeless metal, plastics, or wood possesses. Even in extreme old age, cuts and bruises heal, recovery from illness is frequent, hair continues to grow, skin and other tissues to be regenerated. Another theory is that the accumulation in the cells of certain products of their metabolism gradually impairs their efficiency until they cease to function. This appears more probable than the first explanation but apparently has not been proved.

The most likely explanation of senility and death is that they are programmed by the genes, which at conception contain what we might metaphorically call a blue print for the whole course of the incipient life, from its development through its maturity to its decline and final extinction. One of the most obvious signs of advancing years, the graying of the hair on the head, is almost certainly a programmed development rather than simply the exhaustion of available pigment, for it often occurs long before hair elsewhere on the body loses its color. This badge of approaching senility appears to be analogous to the silvering of the hair on the back of a mature male gorilla. Perhaps it was evolved to ensure to the elders, human or anthropoid, the status and respect due to their years and valuable experience — a privileged position that the youth of today is trying to wrest from the older generation.

The manufacturers of certain articles have been accused — I know not with what justice — of practicing "planned obsolescence," failing to make their products as enduring as they could be made, so that before long they will need to be replaced, thereby increasing sales. Apparently, evolution has done something of the

sort with animal bodies, which may not be intrinsically incapable of living indefinitely but have had the cause of their decline and demise built into them. Death is evidently an event that evolution has promoted because without it evolution could hardly proceed.

Evolution is essentially the gradual replacement of older types by newer types. To accomplish this, the not-so-well-adapted ancestors must be removed little by little, not only to make living space for their better-adapted descendants but also to prevent the older type from continuing to interbreed with the, at first, only slightly different newer type, thereby reducing its efficiency. To be sure, the older type, simply because of its poorer adaptation to prevailing conditions, would suffer heavier mortality from predation, disease, climatic extremes, or whatever happened to be the main causes of death. Nevertheless, the more rapid turnover of individuals that may be gained by limiting the potential life span of each should accelerate evolution, which is naturally, especially in long-lived animals, a very slow process when measured by human rather than geological time. Without death, we might not yet be men.

Thus the genes, which at their best give us the sound mind in a sound body that is the indispensable foundation of a happy, rewarding life, finally withdraw their gifts from us — unless we have already had the misfortune to die prematurely in a traffic accident or by some other viclent means, or from disease. This might be easier for a generous, philosophical mind to bear if he

were assured that death still contributes to human evolution, that in passing away he helps to make room for a race of men superior to those of today in the ways that are most important—in moral and spiritual qualities, appreciation of the privilege of living on a unique planet, and capacity for happiness. But contemporary social conditions, including efforts to control human numbers that result in a differential birth rate in favor of the least intelligent and responsible section of the population, offer little hope that humanity will improve and probably are causing its deterioration.

Likewise, the prospect of death would be less distressing if science supported religion's promise of spiritual survival. But the problem of immortality is beyond the competence of biology. In any case, nothing in evolutionary theory leads us to suppose that the spirit's survival of death is programmed in our genes, like death itself. However, many things that we become and do were never programmed in our genes, which have given us minds capable of rising above strict control by them. This being true, to live in hope of a blessed immortality, and to try with all one's strength to become worthy of it, is not irrational.

Although reluctance to die at an advanced age is rebellion against the despotism of our genes, it is, nevertheless, a compliment to them. It is proof that life in the bodies they have made for us, the only life we know or can realistically imagine, is, despite certain inconveniences, so pleasant that we desire to continue for ever this familiar existence, or something not

too dissimilar from it. Our situation is much the same as that of a man exiled from his country for criticising its government. Despite the faults he has found in it, he would rather be there than anywhere else.

To the Stoics of old, death was no evil, because it is according to nature, and, in their philosophy, nothing natural is evil.

Nevertheless, they viewed fear, anger, hatred, lust, and other strong passions as evils that the wise man would carefully avoid, and we now know that these psychic states have a somatic and, therefore, a genetic foundation, hence they are in the same category as death itself. The Stoics, as their philosophical rivals in the classical world lost no opportunity to proclaim, were not always consistent. But what philosophy is?

Doubtless the Stoics were right in not including death among life's evils, for it is in a class by itself, a superevil, at least for the individual whom it removes from an interesting and beautiful world, without the assurance that he will reach another equally pleasant. For humanity as a whole, it can be a benefit only if it paves the way for racial improvement, and, as we have seen, this is at present doubtful. Otherwise, death merely puts the survivors to the trouble and expense of burying the deceased, settling his estate, and raising and educating replacements who, on the average, will be no better than he was. For most of us, the loss of eyesight, or hearing, or the use of our limbs, or all our knowledge and memories, or all our property, or all our family and friends, would, each by itself, be considered a great evil; how can the loss of all these things simultaneously be other than the greatest of evils that can befall an individual, a superevil?

To help to reconcile themselves to life's termination, men have often disparaged its joys and satisfactions while emphasizing its troubles, pains, and sorrows, thereby trying to persuade themselves that to lose life is to lose nothing of great value. This tendency, widespread in Christianity and Buddhism as well as in paganism, is nowhere more evident than in the meditations of the Stoic emperor, Marcus Aurelius. Death inevitably casts its shadow over the life of any thoughtful person; the uncertainty of its date, of how long we have to complete our undertakings and reach cherished goals, is at times hardly less oppressive than the certainty that it will finally descend upon us. Nevertheless, to permit death to diminish our appreciation of life's precious experiences is an ignoble surrender to its sway. Why should we value beauty, love, knowledge, adventure, and everything else of high worth that life can give us, the less because we cannot enjoy them for ever? We win a temporary victory over death by living fully and fearlessly no less than by prolonging life. Although our genes may have programmed life's ending, we can hardly blame them for the loss of zest in life that the contemplation of this ending sometimes brings to brooding minds, as this is more likely to impede than to further their multiplication.

We should reserve our fears for what we have some hope of avoiding; to dread the inevitable reveals weakness of mind. Nevertheless, the person who fears or abhors death becomes contemptible only when this aversion is narrowly self-centered, when he quails before the prospect of his own death but does not care how many other creatures he kills, or are killed for him. Aversion to death acquires dignity, even nobility, when it becomes absolute and manifests itself in reluctance to deprive any creature, of whatever kind, of its life if this can be avoided without disastrous consequences to oneself, one's family, or the community. Such reverence for all life reveals a mind that has achieved the highest degree of independence from the genes in its body. The conditions of evolution are such that behavior strictly controlled by the genes must contribute to the survival of their bearer and his descendants or close collateral kin, but they do not inhibit the widespread destruction of unrelated creatures. Conduct that contributes to the survival or prosperity of unrelated humans, and, even more, of creatures of other species, is the free choice of a liberated mind.

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FREEDOM AND THE INHERITANCE OF PARENTAL ACCOMPLISHMENTS

Animals and plants often differ more or less from their parents, and some of these differences are inheritable. Inheritable variations that increase the organism's success in living and leaving descendants are preserved and, gradually accumulating in a lineage, produce evolutionary change; while those that decrease success in living and reproducing are sooner or I later eliminated. As to the origin of the inheritable variations, two opposing explanations have been advanced. The older theory, stubbornly held by earlier evolutionists and reluctantly abandoned only when supporting evidence was demonstrated to be inconclusive or falsified, was that changes induced in the parent by the direct action of the environment, or by its individual efforts to survive and prosper, were transmissible to descendants and might become part of their innate heritage. This view has been designated as the inheritance of the effects of the use and disuse of parts, or the inheritance of acquired characters. Since it was advanced in 1809 by Jean Baptiste de Lamarck, in an elaborate work entitled Philosophie Zoologique, the doctrine that acquired characters are inheritable is commonly known as Lamarckism. The presently accepted view, that the effects of use and disuse are not inheritable, but evolution depends wholly on random changes in the structure of the chromosomes or the genes that they contain, is associated

with the name of Charles Darwin, although he himself wavered between these alternative explanations. Likewise, Lamarckists did not deny that some such variations might arise by chance; what they insisted upon was that the efforts of individuals to survive lead directly to evolutionary change.

To make the difference between these two theories clear, we may turn to the classic example of the giraffe. How did this animal acquire its long neck? The Lamarckian explanation runs somewhat as follows: At a time when competition for browse was severe, some ancestral giraffes exerted themselves mightily to nibble leaves and young shoots of trees above the reach of other terrestrial browsers. Thereby they strengthened the muscles of the neck and possibly stretched it slightly. Whatever increment in length they achieved was transmitted to their offspring, who, starting where their parents had left off, might stretch the neck still farther. Such upward straining, continued generation after generation, resulted in this quadruped's unique cervical elongation, which placed within its reach a source of food all its own. Meanwhile, those giraffes who did not try so hard to reach high shoots continued to compete with short-necked browsers; in periods of scarcity many starved, until finally the short-necked giraffes vanished from the Earth.

According to the other view, populations of ancestral giraffes differed somewhat in length of neck, as in other characters. In dry seasons when leaves were scarce, the longer-necked individuals survived better because they could eat foliage in-

accessible to other terrestrial browsers, and they left more progeny. The offspring did not inherit any additional neck length that may have been induced by their parents' upward straining, but some of them received the genes that made the parents' necks grow longer than average. Continued mutation, with the better survival of the longer-necked individuals, resulted in the bizarre animal able to reach foliage high above the ground.

A plausible explanation of the inheritance of acquired characters, known as pangenesis, has been available since ancient times. Without microscopes or knowledge of the minute details of reproduction, the ancients viewed the semen of animals as their seed, the womb as the soil in which it was planted. As we learn from the works of Plutarch and Diogenes Laertius, Democritus of Abdera, and later the Stoic philosophers, believed that every part of the male's body contributed to the formation of this seed, thereby enabling it to reproduce every part of the male parent's body as it grew in the mother's womb. As late as 1871, pangenesis was viewed with favor by Darwin, who wrote: "According to this hypothesis, every unit or cell of the body throws off gemmules or undeveloped atoms, which are transmitted to the offspring of both sexes, and multiplied by self-division."

This, of course, is just the opposite of what we now believe to occur; the reproductive cells, spermatozoa and ova, do not receive contributions from every part of the body; but, after fertilization and by means of repeated nuclear and cell division, they transmit their genetic code to every part of the body, causing the cells in each part to divide and differentiate in the manner appropriate to their place in the organism. Until Weismann's work on the germ plasm and more recent advances in cytology and genetics firmly established the modern doctrine, pangenesis offered the most credible hypothesis in the field and gave strong support to Lamarckism. One great weakness of this hypothesis is, however, immediately apparent. If a parent lacked an organ to supply gemmules to the semen or ova, the offspring should lack this organ, or at least have it underdeveloped. A father who had lost an arm in war or an accident should beget a son whose corresponding arm was absent, or at best incompletely developed, since some gemmules for it might be supplied by the mother. This, of course, does not happen.

The nearest approach to the inheritance of acquired characters that modern evolutionists will admit is genetic assimilation, originally but less aptly called "organic selection," which simulates Lamarckian inheritance, although its mode of operation is quite different. Sometimes an animal, perhaps driven outward by population pressure, settles in a habitat somewhat different from that in which its ancestors lived. Lacking perfect innate adaptation to its new environment, it must, on its own initiative, make certain adjustments, such as eating strange foods and altering other habits. If it succeeds in reproducing in this new habitat, its progeny will not inherit any of its individual acquisitions. But they will inherit the innate plasticity that

enabled the parents to adapt to different surroundings; and some may, as a result of mutations, be slightly better adapted to the new conditions than the pioneers were. If the lineage can perpetuate itself in the new environment long enough, it may eventually achieve a high degree of innate adaptation, not because it inherited any of the effects of use and disuse by the ancestors, but by means of appropriate genetic changes and differential survival. Examples of expenses examples are assimilation are insects that adopt a new food plant, and after some generations differentiate into a physiological race, or perhaps a new species, that eschews the original food plant. If continued long enough in a lineage, any acquired habit that promotes survival and reproduction might finally become genetically based in this fashion.

Not only is there a dearth of sound evidence to support the doctrine of the inheritance of the effects of the use and disuse of organs; even if it occurred, its evolutionary potentialities would seem to be rather limited. If we work much with an axe, certain muscles grow more massive and calluses develop on our hands, but this is because our genetic constitution causes our bodies to respond in this manner. If we put an ill-fitting saddle on a horse without a proper pad, he does not develop a callus on his back— which would be a blessing to the poor animal— but it rubs raw; the horse lacks the innate capacity to react to pressure and friction on his back by developing thick, protective skin. Everything an animal does, whether a physiological response to a stimulus or an outstanding intellectual achievement, it does

because it has the appropriate genetic foundation; without this foundation, it can do nothing.

Since the ancestors of giraffes already had necks and striped muscles, it is conceivable that they could stretch their necks a little longer to reach high, tempting foliage. But if we try to explain the evolution of the vertebrate eye - that stumbling block to metaphysical evolutionists - on Lamarckian principles, we run into insuperable difficulties. We cannot account for its initiation by the principle of use and disuse, because at the beginning there was no such organ to use. Could the sightless creature with which we must begin even imagine vision, as it must have done before it could try to see? Did some remote angestor of the fishes know enough optics to desire a lens and a sensitive retina, then strive to develop such a complicated apparatus in its head? Difficult as it is for us to imagine the number of random mutations that have contributed to the perfecting of a bird's exe or a man's, and the far greater number of mutations affecting vision that were discarded as worthless or harmful; it is even more difficult to conceive how, by willing or striving to see or to see better, any lineage, however long, could have evolved such a marvelous structure.

Even in the case of much simpler organs, such as teeth,

Lamarckian inheritance could hardly account for their close

adaptation to the dietary habits of their possessors, for, as

Julian Huxley pointed out, by the time they enter into action

they are too hard for their shape to be altered, except by wear.

And the chitinous exoskeletons of insects, so infinitely varied

and well adapted to all the insects' diverse modes of life, are
too rigid to be modified by the adult insect's habits or the
direct influence of the environment. Evolution by the natural
selection of random mutations develops things so novel, so improbable, that the most inventive mind could hardly imagine them.
By vegetative propagation, or some other mode of asexual

reproduction, individually acquired characters can be perpetuated. A mutation in an apical cell of a shoot of a tree or shrub may, by cell division, affect all the subsequent growth of that branch, including, perhaps, the flowers and fruits it bears. If this particular plant can be propagated by cuttings, the mutant branch can be multiplied indefinitely, as has happened to some of the best varieties of the banana. But the thousands or millions of plants that may be produced in this way are, in effect, so many detached parts of the original "sport," not separate individuals in the sense that seedlings are new individuals. In any case, the genic mutation in an apical cells that started the new variety arose as "accidentally" as a mutation in a reproductive cell, not in consequence of any effort by the plant in which it occurred.

It is not difficult to understand why, to certain minds,

Lamarckian evolution has been more attractive than Darwinian or,
evolution
more properly, Neo-Darwinian. Not long ago, men believed that God
had made them in his own image, only a little lower than the
angels. In the eighteenth and early nineteenth centuries, Buffon,
Erasmus Darwin (grandfather of Charles), Lamarck, and others,
spread among educated people the idea that man had descended
from humbler forms of life, probably ultimately from creatures
as lowly as worms and microscopic animalcules. This doctrine

proudly claimed for himself, by virtue of his unique origin and special destiny, and place him squarely in the animal kingdom; but the demotion was softened by the thought that he had risen to his position as lord of creation by the efforts of a long line of ancestors to improve themsevles. After all, we are what we are, no matter how we came to be that way; and to have been lifted to our present level by the efforts of our forebears is perhaps more respectable than to have fallen from paradise because of our first mother's gullibility. But to be told now that our ancestors' efforts contributed nothing directly to our present innate endowment, that in brain and body we are wholly creatures of chance, was an affront that some people bitterly resented.

Among those who reacted strongly against the newer view were Samuel Butler, author of <u>Erewhon</u> and <u>The Way of All Flesh</u>, and, later, George Bernard Shaw. In 1890, the former wrote: "According to extreme Charles-Darwinians and Weismannists, habit, effort and intelligence acquired during the experience of any one life goes for nothing. Not even a little fraction of it endures to the benefit of offspring. It dies im him in whom it is acquired, and the heirs of a man's body take no interest therein. To state this doctrine is to arouse instinctive loathing; it is my fortunate task to maintain that such a nightmare of waste and death is as baseless as it is repulsive." Butler saw Luck and Cunning as the alternative main means of organic modification, and he preferred Cunning. 8

It is fascinating to speculate on the differences that the inheritance of acquired characters might have made in the evolution of life - on how Lamarckian evolution might have contrasted with Neo-Darwinian evolution. To return to the patient giraffe, how might the inheritance of the effects of use and disuse have affected its destiny? It seems evident that if upward stretching could have produced an inheritable increase in neck length, then the great structural change that removed the giraffe from active competition with the other terrestrial herbivorous quadrupeds of the African savannas could have been accomplished more rapidly, with less waste of life. For instead of offspring with necks of variable length, some longer and some shorter than those that their parents had before they stretched upward, the giraffes with elongated necks would produce only progeny with equally long necks, who might stretch them still farther. Short-necked giraffes would not have been born to them, only to live on short rations and probably die without descendants.

Similarly with any other animal with some innate plasticity of structure or habit that is striving to adapt itself to new situations: the lineage might accomplish the transition more rapidly, without "such a nightmare of waste and death." If the inheritance of individually acquired characters prevailed in the living world and striving to become adequate to meet life's demands produced heritable modifications, reproductive rates might be much lower than they actually are, for it would not be necessary to engender such a multitude of randomly varying individuals,

in order to select a few that are better adapted to actual conditions. Lamarckian evolution, which postulates the influence of the environment upon the innate constitution of the progeny, should be more successful than the prevailing system in adjusting the reproductive rate to a species' need of recruitment. If, in response to crowding, animals reduced the number of eggs they laid of the size of their litters, this effect might be hereditary.

As we know, evolution can follow the upward path to splendid achievements, or the downward path to parasitism, degeneration, extinction. The inheritance of acquired characters might be as powerless to prevent the latter as is the noninheritance of acquited characters. In certain cases, it might even accelerate the downward journey. When starving or suffering from dietary deficiencies, some animals, including man, turn cannibals, or they may become incipient parasites. So long as the acquired habit does not become heritable, they are likely to abandon these practices when conditions improve; but if these unpleasant habits became innate, they would persist. Nothing short of an omniscient, omnipotent God, either creating directly or guiding evolution with unremitting vigilance, would seem to be able to bring forth from living stuff all the joy and beauty it is capable of yielding, while avoiding all the ugliness, strife, and sorrow that are likewise its potentialities - but a Deity devoid of jealousy, like the Demiurge of Plato's Timaeus, not a jealous God. like Yahweh in Genesis.

In plants, which have slight capacity to change their way of life by their own efforts and, moreover, are frequently subject

to mutilations that do not prevent their setting seed, the inheritance of individually acquired characters might bring little advantage. It seems impossible that they could have contrived all those remarkable methods of promoting cross-pollination and disseminating their seeds, through the agency of wind, water, animals, and explosive mechanisms, that spread them widely over the Earth. For these devices - which if invented by ourselves we would call "ingenious" - they are indebted to the accumulation of random mutations. In animals with considerable mobility and a good deal of individual adaptability, yet with limited capacity to teach their young, and which, moreover, rarely in the natural state succeed in reproducing if seriously injured, the inheritance of acquired characters should be advantageous; it might have saved certain species from extinction. But how is it with man, with his great capacity for learning, innovating, and inventing, along with an ability to transmit his skills, knowledge, and ideals to the next generation that appears to be limited only by the receptivity of the young?

Doubtless it frequently happens that a child of gifted parents, admiring his father's learning or skill in a difficult art, or perhaps his mother's fluency in foreign languages, wishes that he had been born with these accomplishments, instead of having laboriously to acquire them for himself. How fine to become a great mathematician without having to begin by learning to add

two to two and painfully repeating the multiplication table; to become a brilliant musician without years of patient practice; to speak a forerghanguage without ploddingly memorizing vocabularies, declensions, confugations, and grammatical constructions! Although we could hardly expect to do these things in the cradle, the abilities that we inherit in latent form might develop as we grow up, as naturally and effortlessly as some of the innate capacities of animals, such as nest-building by birds, appear to do. If we inherited our ancestors acquisitions, we might begin where they left off, and, continuing to build upon the foundation that they transmitted to us along with our bodily form, raise arts and sciences and manual skills to unimagined heights. And what great expense it would save the State, in school buildings and teachers, if we were born with at least the basic requirements of our culture; ability to read and write, elementary arithmetic, and some knowledge of the fundamentals of morality and law!

Probably, if some god offered us this gift - not for ourselves, who have passed the point where we might profit by it, but for future generations of mankind - we would seize it eagerly, as the greatest boon we could confer upon posterity. But, as the Greeks knew of old, those who receive gifts from the gods often rue it later; so we had better pause and reflect before accepting this. The prospect for our successors is so flattering that we are apt to overlook the hidden snares. Without some special, god-given dispensation, the inheritance of our parents' acquired characters would not be restricted to their virtues, sound

knowledge, and useful skills. Children might be laden from birth with the undesirable no less than the desirable acquisitions of their progenitors. The delinquencies and vices of the parents, their absurd superstitions, their rampant dogmas, their nagging fears, might all be innate in the offspring. We would expect a drunkard's son to become a drunkard, just as we expect a Wood Thrush's son to become a fine songster. Liars' children would naturally become liars, and children of thieves could with difficulty be restrained from theft.

Moreover, to have too many innate endowments might deprive us of the pleasure of learning and improving ourselves by our own efforts. Although to be forced to learn a subject for which we have little aptitude and less interest, as too often happens in school, is painful; to learn the things for which we have a natural affinity is one of our most satisfying experiences. Adolescence, despite its perplexities, is for the eager scholar perhaps the happiest of life's stages; for he feels his mind expanding with new knowledge while his body matures, and nothing is more gratifying to us than growth. As long as learning remains an exciting adventure, we never really grow old, no matter how gray our hair turns. To be born omniscient would deprive us of the joy of learning, and we might not discover another equally satisfying activity. Perhaps it would be desirable to be innately endowed with reading, writing, and arithmetic, along with certain moral principles, leaving more advanced and exciting knowledge to be learned.

In view of the present imperfect state of mankind, the

prevalence of weakness, vice, falsehood, and prejudice, I believe that we must conclude that, on the whole, we are fortunate that we do not inherit the effects of use and disuse, or the acquired characters of our forebears. However it may be for other animals, for us, in our actual state, Darwinian inheritance seems preferable to Lamarckian. What a blessing that the child of the criminal, the profligate, and the vicious is born untainted by his parent's misconduct, but with the possibility of building his life fresh and clean from its prime foundations! Even if he has inherited certain genetically determined weaknesses, he may, if surrounded by wholesome influences in his formative years and gifted with some strength of will, overcome them and live decently, even admirably. The child of outstanding parents may regret that he was not born with all their accomplishments; but he has probably inherited some of their innate ability, and, if he will build diligently upon this foundation, he may rise as high as they did, or higher. Moreover, what we acquire by our own strenuous endeavor is more truly ours, a source of greater satisfaction, than what we receive effortlessly from others.

greater part of the knowledge and skills that we need for living successfully, as it has done for many other animals; if it has deprived us of the possibility of receiving directly from our

deprived us of the possibility of receiving directly from our parents, along with life itself, the admirable virtues and accomplishments that some of them have; it has given us something still more precious, the broadest foundation of undeveloped

capacities in the whole animal kingdom. Instead of loading this

If evolution has not equipped us at birth with all or the

foundation with what our ancestors have built upon it, it has left us free to build as we will. This freedom, like every other, comes accompanied by a heavy responsibility, that of choosing wisely. To refuse this responsibility is to disdain the most splendid gift that nature has bestowed upon any creature, to reject one's humanity. For to be human, in the best sense of the word, is to be responsible — to make one's important decisions with a view to their long-term effects on our own lives, on posterity, on the Earth that supports us and all its living cargo. This is a heavy burden, but a god-like one, that we should bear with joyous pride.

Lamarckian inheritance would give the past greater control over the future, parents over their children, than they now have. Civilization might be more static. This might be an advantage if we could find, or develop, a culture that brought happiness and a sense of fulfillment to all, or the great majority, of its members. Although some people have expressed great admiration for certain societies of the past, such as Periclean Athens and even barbarous, tumultuous Medieval Europe, these civilizations, and all others as far as I know, have had great faults, which were eventually their downfall. I doubt that anyone desires our present flamboyant civilization to continue unchanged for ever! For us, then, a mode of inheritance that leaves the future open seems preferable to one that ties it too firmly to the past. One might suppose that nature, disregarding what might be best for certain other living things, chose the mode of inheritance that would best serve man's future interests. But this is just another example of our good luck.

The reason why neither physical nor mental modifications achieved by parental effort are transmitted to progeny is that, as far as we know, they invariably fail to alter in any way the molecular structure of the DNA that will determine the innate characteristics of the next generation.

When we consider possible undesirable effects of the inheritance of parental acquisitions and, moreover, recall how much of what is best in us we can transmit to the next generation by instruction and example, we must disagree with Butler and Shaw about the desirability, for man, of Lamarckian evolution. Nevertheless, we may share their consternation and moral indignation as they contemplated evolution as it actually operates. It is undeniably a cruel, brutal process, depending upon random alterations in complex molecules for its advances, along with a method of distributing favorable genes that reminds us of nothing so much as shuffling and dealing playing cards in a gamblers' game, and mercilessly eliminating players who, through no fault of their own, receive losing "hands." Life has, in effect, gambled its way upward from its humblest beginnings to its finest achievements. After we, as scientists, have dispassionately weighed the mountains of evidence that support modern evolutionary theory, we may as moral beings constant Shaw's sentiments when he proclaims that "there is a hideous fatalism about it, a ghastly and damnable reduction of beauty and intelligence, of strength and purpose, of honor and aspiration, to such casually picturesque changes as an avalanche may make in a mountain landscape, or a railway accident in a human figure."

The contrast between the splendid things that evolution has accomplished and the crude, merciless, wasteful methods by which it has done so, brings poignantly to mind the greatest of all paradoxes, the glaring inconsistency at the very foundation of life and of the Universe of which it is an expression. Latent in the cosmic stuff of which our planet was made were all the high values that life has achieved or can achieve - beauty, intelligence, happiness, friendship, love, honor, compassion, and all the rest. The realization of these values has depended, primarily, upon the arrangement of the atoms in coherent, harmoniously attuned patterns, such as we find in all organized beings and, preeminently, in the higher vertebrates. Yet, as far as our utmost diligence can discover, there never was a plan for the organization of this cosmic stuff throbbing with glorious potentialities, never an Intelligence capable of guiding it to their realization. Life has had to blunder its way upward by trial and error, much in the manner of a rat trying to find its way through an experimenter's maze, depending upon fortuitous alterations of atomic patterns for all its advances. I am aware that certain Deists, including Charles Darwin's grandfather, Erasmus, have held that God showed his greatness more adequately by establishing a system capable of evolving to its present state without further guidance than if he had directly created the world as it is. I might believe this if the method of evolution were not so harsh and wasteful, capable of producing so much that is ugly and evil as well as so much that is beautiful and good, that to ascribe it to a God whom we can love and worship is treason to

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our moral sentiments.

The cosmic stuff that, when it formed our planet, had latent within it such high values must likewise have been infused with some urge or impulsion to bring these values to fruition; otherwise, they must have remained for ever latent. We can as little imagine how it acquired this striving as how it gained its potentialities— these are the ultimate mysteries. We may concede this much to teleology without supposing that any of the forms that evolution would produce, or any of the values that it would yield, were foreseen or imagined. Although in theory everything that happens in a determinate Universe would be predictable by a mind sufficiently informed and capable, we lack convincing evidence for the existence of such a mind.

At every stage of evolution, the succeeding stage comes as a surprise. Who could have guessed, when the mighty, apparently cold-blooded dinosaurs dominated the Earth, that they would be supplanted by the mostly much smaller, homeothermal birds and mammals? Our remote ancestors who chipped the first crude stone tools and weapons could never have for seen the multitude of marvelous inventions which the technology that they thereby started would give to their descendants. Even as little could they have imagined all the values that these descendants would discover, in the contemplation and study of nature, in intellectual pursuits of many kinds, in cultivating friendship and exchanging ideas with people of all nations and races instead of hating, scorning, and fighting neighboring tribes. Likewise, despite all our sanguine or gloomy prophets and the flattering or bewilder-

ing pictures of the future that germinate in the fertile minds of innumerable science-fiction writers, we have no convincing forecast of what humanity will be like fifty or a hundred thousand years from now, if it does not in the interval overwhelm the planet with its soaring numbers. This future may be more splendid than we can imagine— or so pitiful that we would prefer to see the final curtain drop on the human drama. In view of this uncertainty, we should be grateful that, by education and example, we can transmit our finest accomplishments selectively to our descendants, without being tied to a mode of inheritance that automatically fastens our personal skills and habits, good and bad alike, upon defenseless children.

Ry failing to transport arguered accomplishments directly to descendants the genes increase our freedom.

## FREEDOM OF THE WILL

In chapter 3 we noticed examples of revolt, often successful, against the despotism of the genes that shape our bodies and lay the foundations of our minds. The ascetic's harsh treatment of his body could hardly be genetically programmed. His effort to repress or eradicate his reproductive impulses runs contrary to the genes' dominant effort to multiply themselves. Although the behavior of some of the more extreme ascetics often appears perversely irrational, they are not insane; they know what they are doing and can give reasons for it; often they write with clarity about their beliefs and practices. Likewise the effort to live without harming any creature, which has been widely practiced in the East and more rarely in the West, could never, according to evolutionary theory, be genetically programmed; the evolutionist knows no means by which behavior that favors unrelated organisms and brings no advantage in the struggle for existence could become genetically based. And daily each of us engages in activities not programmed in our genes. How has human behavior escaped from strict control by heredity, which appears to regulate rather closely all the activities of instinct-guided animals?

Can we owe this liberty to the free will attributed to man by many philosophers and, perhaps even more vehemently, by multitudes who disclaim interest in philosophy?

Before we undertake to answer this difficult question, we

has little to do with the possibility of acting upon our volitions or realizing our desires. Most of us do so, in matters small if not great, a hundred times daily; no philosopher would waste his time defending or refuting what is so obvious. Yet countless pages have been written. proceedings or refuting the doctrine of free will. What, then, is it all about?

Neither is the problem of free will concerned with the question of whether our volitions originate within us as expressions of what we "really" desire. It goes deeper than this, to examine how they originate. The libertarian, who supports the doctrine of free will, asserts that at least some of our volitions or decisions might have been different from what they were, because they were not necessary consequences of all the factors affecting our minds at the moment when they were made. He denies strict, uninterrupted causality in the mind that wills; he regards volitions, or at least some of them, as uncaused causes of action.

On his view, even if all pertinent conditions were exactly the same (which probably never happens in complex human minds and

situations) we might not make the same choice the second time as we did the first time. Accordingly, human decisions are not, even in principle, always predictable.

Opposed to the libertarian is the determinist who believes that the whole Universe, the totality of nature including man, is ruled by strict necessity, so that nothing could have been otherwise than as it is. For him, causality reigns supreme, and he makes no exception for mental events such as choosing and willing. Identical situations, if they ever occur, invariably produce identical results. Human choices and actions are, at least in principle, predictable because, in the given situation, we could not have chosen otherwise than we did. A mind sufficiently capacious (as theologians have asserted the mind of God to be) to take account of every dart and spin, every positive and negative charge, of each of the countless trillions of particles in the Universe, might with confidence predict everything that will happen in it throughout all future time, including every flick of a gnat's wing and every whim of the most fickle person. We are what we must be, and one who knew us well enough might foretell how we will act in any given situation. Among the most famous of the deterministic philosophies are those of the Stoics in ancient times and Spinoza in early modern times. A complete description of a deterministic universe was an ideal of early modern science, encouraged by its successes in mechanics, especially in explaining and predicting the movements of the planets and their satellites. In simplest terms, the conflict between the libertarian and his opposite hinges upon the question of

whether determinacy invariably prevails in the mind, or whether indeterminacy sometimes occurs.

Physical systems might be wholly determinate while a measure of indeterminacy enters into biological and mental systems. Or both physical and biological systems could be determinate, while mental systems are not. Nevertheless, could we prove that indeterminacy occurs in the physical world, it would strengthen the case of libertarians who assert that it occurs in the mental world, at least in the act of willing. And if we could demonstrate beyond all doubt that the physical world is everywhere strictly determinate, it would afford a presumption, although not a proof, that those who deny free will are right. Since physical systems can be so much simpler than biological and mental systems, and lend themselves so much more readily to experimentation and analysis, it might repay us to examine briefly the situation in the physical world.

Modern science summarizes its findings in laws that are no more than expressions, preferably mathematical, of observed regularities. They do not, like civil laws, pretend to regulate the behavior of the materials to which they apply. They can never be broken, because any well-authenticated deviation from a physical or chemical law would invalidate it, or at least cause its modification — in contrast to a statute law, which can be disobeyed many times yet remain unchanged. Modern science, at least above the subatomic level, is based firmly on the postulate that its laws apply to determinate systems in which, when all pertinent factors are the same, the effects will always be the same and,

accordingly, predictable. Every engineer who designs a complicated machine or a huge construction has faith, at least implicitly, in the reign of causality. The feats of sending men to the moon and bringing them back, of sending unmanned space craft to Mars or Jupiter, rest upon exceedingly intricate plans and calculations that assume strict causality. The success of these grand enterprises seems to validate the assumption that we live in a determinate Universe.

Nevertheless, these successes do not place this assumption beyond question. Repetitions of experiments in physics or chemistry often yield slightly different numerical results, perhaps far to the right of the decimal point. Often these small divergences are attributed to undetected variations in the experimental setup, perhaps slight fluctuations in temperature, or minute traces of impurities; the results of repeated measurements are averaged to give the accepted value. Nevertheless, we cannot arbitrarily dismiss the possibility that these small variations spring from the indeterminate behavior of some of the components of the experiments.

Some of the laws of physics and chemistry are statistical, in the sense that they express the average behavior of large numbers of units. One of the simplest of these, Boyle's law, states that, the temperature remaining the same, the product of the volume and pressure of a fixed quantity of gas is constant, or that the pressure varies inversely with the volume. The pressure that a gas exerts upon the wall of the container is caused by

at varying velocities. In a second of time, so many particles impinge upon the sensitive surface of a pressure gauge that irregularities resulting from the erratic movements of the particles are smoothed out, and the reading on the gauge corresponds very closely to that predicted by the law. But if we could make our gauge small and sensitive enough, it might reveal wild fluctu-

ations due to the different numbers and velocities of the particles colliding each instant upon a very small surface. Through a powerful microscope, one may watch minute particles, suspended in a liquid, vibrate rapidly in the erratic "dance" called Brownian movement, which is caused by the random impacts of darting molecules.

We believe that the courses of darting molecules, erratic though they be, always conform to laws such as we can demonstrate to hold in the rebound of visible bodies, such as billiard balls, but we cannot prove this. Some or many of the millions of particles in our container might be behaving indeterminately, deviating now in this direction, now in that, from the norm, in such a manner that their idiosyncracies cancel out, giving us the regularities expressed by Boyle's law. I suspect, however, that even statistical laws would not apply to systems infected with much indeterminacy.

Physicists speak of Heisenberg's uncertainty principle, which recognizes the difficulty of determining simultaneously both the position and velocity of an electron orbiting around an atomic nucleus. The celebrated physicist, Sir Arthur Stanley Eddington, called this "the principle of indeterminacy" and detected in it the foundation of the freedom of the human will—a tremendous and hazardous leap, which reminds us of the rather similar attempt of the ancient Epicureans to deduce human freedom from

the unexplained sideward deviation of atoms falling through the void. As I understand it, the uncertainty principle expresses a difficulty of measurement that does not necessarily imply indeterminacy in the movements of the electrons.

For the regularities that prevail in the physical world and the accuracy of the laws that express them we have massive evidence. All the calculations of astronomers and engineers, all our daily activities, at least when we deal with inanimate things, are based upon the usually tacit assumption that we dwell in a determinate Universe. The more science advances and our understanding deepens, the more accurately are we able to predict events, not only in the physical realm but likewise in the living world, including the behavior of human individuals and societies. Nevertheless, unexpected things do happen, and we cannot follow the movements of each of the millions of particles that compose any visible material body. Although we cannot demonstrate the occurrence of indeterminate events, we cannot exclude the possibility that they occur more or less frequently. We may live in a Universe that is partly determinate and partly indeterminate, but to me this seems improbable.

If we cannot exclude the possibility of indeterminacy in the physical world, how can we hope to decide whether it does or does not occur in the mental realm, which is more complex and far less accessible to observation (other than by notoriously fallible introspection) and to exact measurements? Although I agree with Maurice Cranston that the problem of free will is not, as some

have held, a false problem arising from verbal confusion, in the present state of our knowledge it is an insoluble problem. Those who most strongly insist that the will is, at least on occasions, free and uncaused, have supplied no criterion by which to recognize these occasions; we have no means to distinguish free from necessary volitions. Moreover, some advocates of free will allow us so little of it that we may wonder whether it is worth having. They may even, like Bergson, assert that many people pass their whole lives without ever having known true freedom. 13

While we are choosing between two alternatives equally accessible to us, we feel that our choice will be perfectly free, in the sense of being undetermined by our own past, and that we could as easily elect one alternative as the other. Our minds are in much the same situation as a balance on which two nearly equal weights have just been placed on the opposite pans. The beam oscillates back and forth, like a mind wavering between two enticing possibilities, but we are certain that it will eventually incline toward the side with the heavier weight. Similarly, the deliberating mind must yield to the attraction that is stronger at the moment when the decision is reached. To be sure, if the decision was not irrevocable, we might a minute later, swayed by new considerations that occur to us in the interval, choose the other alternative; but this is a different decision, made in a new set of circumstances,

Although, when we review some of our recent choices, they may strengthen belief that the will is free, when we examine decisions that we made long ago, we may reach a contrary conclusion. Prob-

After a decade or two, we are likely to remember only our more important decisions, especially our inward struggles at crises in our lives, when something precious to us, our happiness, our reputation, or our most cherished aims, was at stake. At these critical times, our will does not seem as free and undetermined as when we choose between wearing a blue shirt or a gray one, between two enticing woodland paths, or perhaps even between marrying Jane or Helen. Bergson, however, took just the opposite

view from Sidgwick, Cranston, and me. According to the French the occasions of freedom are not philosopher, freedom is revealed, not in our small daily choices but in the decisions we make at the great crises in our lives, when our true inmost self is revealed. But if our decision is to be faithful to our true self, must it not, in some sense, be determined by it?

The doctrine of free will appears to make deliberation a futile waste of time. When we earnestly consider whether or not to follow a certain course of action, we place on one side all the pleasant experiences, gains, and other advantages that we expect it to bring us, and we weigh against them, as in a balance, all the risks, discomforts, sacrifices, and other deterrents that we foresee in this course. The incentives act like accelerating forces in a mechanical system, the deterrents like opposing forces or obstacles, and the will is finally, often after much delay, moved in the direction of the stronger influences, in a manner analogous to that of a body subjected to a manifold of forces. If a decision is not determined by deliberation, deliberation is a farce; and if it is so determined, it hardly escapes causality.

Belief in free will or its opposite, absolute determinism, seems to depend more upon one's religion, philosophy, world view, or temperament, than upon personal experience or even a painstaking survey of all the time-worn arguments for and against the doctrine. Why do people cling so tenaciously to belief in free will and defend it so vehemently? Foremost in many minds is the relevance of free will to ethics, with its problems of moral

responsibility, praise, blame, punishment, and the like. Among philosophers who have held that if we lack free will morality is doomed was Nicolai Hartmann, who in his great work on valuational ethics, wrote that "the whole significance of morality is abolished, if freedom be proved to be an illusion." But so great an authority as Henry Sidgwick, taking a more down-to-earth British view, thought "it possible and useful to shew that the ethical importance of deciding the question of free will one way or another is liable to be exaggerated; and that any one who will consider the matter soberly and carefully will find this importance to be of a strictly limited kind. Certainly, morality is only weakened by making it depend upon a dubious metaphysic; unless it is strong enough to stand on its own feet without metaphysical props, man's future is bleak.

To say that one ought to do something implies not only that he could do it if he so willed but that he can will to do it. But if our moral decisions are determined, so that they could not be otherwise than they are, how can any one ever be held responsible for neglecting a duty or committing a crime? How true this objection is we shall consider later; now let us see whether the alternative is any better.

I can understand the doctrine of free will only as an assertion that my volitions, in so far as they are free, are not determined by my character, my past life, my present interests, or any combination of pertinent factors. To admit that they are so determined is a contradiction of terms, for "free" in this context is generally taken to be the equivalent of undetermined or uncaused; it is the denial that the act of willing is subject to strict causal-

ity. The "free" volition seems to spring from nowhere, owing to nothing to anything that preceded it in the natural order; according to Hartmann's modification of Kant's doctrine of the phenomenal and noumenal worlds, it intrudes into this order from a metaphysically higher level. In any case, it appears to be independent of me. How can I be held responsible for a volition that springs into my mind in this mysterious fashion, perhaps to issue in an act that will shame me or send me to prison? If my will is free, I appear to be in a situation not unlike that of a driver whose car does not obey the steering wheel. How can he hope to control it? Free will, if it means what it appears to mean, seems to destroy responsibility, for how can one be held responsible for volitions released from causality and accordingly, from all control?

truly mine must be a faithful expression of my character, my steadfast principles, my enduring interests, or something of the sort, as related to pertinent external circumstances. To say this is to assert that it must be controlled, that is, caused by me; otherwise I cannot recognize it as mine. Not free will but causality, not indeterminacy but determinacy, enables us to assume responsibility for our volitions and our deeds. I would be happy to believe that whenever I choose wisely and do well my behavior is strictly determinate, but my wrong decisions spring from my "free will," for then I could claim credit for the former and disclaim responsibility for the latter. If our decisions and conduct are not necessary consequences of our character, then, placed in exactly the same circumstances a second time, we might behave

quite differently. The man who is today a paragon of righteousness might tomorrow commit some horrible crime. Responsibility and causality are inseparable.

The notion that without free will ethics is doomed, because it is inappropriate to praise, blame, or punish acts that could not have been otherwise, reveals failure to understand what ethics is about. From its birth in ancient Hellas, ethics has pondered the proper ends of human life and the conduct that promotes their realization. Praise, blame, and punishment are not the ends of morality but aids to their attainment. Praise may strengthen a wavering effort to be righteeus; blame or censure may inhibit improper behavior; while punishment may act as a deterrent to crime and perhaps reform the offender. But the truly good man will continue to live righteously whether or not he is praised; the hardened criminal is indifferent to blame and may hardly be influenced by the prospect of punishment. Those who stand midway between these extremes may be encouraged to improve by commending their good behavior, censuring their shortcomings, and reminding them that flagrant misbehavior will be punished.

Among the foremost aims of ethics is the improvement of character and conduct, and in this sphere the success of our efforts would seem to depend largely upon whether we are dealing with a system in which determinacy or indeterminacy prevails. In all practical endeavors, whether to improve crops, a factory, or a communications system, we proceed upon the assumption that certain operations will have definite, predictable results. Can it be otherwise when dealing with human character? Would our efforts

to improve ourselves or others be more likely to succeed if we dealt with an indeterminate system, in which states followed each other capriciously, or with a system in which procedures determine their results? Contrary to what is sometimes stated, the deterministic view should fortify, rather than discourage, our efforts to improve character. To be sure, human minds and temperaments differ so greatly that the training appropriate for one may fail miserably with another, so that we must choose our methods with some understanding of the person with whom we deal.

It is sometimes claimed that in a wholly determinate universe, where everything is the necessary outcome of its antecedents, our efforts - including the most important of them, the improvement of character - count for nothing, for in the end everything will inevitably be what it could not avoid becoming. Nevertheless, all our toils and pains, all our striving and planning, are indispensable parts of the process, which would be far different if we could omit them. What the world will be like a century or a millenium from now may be predetermined in all details by its present condition, but it will not attain this future state without the efforts, for better or worse, which those who live through the intervening years are impelled to make. Although an omniscient mind might, after surveying the world's present state, predict exactly what its condition will be at any future date, we whose intellects are limited can only learn this by waiting and working through the interval, with the hope that our best efforts will make it better than it is. A problem in simple arithmetic has only one answer, which a super-mathematician might be able to tell you at a glance but we can learn only by painstaking work

with paper and pencil. If we wish to know the answer, who would say that the effort we make to find it is wasted, because this answer was implicit in the terms of the problem and, therefore, predetermined? Or who would contend that the construction of a building is an appalling waste of materials and labor, because its finished form was predetermined by the architect's plans? Similarly with our efforts to improve ourselves and our world; the results may be predetermined, but we cannot know or enjoy them unless we make the effort—and if we are earnest and optimistic, we cannot avoid making it.

The problem of free will versus determinism has exercised the minds of theologians perhaps even more than those of secular philosophers, because the values at stake are no less than God's omnipotence, omniscience, and benevolence. First, let us glance at the question of his omniscience. The most trustworthy criterion of a determinate system is its predictability. If, from knowledge of the characteristics of a system we can foretell exact how it will behave, evidently the uncertainty introduced by indeterminacy is absent. If God knew "at the beginning of the world" exactly what each of us would ever do, we cannot do otherwise without falsifying his foreknowledge, which a pious mind would consider impossible. Long ago Boethius, in his prison cell, saw clearly that God's omniscience cannot easily be reconciled with man's free will, and, despite theological subtleties, the difficulty has not been overcome. Either God's foreknowledge is not complete, because he does not know what men will choose, or free will is a delusion.

We might save man's free will by sacrificing God's omniscience, at least with reference to certain future events, but his omnipotence must go along with his omniscience. For, in so far as man is free to choose, between good and evil or otherwise, God is obviously not in full control of everything that happens on Earth, even if the movements of planets, stars, and galaxies obey him strictly. However, by this course we may also save his benevolence. Following an ancient belief, we may hold that the power of God or the gods is limited by a prior necessity, Rita or Fate, rooted in the very foundation of Being and not wholly amenable even to the divine will. Plate took up this thought in the Timaeus, where he represented a benevolent, creative Demiurge as fashioning the best world that the nature of his materials permitted, yet, because of the refractoriness of some of them, failing to make it as excellent as his model in the realm of the eternal Forms. Centuries later, Leibniz developed a rather similar notion in his doctrine of compossibles: that certain desirable things are incompatible with other desirable things, and a benevolent Creator chose the best possible combination. Thus we might say that man's intelligence could never have been developed without enabling him to choose freely. By giving man this power, God surrendered complete control of mundame affairs, with the result that countless evils arose, but this was better than peopling a world with puppets.

S. Radhakrishnan, the philosopher who became president of India, declared that to believe that God is what we imagine him to be is blasphemy. If I could believe in a God who is, above all, the infinite magnification of certain human attributes such

as knowledge, power, and justice, I would worship with much more loving devotion a merciful Deity of limited power and foresight than an omnipotent, omniscient God devoid of compassion. Others have thought differently, giving rise to the grim dogma of predestination. By withholding free will from man in a strictly determinate world, the omnipotent God retains full control of everything, and, being likewise omniscient, he foreknows all that will happen. Bound in adamantine causal chains, no one could be other than he is or act other than he does. Eve could not avoid succumbing to the Serpent's wiles, and her maker knew that she would, as he knew in advance all the evil and suffering that would ensue from her folly. In such a world, all responsibility for everything that happens appears to go straight back to the Creator; creatures are what he made them and could not by any means be different or act differently. However, God is also just (in a way that surpasses our understanding) so he damns the sinners everlastingly and admits to ineffable bliss those of his puppets who have acted exactly as he forced them to act.

It is clear that the problem of free will is closely connected with the question of whether God or man is responsible for all the world's evils. Man has ever been ready to humble himself before his God and cast the blame for all his ills upon his own perverse use of his free will, thereby exonerating Deity. And even if he denies the reality of free will, he may, following Job, conclude that God's ways are beyond human understanding, so that he cannot be blamed for our sufferings. However that may be, we now know that the ills which afflict life began long before

man arose, in the occasional excesses of the physical world and, even more, in the clash of organism with organism on a crowded planet. Man has inherited, and often intensified, these ills. His passions, which so often overpower his judgment and thwart his benevolence, were foisted upon his stock during the long ages when he was struggling to survive along the rough evolutionary road that led from a relatively innocent arboreal primate to full manhood with its mixture of divine and diabolic attributes.

Another reason why certain thinkers have fervently supported free will, and indeterminacy in general, is that it seems to increase the potentialities of creation. This was especially true of Bergson, who discerned at the foundation of life "an effort to graft, on the determinacy of physical forces, the greatest possible amount of indeterminacy. To me it appears most dubious that indeterminate developments could appreciably increase the incalculably vast potentialities of the Universe. Consider the almost infinitely diverse forms, the immense variety of activities, that have already resulted from the combination of the three basic particles, protons, electrons, and neutrons, in different patterns, first in the formation of atoms, then in the structures built up with the ninety-two naturally occurring elements. Creative advance depends primarily upon the combination of these ancient structural units in improved patterns; we are men, rather than amoebas or frogs or some other humbler form of life, because in the DNA molecules in our chromosomes the atoms are arranged somewhat differently, forming genes with different potentialities.

Physicochemical forces, acting, as far as we know, in a

determinate manner, are constantly shifting atoms about, in the genes as elsewhere, giving them new arrangements with new potentialities. The value of these new patterns can be discovered only by testing their behavior in their actual environments. Many prove to be inefficient or poorly adapted to their circumstances and are eliminated in the struggle for survival. Others are in certain ways superior to the older types and multiply themselves, perhaps indefinitely. Since known forces are capable of shuffling the atoms into an endless diversity of patterns, I fail to see what would be gained by the intrusion of indeterminacy into the process. And capricious, indeterminate behavior, at any level of creation, might make all advances precarious. Much indeterminacy could be far more harmful than beneficial to nature and to man. In a world heavily infected with indeterminacy, we could not have confidence in anything.

The creative activity of the human mind runs a course somewhat similar to that of the external world. A new mechanical invention seldom contains a novel basic principle. The inventor is familiar with wheels, levers, gears, springs, and so forth as well as with a wide variety of materials and their behavior when subjected to heat, cold, pressure, electric charges, and the like. He combines these well-known elements in a novel way to meet some special need, first in his mind, perhaps in a sudden flash of insight, perhaps in a long process of trial and error. If he is satisfied that his invention will work, he may make a drawing of it, then a working model. The model may work poorly or not at all, so he improves it, perhaps repeatedly, until it becomes operative.

As a rule, many modifications by a succession of inventors over the years are required to perfect a complicated machine, such as an airplane or a printing press.

Some thinkers have held that such creative activity reveals the mind's freedom from the chain of causation. I see no reason for such a claim. The inventor evidently has an engrossing interest in machines, a wide familiarity with mechanical principles, and probably some knowledge of previous attempts - and failures - to design what he is trying to make, say a flying machine. He succeeds where others have failed, not because something without antecedents has miraculously surged up into his mind, but because he is more persevering, and possibly also more intelligent, than his predecessors, and often, too, because he has the advantage of recent developments, such as the internal combustion engine, which they lacked. Similarly with creative work in literature and the arts. A novel or drama is composed of current words and recurrent situations in human life, put together in ways suggested by the author's experience or imagination and imbued with his sentiments, such as sympathy, moral indignation, or cynicism, which give the work its special flavor and make it great or trifling. What need or authority have we to assume that literary or artistic creation owes its successes to free will or indeterminacy?

In determinate transformations, the quantity of matter and of energy (or of matter plus its energy equivalent if the transformation is atomic fission or fusion) remains unchanged. Causes and effects bear a constant relation. But if the effect is not

the necessary result of its antecedents, something - matter or energy or something else - appears to have surreptitiously entered the system, or perhaps dropped out of it. An indeterminate effect resembles, on a miniature scale, the creation of a world from nothing, if such has ever occurred. Readers of Fred Hoyle's books on astronomy have become familiar with the hypothesis that new matter, from which new galaxies will eventually be formed, is continually springing up in the intergalactic spaces, compensating for the reduction of the average density of matter in the Universe that results from its continuous expansion and thereby keeping it in a "steady state." But space, the matrix and sustainer of all that is, at once the most marvelous and the most mysterious of existing things, is far from being nothing. If it is true that it gives birth to new matter, it probably does so in an orderly, determinate fashion, conforming to certain natural laws of which we remain ignorant - a question difficult to investigate in the inaccessible spaces between the galaxies.

However this may be, neither the addition of matter or energy to the Universe, nor the indeterminate behavior of that already present, nor indeterminacy in the act of willing, appears able appreciably to increase our already immense potentialities for creation. Just as adding letters to the twenty-six already in our alphabet would not increase the quality of our literature or philosophy, which depends upon the ability of thinkers and authors to arrange them, and the words they compose, in truer or more beautiful writings; so creative advance of every kind involves above all the arrangement in patterns that are more harmonicus,

more coherent, and more inclusive of materials that have long been available.

Although moralists may support the doctrine of free will because it seems to validate praise and blame, theologians because it enables them to shift responsibility for the world's evils from God to man, and philosophers because it appears to open the way for novel developments, many people insist that their wills are free for a much simpler reason - the appeal of the word "free." They welcome anything that is free for themselves or their dependents: free meals, free transportation, free amusements, free samples of merchandise. They desire to be free from insect pests, noise, dirt, and all other annoyances; they want to be free to say what they think and go where they wish and in general to do as they please. If they know a little history, they may remember man's long, often bloody struggle to win freedom from oppressive rulers, religions, and economic systems, and they may may recall how many millions of their contemporaries are still in thrall to tyrannous governments. Anything called "free" recommends itself to them at first sight, and, without carefully examining the question, they imagine that having a "free will" increases their liberty. One wonders how many would so vehemently oppose the suggestion that free will is a delusion if it were called by some other, technically more appropriate name, such as "volitional indeterminacy"?

We conclude, then, that the accuracy with which physical and chemical laws have been found to apply to a wide range of phenomena demonstrates convincingly that we live in a Universe that is prevailingly determinate, yet we cannot exclude the possibility

of a small measure of indeterminacy. As our understanding of biology deepens, we find that here, too, processes are orderly and predictable, yet it is even less possible to prove that indeterminate events never occur. Similarly, in the realm of mind, the more profound our psychology, the better we can predict how people, individually or in masses, will think and behave, yet we cannot exclude the possibility of free will. All our mounting evidence favors the hypothesis that, from its foundations in the physical world to its flowering in the human spirit, our world is governed by causality. In contrast to the massive evidence that supports determinism, belief in free will is upheld by no evidence but simply by metaphysical speculations made more or less plausible by the lack of evidence, naturally extremely difficult to amass, that the Universe is wholly, in all its aspects, determinate. Even the most ardent supporters of free will admit that most people exercise it seldom, many perhaps never, and they provide no satisfactory criterion by which we can identify its occasions.

why, then, do ordinary people and philosophers alike cling so stubbornly to belief that volitions are free in the sense of being undetermined by antecedent conditions? Largely, I am convinced, because of certain misconceptions. First is the common experience that we feel perfectly free to choose between alternatives. As has been shown, when the decision will have no momentous effect upon our lives, which will continue much the same whichever of the alternatives we elect, this impression of freedom is strongest; our final choice appears to be determined by

slight, fluctuating preferences, so that, although it could not have been different at the instant it was made, a minute later we might well have elected the other alternative. The more momentous the decision, the more it appears to be constrained by forces deep within us, so that in retrospect we often recognize that we could not have chosen other than we did.

Secondly, free will has appeared to many to be the indispensable condition of moral responsibility. It is indeed hard to
understand how so many brilliant minds have persisted in this
curious error. Free will is the negation of causality, according
to which events are controlled by their antecedents, as modified
by present circumstances. If a man's acts are not strictly subject
to his control, how can he be held responsible for them? Free
will destroys responsibility.

Thirdly, the emotionally charged word "free" predisposes people to assert that their will is free. Freedom of the will seems to enhance man's dignity and liberty. But, just as the alternative to living under just laws is to fall into a state of anarchy, so the alternative to causality in our volitions is lack of control over them. Would our feeling of dignity and freedom be increased by knowledge that our volitions, instead of being necessary consequences of our character, sometimes or often arise at random? I cannot prove that our volitions are never free in the sense of escaping causality, although satisfactory evidence for this belief is lacking. But I am certain that nobody who understands the implications of "free will" would choose it for himself or his children. On the contrary, he would fear it like some pernicious

disease, for he would lack full control of his volitions and their consequences.

A powerful support of the dogma of free will is man's reluctance to admit that he is wholly a part of nature, that vast, enigmatic system whose potentialities we have explored most imperfectly. All the rest of nature, including the whole animal kingdom except man, is, according to some of the most fervid advocates of free will, governed by undeviating causality; man alone enjoys freedom. However, to view ourselves as separate from nature makes all the evil in us much more difficult to understand, and to forgive, than when we recognize that we have been formed, in body and mind, by the same evolutionary process that shaped the rest of the living world. Both of our sharply contrasting aspects, our godlike benevolence and our demonic malice, become the more explicable the more profoundly we study evolution and the behavior of our brother animals. Instead of perversely holding ourselves aloof from nature, let us humbly admit that we belong wholly to the single, universal system of which we have any knowledge, and try to demonstrate by our own development to what splendid heights nature can rise.

## THE FOUNDATIONS OF HUMAN FREEDOM

In the preceding chapter we concluded that if our freedom depends upon the escape of our volitions from causation it is dubious and precariously established, a source of danger to ourselves and those around us. Now let us seek it in another direction.

How do we decide the more important questions in our lives? What is the nature of deliberation? Suppose we are contemplating a journey through foreign countries. If we seldem leave home, we probably think about the trip for weeks or months before the date of departure, balancing the incentives for such an adventure against the deterrents. With pleasure we anticipate grand scenery, visits to famous places, meeting different people, a break in our daily routine, seeing archaeological sites or birds or whatever our interest happens to be. Against these attractions we weigh the expense, the often troublesome formalities at frontiers, the possible loss of luggage, the dangers of travel, neglect of our home and affairs while we are absent. We make our journey in imagination, over and over, before we buy a ticket. On some days when vitality is low, we decide to stay at home. On others, in a more sanguine mood, we are eager to go. Much will depend on how we feel when the time for the final decision arrives.

Or we consider building a new house. If we have definite ideas about it, we see it in our mind's eye even before we con-

sult an architect; we imagine living in it before a single foundation stone is laid. We dwell in fancy on its imposing façade
and commodious arrangements, the more ample space it will provide for our family, the pleasure of entertaining honored guests
in it. On the other hand, we are appalled by the costs of construction; we shrink from difficulties with contractors; to move
all our household goods will be laborious; parting from the home
where we have lived long and happily will be painful. Perhaps,
after all, we shall stay where we are.

These examples will suffice to remind every reader of what he already knows, the nature of deliberation. Before taking an important step, the thoughtful person looks ahead. He performs a mental experiment with himself as a principal actor. He makes an imaginary excursion into the future and gives it a voice in its own determination. Since the future does not yet exist, how can it influence its own becoming? Let us say, then, that an ideal future helps to shape the actual future.

Although deliberation, "trying to make up one's mind," is no stranger to us, few, I imagine, pause to reflect upon the uniqueness of the process. As far as we can tell, nothing remotely resembling it occurs in the nonliving world. Bodies move in response to present forces, without ever giving a thought to where they are going. Chemical reactions occur without anticipation of the future. Animals obey their organic impulses and innate drives. The more intelligent of them probably foresee, more of less clearly, where their courses are leading; but I am not sure that any of

them defer action while they ponder alternatives and try to decide which will best satisfy them in the long run. All the rest of creation appears to be pushed from the past; man alone, as far as we know, is pulled by the future. He alone has a voice in deciding what he shall become, This is the foundation of human freedom.

This freedom differs profoundly from free will as commonly conceived. We have no reason to conclude that indeterminacy enters anywhere into the process of deliberation. As we weigh the motives for and against a contemplated course, our ideas follow sequences determined by our past experiences and the "laws" of association, such as resemblance, contrast, and contiguity. Whether one idea calls up another, or whether the causality resides in the underlying structure of the brain, we need not examine here. In any case, random and capricious as the sequence of our thoughts often appears to be, they evidently do not spring out of the void but are determined by preceding events, mental or neural. The value of determination would be weakened by the intrusion of indeterminacy, which destroys predictability. The more accurate our knowledge of the circumstances in which our proposed action would occur, the more profound our understanding of ourselves, the more perspicacious our forecast of our probable reaction to the contemplated situation, the less likely we shall be to choose a course that we shall regret. Our decision, we have every reason to believe, is the necessary, inevitable consequence of our own nature as related to the situation that confronts us.

Accordingly, deliberation does not free us from the past. We who deliberate are products of the past; our present thoughts are determined by past thoughts and experiences; the massesses external situation is a necessary consequence of the past history of the Universe. Nevertheless, our capacity to foresee and choose profoundly modifies the effect that the past has upon us. Instead of pushing us irresistibly from behind, it calls us from in front. It permits us to test its force against the constants of our own nature and to react to the situation that it has created in a manner that is determined largely not only by what we are but equally by what we hope to become. In a mechanical system, objects are moved by superior forces, which take no account of their past history or present strivings. The boulder is rolled along the river bed by the raging torrent, as we would be carried along if we had the misfortune to fall into it. But whenever we are able to pause and deliberate, the impact of age-long causal sequences upon us is mitigated; how they affect us may depend more upon our own past history than upon the whole course of cosmic events outside us. Human freedom is not free will or indeterminacy but a unique mode of determination, peculiar to minds that can delay their decisions, compare, and foresee, and, as far as we can be sure, confined to man on this planet.

But how can I call myself free if I and my decisions are necessary consequences of inexorable causal sequences that have been operating "since the world began"? Should I not humbly regard myself as a puppet moved by the strings of fate? I reflect that I am what I am, however I happened to become what I am.

Developments that long antedated my origin, over which I had no control, have endowed me, all unasked, with a high degree of autonomy or ability to control my own thoughts and deeds. The causal sequences that result in my decisions do not bypass me but course through my mind, where they are highly modified by what I am and aspire to become. The choices that I make are mine and not another person's; I feel perfectly free in making them and do not hesitate to recognize them as my own. Nevertheless, whether I or any one in a determinate Universe can be held responsible, in a radical sense, for what he is and does, is another question, to which we shall return in the following chapter  $\delta_t$ 

We owe our precious ability to deliberate and choose to our heredity, to the genes that control our development. It is a measure of freedom from their autocratic government of our lives that they have conceded to us, without our demanding it. By education and training, the formation of good habits and the growth of understanding, our power to choose wisely is greatly increased; but all our growth in self-control and wisdom is built solidly upon a foundation that our genes provided for us. Nevertheless, their gift of the power to choose was not absolute but subject to limitations; they continue to make us susceptible to emotional storms that jeopardize it. Whenever anger, hatred, lust, jealousy, vengefulness, or similar passions prod us into action before we have had time to reflect, we are hardly freer than a leaf borne along by the gale. The exercise of the freedom that resides in our unique mode of determination is strictly dependent upon our

ability to control our passions. This is the reason why, in chapter 2, freedom from domination by the passions was designated "basic freedom," the indispensable foundation of all other freedoms.

1

As long as we retain our sanity and are not forcibly drugged, no external power can wholly deprive us of the freedom that our power of deliberate choice gives to us; we can always choose whether to act or not to act, or, if so closely confined that action is impossible, to acquiesce or not to acquiesce. Even in the dungeon of an outrageous tyrant who offers his victim the alternatives of committing some shameful deed or suffering torture and death, the resolute prisoner can defy his persecutor and die free in spirit. Is it not paradoxical that the freedom which no tyrant can wholly take from us can be annuled, temporarily or permanently, by the passions that surge up within ourselves and deprive us of the power to deliberate, or by stupefying ourselves with alcohol or drugs?

Our freedom depends upon our bodies no less than our minds. Our ability to choose between alternatives would be worth little if the body's construction permitted no alternative courses of action; if, like a barnacle or an oyster, we could only rest in one spot and suck in food. The versatility of our limbs is the precious counterpart of the flexibility of our minds; it is no accident that they evolved together. They permit us to choose the activities that best comport with our ideals or moral purposes, to select the right livelihood which is a cardinal point of Buddhist ethics.

Another important complement to our freedom to choose is the versatility of our digestive system, which makes us, potentially, almost omnivorous. The moral and mammamia ecological consequences of this versatility are enormous. On the one hand, an omnivorous stomach, served by limbs that bring practically every living thing within its reach, has made man the most fearful predator, the most destructive animal, that this tortured planet has ever supported. Nothing edible on or beneath the ground, in the air, or in the oceans escapes his insatiable appetite; probably no species of animal that ever existed has preyed upon as many other species of animals or eaten so many kinds of plants. Man's omnivorous habits, together with his ever-mounting numbers, threaten to wreck the living world. Man's stomach may become nature's grave.

On the other hand, man' versatile digestive system, coupled with his manual skills, permits him to select his diet with regard to moral, ecologic, and economic considerations, as no other species can. The tiger and the wolf must kill other animals or starve; compassionate humans who shrink from violence and bloodshed thrive upon a vegetarian diet. By growing what he needs instead of snatching it from wild nature, man mitigates his impact upon the living world. Although, to be sure, agriculture makes vast inroads upon the natural vegetation, destroying the wilderness as primitive hunters and gatherers rarely do, this is because of the huge number of mouths that it is now required to feed. For the same number of people, we harm nature less by clearing land and growing our food than by depending upon what the wilderness provides. If the billions who now inhabit the Earth were to try

to live without agriculture, as our remote ancestors did, our planet would be utterly devastated before most of us starved. Equipped with such accomodating digestive systems, a scientifically guided, morally responsible, compassionate population would choose the foods that enable the greatest number to live in the most perfect health with the least burden upon the land and the living things that share it with us.

Another aspect of our freedom for which we must thank our genes is the physiological adaptability that permits us to live in a great variety of climates. Many organisms are much more narrowly restricted. In several decades of residence in the foothills of a high tropical mountain range, I have never seen here mobile birds that are abundant on slopes a thousand feet or so higher. Part of man's adaptation to diverse climates is racial: Indians established for countless generations in the thin atmosphere of the high Andes have evolved an especially efficient respiratory system; 2 Negroes thrive better than Europeans or Indians in hot, humid lowlands. But we also have a remarkable degree of individual adaptability, so that, with proper precautions, the same person can live for years on the warm coast or a high, cool plateau, in the tropics, the temperate zone, or even the Arctic. Our physiological adaptability permits us to choose our residence with some regard for our temperament and interests.

Although the genes of many organisms act like absolute despots, when we review all the evidence, I believe we must concede that ours have established something like a constitutional monarchy. While they stubbornly retain certain powers for themselves, they have granted us a wide range of liberties, freely and without

the bloody rebellions that have so often wrested more freedom from crowned heads. They have given us minds able to look into the future and choose the course most congenial to us; versatile limbs to make our volitions effective; digestive systems that permit us to select the diet that best comports with our economic situation or our ideals; physiological adaptability that permits us to dwell almost anywhere on our planet. Among the powers that the genes have retained are the regulation of the growth, form, and internal functioning of our bodies. In the first of these, they are inexorable; they make us tall or short, robust or weakly, handsome or ugly, blond or brunet, without the least regard for our wishes. Although we have slowly learned to modify, chiefly with drugs, some of the innumerable physiological and biochemical processes that they regulate, our efforts to interfere with their reign in these departments are precarious and may incite reprisals.

The genes' continued reluctance to grant our conscious selves a voice in these internal affairs is not surprising; they are so complicated that we might bungle them horribly. To regulate his own growth, a baby would need a more thorough understanding of cellular dynamics than he will ever have if he becomes a distinguished biologist. A whole team of physiologists would hardly suffice to control the daily metabolism of a single individual. Rightly viewed, the genes' despotic management of our organic functions increases our freedom. If a child had to supervise his own growth, he might have no time for play or to learn his school lessons and all the things that he should know to become a responsible citizen of a free country. If we were burdened with the con-

scious regulation of the digestion of our food, the aeration of our blood, and all the chemical transformations in the billions of cells in our bodies, we could hardly think about anything else. Our minds, which now range far beyond our bodies, would be wholly preoccupied by them. We would have little time for the deliberation that is the foundation of our freedom.

In two departments, however, our genes remain stubbornly, unreasonably autocratic. Their persistent refusal to allow us greater control of our reproduction is an insult to the intelligence that they have given us. Certainly a rational being who can look around and ahead is in a better position to judge how many people his country can support, and in what conditions babies can be born with a fair prospect of living happily, than are genes acting blindly deep in the flesh. However it may have been in prehistoric times, today all the people that the world needs and can well accommodate would be produced by those who love children and generously desire to give the boon of a happy life. Human genes would be in no danger of extinction if they would desist from goading us to beget offspring long before we can support them and continuing to do so long after we have engendered all that we desire and can properly raise.

The decision to reproduce, the most momentous that most of us make, should be a free choice reached by the most careful deliberation. It should cause the maturation of the reproductive organs, which might well remain quiescent and nonfunctional until they receive a signal from the mind — as in many animals they do until the environment becomes favorable for rearing young. It is diffi-

cult to imagine a genetic change that would contribute more to human freedom, tranquility, happiness, and adjustment to the environment. It would enhance the dignity that we strive to give human life if the act that starts it were performed for this purpose alone, never casually or in blind obedience to organic pressures or the appetite for pleasure. Unhappily, the last freedom that despotic genes grant to their subjects is that which might diminish the intensity of their dominant effort to multiply themselves without limit.

The second point on which the genes remain obdurate is closely related to the first. Since they so persistently multiply the bodies that bear them, they must remove older individuals to make room for the younger. They give us splendid gifts, including minds able to look ahead and choose and bodies flexible enough to obey the most diverse commands; then, slowly, inexorably, they take away what they have given. They do not permit us to choose how long we shall enjoy our fullest powers, but as we grow old they weaken or destroy them, until, in that final stillness that evidently they programmed for us before our birth, they cancel all our prerogatives. Do they deserve our gratitude for giving us a few decades of well-endowed life on a beautiful planet, or our resentment for compelling us so soon to leave it?

The conclusion of this survey is that we enjoy a generous measure of freedom to choose the course that most appeals to us and seek the goals most dear to us, but in certain directions our freedom is exasperatingly restricted. How can we account for freedom of choice in a determinate world? Lloyd Morgan's doctrine of

emergent evolution is helpful here. As the basic constituents of the Universe are combined in patterns of increasing complexity, new and unexpected qualities emerge. Doubtless no chemist who ever lived could have predicted, from his knowledge of the properties of the metal sodium and the gas chlorine in their pure states, that their union would produce a compound with just the crystalline structure, chemical behavior, and taste of common table salt. As, while the Earth was young, the elements combined in much larger and more complex patterns, they produced the wholly novel and unpredictable properties of living substance. Gradually evolving into bigger, highly complex yet highly integrated organisms, life gave birth to intelligence, a novel development on this planet.

Another aspect of emergence is the increasing capacity for increasing structural complexity. In contrast to the old-fashioned camera shutter that needed to be manually set for aperture and speed of exposure, a modern shutter attached to a light meter automatically adjusts its exposure to the illumination and refuses to open if the light is too dim for a photograph. A very much more complicated apparatus, a Viking space ship, behaves even more like an intelligent being, performing a variety of complicated operations millions of miles away from its directors, who communicate with it by means of radio signals which, as received, have minimal intensity. But even such a sophisticated machine lacks foresight and the initiative that accompanies foresight and can hardly be said to be free.

A Wiking space probe is a simple construction compared with a

human brain, with its billions of neurons connected by an infinitude of diverse paths and, moreover, pervaded by consciousness. Since, as we have seen, the capacity for self-regulation emerges with the increasing complexity of the structure, we would expect a brain to possess this capacity to a vey high degree, to be able to arrange its ideas in every conceivable combination, to foresee, compare, and choose whatever attracts it most strongly. Without pushing too far the analogy between a self-regulating mechanical device and a living mind, we may suppose that just as the former operates in a determinate fashion - and indeed its efficiency depends upon its determinateness - so the mind's operation is determinate, but with a much more complex and delicate balance of mutually reinforcing and opposing factors. And from this interplay of forces or influences emerges the choice most satisfactory to the chooser. So that we might say that freedom, not in some abstruse metaphysical sense but in its usual meaning of being able to choose the alternative most agreeable to us, emerges from the complication of causality. Freedom is the flowering of determinacy.

## RESPONSIBILITY: ITS GROWTH AND DECAY

Responsibility is an attitude of mind and a way of life. It includes the fulfillment of promises and obligations, the faithful performance of undertakings, concern for the welfare of whatever depends upon us wholly or in part, and readiness to acknowledge our acts and bear their consequences. In all but the last of these meanings, it differs little from duty; yet it is more comprehensive, for we may feel responsible for things and causes which we have no clearly recognized duty to protect or support. Responsibility is not only wider in scope than duty, but it is felt by a more sensitive, thoughtful mind. One may faultlessly perform all the duties assigned to him, as a soldier those of his commander or a servant those of his employer, without much interest in the results. Responsibility implies greater involvement and concern, the capacity for caring deeply.

Perhaps only man is explicitly conscious of responsibility, yet responsible behavior is widespread in the animal kingdom. Most obviously, it is displayed by parents attending their young. All mammals nurse their offspring, and protect them as well as they can. Some make nests for them or, after they are old enough to take solid nourishment, bring them food by mouth. Birds give their chicks more laborious care. After building a more or less elaborate nest and patiently warming the eggs into active life for from ten to eighty days, they feed their young from their own mouths or, in the case of

precocial species, scratch diligently to expose food for them; they shelter and warm their offspring with their own bodies, and defend them against enemies, sometimes bravely attacking animals much larger and more powerful than themselves. Even after their young are full grown and can fly well, many avian parents continue for weeks or months to nourish them, and a few, especially among the permanently resident birds of mild climates, carefully install their fledged young in nests or sheltering nooks at nightfall. Although we are wholly ignorant of the sentiments of feathered parents, they undoubtedly furnish a model of responsible parental behavior.

Not the least important aspect of responsibility is concern for one's own welfare, present and future. In the natural world, an adult animal's survival from day to day depends upon its diligence in finding food and vigilance in avoiding predators; it is, in a sense, responsible for itself. Many of the more social birds and mammals facilitate the search for food and defense from enemies by flying or foraging in flocks or herds, but in these aggregations every adult is essentially self-supporting. Although some mammals and many birds supplement their mate's diet with occasional offerings, only a few of the most social birds support handicapped companions.

By storing food when it is abundant, certain animals prepare for the ensuing season of scarcity. The habit is well developed in social insects, including ants, bees, and wasps. Among mammals, it is most frequent among rodents,

notably beavers, mountain beavers, hamsters, pikas, and certain squirrels, voles, and rats. The woodpecker and crow families contain outstanding examples of avian forehandedness. In western North America and the highlands of Middle America, acorn woodpeckers, working in family groups, store thousands of acorns in posts, dead trunks, and trees with thick bark, each fitted snugly into a separate hole made by the birds themselves. Red-headed woodpeckers and Lewis' woodpeckers are also diligent food storers. In the crow family, nutcrackers and pinyon jays bury many pine seeds, hazel nuts, or other kinds when they ripen in autumn. Some of these birds have an amazing ability to retrieve their caches beneath thick snow. Their stored food may help to nourish nestlings hatched early in the following year.

If we seek the birthplace of our human sense of responsibility, I believe that we shall find it in situations not unlike those which furnish its models among nonhuman animals—in parental care and foresighted preparation for the welfare of the individual and his family. Doubtless our more distant ancestors attended their babies as instinctively as any animal guided by innate patterns of behavior. Only with increasing thoughtfulness and the concomitant refinement of sentiments did responsibility begin to mature. When a father or mother thought or said "This is my child. I brought it into the world and it is my duty to see that it has everything it needs for a happy life," a truly responsible attitude to

parenthood had arisen. When the parent dreamed of a splendid future for the child and spared no effort to make it come true, parental responsibility flowered.

Contributing greatly to the growth of responsibility was the need to prepare for a season of scarcity. Among animals, food storage, although not unknown in tropical birds, mammals, and insects, is practiced chiefly, and on the largest scale, by those that reside where winter is a time of dearth. As far depends upon as I know, no primate except man stores food. Mostly dwellers in warm forests and savannas where food is available throughout the year, monkeys and apes appear to take little thought of tomorrow. Probably prehistoric man did not store provisions, except for the next few days, until he settled in fixed abodes and began to sow and reap. When he practiced agriculture in a strongly seasonal climate, where crops would not grow through cold or rainless months, the storage not only of food but of seeds for the next sowing became imperative. The necessity to look ahead, to exercise not only foresight in storing provisions but prudence in consuming them, lest they be exhausted before fresh supplies became available, helped to develop responsibility.

Among the most impressive features of surviving "primitive" cultures that have been studied by modern travelers and anthropologists is the responsible attitude toward procreation of some of them. To raise healthy, well-developed children, parents tend to space births widely, so that each

baby may enjoy its mother's milk for several years before being displaced from her breast by a younger sibling. To this end, both parents may refrain from sexual intercourse from several months before to as much as several years after each birth. They abstain from eating foods that might adversely affect the newborn, such as animals whose occult influence might make the child weak, cowardly, blind, or deformed. The widespread couvade, in which the father secluded himself, often lying in his hammock, for days or even months after his child was born, was evidently a practice intended to prevent his doing anything that might, in some mysterious way, harm the tender infant, such as using weapons, knives, or other sharp instruments that, even at a distance, might inexplicably injure it. The absurdity of some of these primitive beliefs and practices, many of which modern man would find intolerable, may make us overlook the nobility of the responsible attitude that prompted parents to spare no effort to give each child the best possible start in life.

The tribesman's responsibility frequently extended beyond his immediate family to a larger group. Births were controlled not only to produce vigorous children but to adjust the population to the resources of its territory. If the prospects for feeding additional mouths were poor, the father might resort to infanticide. While primitive agriculturists still depended upon wild animals to supplement their diet, hunters desisted from killing more than they needed, in order to con-

serve the stock. The many taboos that trammeled the activities of tribesmen were observed to avert disasters. Men in small groups, surrounded by neighbors who were often hostile, necessarily cultivated a responsible attitude toward the environment that supported them; they could not depend upon international relief organizations to succor them if, in consequence of their own imprudence, it failed to yield enough to nourish them. Evidently, long before he had developed scientific methods to evaluate his procedures, primitive man's strong feeling of responsibility for his children and his environment led him to multiply practices that were perhaps as often futile as effective. Nevertheless, they helped to keep him mindful of his obligations.

Supported by modern man's science, technology, and religions, this ancient heritage of responsibility could correct many of the ills that now afflict the world. Unfortunately, the conditions of modern life tend to dissolve rather than to strengthen responsibility. Dwelling in great cities, far removed from the sources of the food that nourishes them, men lost responsibility for their environment—a condition that is now, happily, being corrected by a thoughtful minority. Even farmers, who in highly industrial countries increasingly concentrate upon a single crop in an artificial environment, have lost the multifarious contacts with a natural world that supplied nearly all their needs which primitive peoples knew. Although early cults that grew out of man's experience with

the natural world strongly influenced his dealings with it, Christianity, which took root among the lower classes of crowded cities in the Roman Empire, has largely ignored man's relations with nature, while focusing his attention upon a future existence in a supernatural realm. If, on the one hand, insistence upon charity or almsgiving, which Christianity shares with other world religions, has made people more sensitive to the misfortunes of their fellows, on the other hand, it has encouraged the incompetent and the shiftless to expect substantial help from others, thus supporting irresponsibility.

The greatest present threat to responsibility comes from all those tendencies in modern life that weaken parental responsibility, the most deeply rooted of all its expressions, the very fountainhead of all responsible behavior. Contrast the attitude of the tribesman who long refrains from sexual intercourse, so that each child will develop in the most favorable circumstances, with that of the Catholic priest who admonishes the couple that he is about to marry "to have all the children that God sends you; he will provide for them."

Sometimes he does, through the charitable institutions of the Church itself; but responsibility and self-respect are not thereby strengthened.

In primitive societies, parents not only raised their children but taught them necessary arts, often aided by other extended members of the family. It remained for modern democratic

States to provide free elementary and secondary education for all children, a measure not only just but indispensable for the development of an informed electorate. Now, increasingly, governments relieve parents of the support of their offspring, while parental authority and responsibility are assailed from every side. The course of a pregnancy is checked at a clinic supported by general taxation. With no expense to the parent, the baby is delivered in a public hospital. The infant's health is guarded by doctors and nurses employed by the government or a State-supported institution. In some countries, the preschool child is entertained in a day nursery while its mother works in an office or factory. When the child attends school, he receives not only free education but one or two free meals a day - meals in which mothers and expectant mothers may participate. In some welfare States, free tuition and meals are continued even at the university level, at least for children of parents with out large incomes. Understandably, parents feel less responsible for children for whom the paternal government cares so well. Feeling less dependent upon their parents, children lose respect for their authority. In later years, children who received much from the State tend to abandon their ageing parents to the State's cold beneficence.

A woman bearing her tenth or fifteenth baby receives the same free care as one pregnant with her first. No distinction is made between married and unmarried mothers. The latter may, indeed, receive preferential treatment; lacking husbands

to provide for them and their children, they are supported by the State. The more illegitimate offspring each one has, the larger her subvention. At the same time, the social reprobation that formerly drove many a well-bred girl who lost her virginity to hide herself in shame, even to destroy herself, is fast disappearing. When, far from being condemned, extramarital motherhood is supported by society and may even become profitable, it inevitably increases. And when so much of the burden of rearing and educating children is borne by the taxpayers, careless couples have less incentive to limit the number of their offspring. Although welfare States may advocate family limitation, their social policies have a contrary effect, abetting reproduction, especially among the ignorant, the thoughtless, and the profligate - just the segment of the population that it is least in the public interest to increase. Thus parental responsibility, biologically the principal source of responsibility, is attenuated and in danger of vanishing.

Not only do the measures of welfare States weaken parental responsibility, they erode the individual's responsibility for his own future. The employe who expects a retirement or disability pension, funded, at least in part, by deductions from his wages that are obligatory and automatic, loses the incentive to save. When the unemployed receive benefits that enable them to enjoy a comfortable leisure, they may make little effort to find work, even refusing offers of suitable employment that does not pay much more than they are given

for idleness. The responsible foresightedness that we inherit from Neolithic ancestors who tilled the soil and husbanded its products decays among urban multitudes who can depend upon the State to support them whatever they do.

Loyalties and responsibilities may shift. If the decay of responsibility for offspring and one's own future were compensated by growing responsibility for the national welfare and the stability of the State that lavishes benefits, the situation would be less alarming. Unfortunately, the contrary is true. The more that people are given, the more they demand. Students who receive free tuition, and even free meals, at State-supported secondary schools and universities strike because their government, its resources strained by trying to do too much for too many, cannot give them all that they are persuaded that they should have. Employes in both the private and public sectors strike for higher wages and more liberal benefits, often crippling their country's faltering economy. Politicians seeking votes support spendthrift measures. Everyone shortsightedly pursues his own advantage, regardless of long-term consequences, then grumbles about the resulting inflation. The waning of the basic, biologically rooted responsibilities is not with compensated by increased responsibility to the nation. A structure or function that loses its utility and is not continually exercised tends to become rudimentary or vanish in the course of evolution. Can it be otherwise with responsibility in modern

States whose policies weaken it?

The decay of responsibility results from the waning of self-reliance and must end in the loss of freedom. In his frantic quest of security, modern man looks more and more to his governments to sustain him through all vicissitudes. He barters his freedom for security, for to be free is to take risks, to be responsible for one's own future and bear the consequences of one's own decisions and acts. As paternal governments increasingly treat their citizens like dependent, irresponsible children, regimentation grows apace. The more prosperous citizens must pay ever higher taxes to support arrangements that they may highly disapprove, which is a form of bondage. Nations once powerful and prosperous verge upon bankruptcy after they become welfare States, as has happened to Great Britain. A democratic government finds itself overburdened by its exorbitant concessions to its citizens, collapses, and is succeeded by a dictatorship, as in Uruguay. Measures that relieve men from responsibility for their own welfare and that of their children inevitably curtail their freedom.

Welfare states attempt to mitigate the harshness of highly competitive industrial societies, especially as it falls upon the lower classes. Their measures prove most burdensome to those who try to stand upon their own feet and preserve their independence, economic and otherwise, such as the small farmer, business man, or manufacturer — in general, upon the middle

class, which, as Aristotle recognized long ago, is the stabilizing core of society. The solid benefits of a social security
program might be realized, without its injustices and dangers
moral and economic, if, instead of being administered by a

vast, unperceptive bureaucracy mechanically applying regulations, it could be implemented by a small community of intelligent, responsible citizens who know each other personally.
Unfortunately, such communities are increasingly difficult
to find in the mass societies of the twentieth century.

One of the brightest aspects of a world that contains much to distress us is the growing responsibility for the health of the natural world. Although for many this is hardly more than an attitude of mind that is becoming fashionable among the educated, for others it has also become a way of life, an effort to live in a manner that reduces man's overwhelming pressure on his environment. This concern for the Earth is not a wholly new development, but rather a resurgence and am amplification of an attitude by no means absent from primitive men. Whereas they, who derived almost everything they needed from their own territory and had little knowledge of the larger world, were interested only in the conservation of their local resources; we, who consume products from the ends of the Earth, have cultivated a wider concern, as is proper. The recent upsurge of interest in the welfare of our planet is proof that man's capacity for responcibility, developed through long ages when he could look

neither to a paternal government nor to distant obliging tribes for succor, is too deeply rooted in his nature to be extinguished in a few generations. With social institutions that encourage rather than weaken this capacity, it might acquire fresh vigor and ampler scope.

## RESPONSIBILITY AND PUNISHMENT

In chapter 5 we learned that the libertarian warmly defends his doctrine of free will because it permits him to hold us radically responsible for our volitions and the deeds that follow from them, to praise us and to blame us. Undetermined by the past history or present condition of the one who wills, the free choice could have been different and, therefore, the libertarian holds, he must be responsible for it.

To me, it is incredible that philosophers have so often failed to recognize that the conclusion does not follow from the premises. An event, physical or mental, is either caused, (partly or wholly) determinate, and controlled or, uncaused, indeterminate, and uncontrolled. In so far as it is the former, it could not have been different in the given circumstances. If it is uncaused, indeterminate, and uncontrolled it bears no necessary relation to all that preceded it. The presumably free volition not only escapes determination by the past but in equal degree it escapes determination by the character, principles, or steadfast purposes of the person to whom it is attributed, all of which were molded by his past. It springs up in him but is not of him. Like a pathogenic microbe that one picks up in a crowd, its source, if it has one, is undiscoverable. It is something that one suffers rather than does. How can anyone be held accountable for what happens within him in this mysterious fashion? Far from affording a foundation for human responsibility, the doctrine of free will utterly destroys responsibility.

It is easy to see that, just as causality is the foundation of our control of physical and chemical operations, it likewise enables us to assume responsibility for our decisions and, in the absence of external obstacles, the ensuing actions. A necessary consequence of what we are in the circumstances in which we happen to be, our decision belongs to us in no uncertain fashion.

We can recognize it as our own.

Were this the whole problem, no further discussion would be necessary. Although determinacy makes us responsible in the sense that it gives us control over our decisions, just as it gives us control over our limbs, we wish to know whether the responsibility is radical. Are we to be blamed or punished for our misdeeds, praised for what we do well, or are we puppets moved by causality, more poetically called Fate, which has made us and our acts what and they we are, so that it is unjust to blame or punish us for what could not have been different?

Today no thoughtful person fails to recognize the immense influence toft heredity, environment, and education, above all the
circumstances of early childhood, have upon character and conduct.
Whather he does well or ill, the perspicacious person can often
trace the factors that contributed to his successes or his failures back to conditions over which he had no control, such as his
parents and the genes they transmitted to him, the atmosphere of
his childhood home, his teachers, the social ambient; that surrounds
him. If he knew enough, he might trace all that he is and does
through causal chains running back to arboreal ancestors many
millions of years ago, or beyond that. Although the successful

person is likely to attribute his achievements to something peculiarly his own, while the failure and the criminal case their minds by casting the blame on the poor start they had in life or the maladjustments of society, we owe our successes no less than our failures, at least in part, to factors beyond our control. Just as every atom in our body has an external source and a history of permutations, of chemical unions and dissolutions, that, could we trace it, goes back to "the beginning of the world," so all our thoughts and decisions are results of tremendously long causal sequences.

When arraigned before a court, the criminal or his counsel urges every extenuating circumstance and uses every art to make it appear that he is not responsible for his crime. In a less overt way, we all tend to do the same before the tribunal of our conscience or the judgment of our acquaintainces. We excuse our shortcomings, weaknesses, and surrenders to passion by recalling our perhaps unfortunate heredity, errors in our early training, our difficult present circumstances, and other contributing factors beyond our control. In view of the confusing controversies that surround the questions of moral freedom and responsibility and the deterministic explanations of human conduct prevalent in modern psychology, we can hardly be censured for taking this course. When we cast the blame for our aberrations and failures upon causes beyond our control, we do nothing wicked or absurd, and it is hardly possible to prove that we are wrong.

Although to take this attitude toward ourselves may be permissible, it is morally disastrous, a voluntary surrender of our autonomy, dignity, and ethical personality. We regard ourselves,

and ask others to regard us, as a focus of causal sequences that pass through us unaltered, much as rays of light from all sides stream through a point in the open air with no change of frequency or direction. We undervalue the wonderful mental organization that enables us to delay response, examine alternatives, weigh conflicting motives, and elect the course most compatible with our character and principles. By casting back all our mental contents upon their sources, we seem to dissolve our personality; as though we were to claim that our bodies are no more than the milk, cercals, fruits, and other comestibles from which their materials were derived. Although, whether we hold the libertarian or the deterministic view of mental events, we can defend with plausible arguments our denial of our radical responsibility, we dishonor and belittle ourselves by doing so.

I have contended that neither the deterministic nor the libertarian doctrine gives anybody solid grounds for attributing radical responsibility to anyone else; the former, because it views
our decisions as inevitable consequences of situations long antedating our birth; the latter, because, contrary to its intention,
it in fact deprives us of control over our "free" choices. Neverthe less, by refusing to accept full responsibility for our acts,
we depreciate ourselves and injure our character. We seem to be
placed in a most ambarrassing predicament. Is there no solution
to our difficulty?

There is a solution. We can voluntarily assume field responsibility for all that we say and do. Ignoring philosophic doubts and legal quibbles, we can assert that we are fully responsible for our acts, and we can make this claim valid by our conduct. We did not choose our parents, who may have transmitted to us weaknesses and faults of character that distress us, perhaps also physical or mental defects that handicap us. In childhood's impressionable years, we may have been exposed to unwholesome influences that have scarred our souls. We have struggled with adversity, and our present circumstances are not what we strove to make them. Very well, we voluntarily accept this sad legacy of the years and make it our own. The burden was thrust upon us; we bear it bravely, without remonstrance or complaint. We do not pause to discuss baffling metaphysical questions of causality and radical responsibility; by a voluntary decision, we make ourselves accountable for all that we do, and by this free acceptance of our personality we defend our dignity and assert our autonomy. The behaviorist may, if it amuses him, explain all our attitudes, words, and deeds as the inevitable outcome of circumstances beyond our control; we make every choice as though the full weight of it rested upon ourselves alone.

Only by such full, uncompromising acceptance of everything that the unalterable past has poured into each of us can we establish ourselves as ethical persons. We do not wait until society, for its own purposes, decides that we are responsible, for such imputed responsibility is a fiction. We anticipate society by claiming responsibility as an inalienable right, thereby asserting our moral worth.

This voluntary acceptance of responsibility is no idle boast, no childish gesture of defiance to inexorable fate. The chain of causation may pass unbroken, within the mind as in the physical

world, with all the iron rigor that nineteenth century materialism ascribed to it. Yet we are certain that in deliberation the causal sequence follows a unique route, which sets it sharply apart from that in the physical universe. Our deliberate choices are made with a view to the future, in a manner that gives our ideals and aspirations a voice in shaping it. Necessity may rule the human will no less than the falling stone, but it is there an enlightened instead of a blind necessity. Causal sequences that, for all we know, have since the beginning of time coursed through the universe without a goal are by the moral will at last given a purpose and redirected toward an ideal end. By the free acceptance of responsibility we begin to make ourselves what we aspire to be, autonomous agents dedicated to the sacred task of creating a happier, more harmonious world.

But what about those who refuse to shoulder the burden of responsibility, preferring to cast the blame for their failures and shortcomings on circumstances that they could not control?

Just as in social intercourse we overlook obvious defects, treating handicapped people as though they were quite normal; so, perhaps, we should ignore their possibly correct claim that their misdeeds were the unavoidable consequences of conditions that they could not prevent and treat them as though they were fully responsible. By this course we honor them more than they honor themselves, and perhaps we can thereby help them to take a more hopeful view of their ability to assume command of their lives.

Belief that one is responsible, even if not wholly correct, is itself a causal factor that can influence the course of deliber-

ation. And knowledge that, whatever happens, one will be held responsible tends to make any normal person proceed with care.

The question of responsibility assumes a grimmer aspect when one is convicted of a serious crime. The murderer may, in fact, be a focus of evil influences that from a distant past have converged upon him from all sides - hardly more than a lump of clay in the hands of fate. But it is impossible to trace all these contributing factors back to their sources and deal with each one separately, dividing the delinquent's punishment between his profligate rather and his drunken mother (perhaps already dead), his incompetent teachers, all those who set him a vicious example in impressionable childhood, as well as the community at large for allowing so many noxious situations in its midst. Society must, so to speak, take hold of all these contributing threads where they have converged into a tight knot, in the culprit himself, and deal with the knot rather than with the separate filaments; no other course is feasible. We cannot separate a man from his deeds by claiming that they are consequences of an ineluctable necessity. The man himself is a product of the same necessity. The claim that he could not have decided otherwise, far from dissociating him from his crime, is an assertion that it was inseparably connected with his character. Just as goodness and beauty are fruits of beneficent trends that have long been at work in the cosmos; so a vicious character and a wicked deed are resultants of evil tendencies that are ancient and widespread in the Universe and have come to a focus in the unfortunate person of the criminal. When we condemn him, we condemn much more than

him, but we need not, for that reason, refrain from punishing him.

When we incarcerate a man merely to prevent a repetition of his misdeeds, we treat him like a vicious dog or bull, that must be closely confined to protect people. If we keep him in prison expressly to serve as a warning to others of what awaits them if they commit similar crimes, we use him as a sign with a picture of a convict behind bars and the legend: "Warning! This will happen to you if you steal or murder." But when we punish him because he has done wrong and deserves punishment, we at least pay him the compliment of treating him like a responsible human being who knows what he has done. We do not punish a decaying branch for falling from a tree and killing a passerby. Long ago, Plato wrote: "When a man counts not himself but others responsible for his own sins and for the most and greatest evils, and exempts himself always from blame, thereby honoring, as he fancies, his own soulthen he is far indeed from honoring it, since he is doing it injury. Perhaps the growing attitude that the treatment of criminals should be corrective and exemplary but never retributive needs reconsideration. Not only does it often offend a deep-rooted sense of justice but it weakens the feeling of responsibility and injures the sinner by divesting him of an essential part of his humanity and treating him as a thing. Hartmann recognized this when a he wrote: "He who pardons a guilty person compromises him spiritually Determinists may agree with libertarians on the social and

psychological necessity of punishment. Permissiveness readily becomes disastrous to any society. If our neighbors and the State will treat us just the same whether we flout or obey its rules, only the most conscientious people will abide by them. We are often troubled by the sight of one who has willfully injured his fellow men continuing to live as though he had done no wrong. If we cling to traditional beliefs, our certainty that after death the wicked man will suffer for his misdeeds helps us to preserve faith that justice is more than a word. Sometimes it seems that increasing leniency toward criminals, far from revealing a recognition of human worth, springs from valuing life too cheaply. When the perpetrator of an unprovoked multiple murder is given no more than a life sentence, with the possibility that after being confined for twenty years or so, at great expense to the State, he will be paroled and enjoy many additional years of life, the sentence does not appear commensurate with the enormity of the crime. Why should he be treated more gently than he treated his victims, who were probably much better people than their assassin?

Although to forgive those who have injured us has long been considered the attitude of a noble mind, it is not for us to forgive those who have injured others. On the contrary, not to insist that they be appropriately punished reveals a deficiency of such qualities as solidarity with law-abiding fellow citizens and sympathy for the victims of outrageous crimes. Suppose that by means of a few pills, or a brief, comfortable internment in a mental hospital, the perpetrator of some dreadful deed could be safely cured of his criminal tendencies, and would then be permitted to live in freedom, just as though he had done no wrong. This course should satisfy those who oppose retributive punishment. Others might be

perturbed by the thought that the murderer lives prosperously while the man he slew to rob lies in his grave, or that the rapist is comfortably married while the virgin whom he violated will never quite outlive her harrowing experience.

The narrow-minded savage hates those who injure himself or his clan but feels no resentment toward those who brutally mistreat unrelated people. The awakened spirit is distressed by any wrong done to any sentient being, no matter how far removed in space or time. Knowledge of such acts makes the world seem a less desirable place in which to live. Despite the teaching of certain prophets and moralists, I doubt that we can outgrow moral indignation and the demand for appropriate punishment without the atrophy of an important facet of our social adaptation.

Punishment is always the infliction of an injury, whether by depriving the offender of life, liberty, or property, or by making him suffer physically. Thereby the sum of suffering and unhappiness in the human world is increased, usually without bringing any benefits to the victims of crime, who are not thereby compensated for losses which, in the case of murder and other acts of violence, may be irreparable. And if the injured person does gloat on the suffering of his assailant, we condemn his vengeful, unforgiving attitude; for have not our most respected spiritual guides commanded us to forgive our enemies? Therefore, confronted by the social necessity to take action against criminals, we may justify their incarceration by asserting that is done in order to referm them, to prevent the repetition of their misdeeds,

or as to serve as a warning to others - not as punishment for their crimes.

Since the past is unalterable and its misdeeds cannot be annulled, perhaps our concern should be wholly with the present and the future. Nature heals wounds and restores the ravages of cataclysms without penalizing their causes. Whuld it not be best to follow nature's example, desist from our often blundering attempts to make the punishment fit the crime, and concentrate upon creating a happier future? If we took this attitude, punishment would be inflicted solely with regard to its probable effects upon the future welfare of the community and retribution would become obsolete.

This course might perturb our sense of justice and blight the ancient, widespread faith that, in the long run, man's happiness will depend upon his conduct. Every moderately advanced civilization has cherished belief in the moral governance of the world, that somehow, somewhere, the righteous would be rewarded with felicity, while those who made their neighbors suffer would be repaid with suffering. A world in which goodness receives its recompense and evil is punished has seemed to all peoples with a somewhat developed moral sense to be more livable, more humane, than one in which our little human worth is disregarded while nature pursues its impersonal onward course. Evidently it is to preserve faith in such a world, thetation pure rather than pure vindictiveness or sadistic pleasure in contemplating the plight of the condemned, that kindly people, who may shrink from harming

any creature, are distressed when flagrant crime passes unpunished or inadequately punished. The worst part of the old <u>lex talionis</u> was not that it insisted upon proportionality between an injury and its repayment but that it took little account of motives and circumstances, making hardly any distinction between an accident and a premeditated injury, between a provoked and an unprovoked assault. It flourished in an atmosphere where animals and even inamimate objects might be treated as responsible agents; it often demanded that the avenger of an injury duplicate acts of the most shocking brutality; and it might set off a long chain of reciprocating murders.

The methods contemplated for the reward of virtue and punishment of wickedness have varied greatly from culture to culture.

The Hellenic philosophers (by nb means only the Stoics) adopted the loftiest, most courageous solution of the problem. They taught that virtue is its own reward and needs no external recompense.

Their doctrine that virtue is sufficient for happiness implied that the individual who becomes good enough is automatically happy; just as, when a metal is heated to a certain temperature, it emits light. That the virtuous man's happiness differed from what we moderns usually understand by the word is evident from a remark of Aristotle, that children and animals cannot be happy; whereas we often consider a fortunate childhood to be the happiest of life's stages. Apparently, the virtuous man's felicity was more like an untroubled conscience, or the satisfaction we feel when we have accomplished some cherished undertaking or discharged a

duty, although we may be suffering from wounds or extreme fatigue. Hinduism and Buddhism have taught that rewards and penalties are meted out, in a succession of reincarnations, by an impersonal karmic mechanism, a moral power diffused through the very fabric of nature. Traditional Christianity has been able to advocate forgiveness of enemies, and turning the other cheek to the violent, without compromising justice, because it has held that after death the wicked will be punished with suffering far more intense and prolonged than men could inflict.

As modern scepticism dismisses these venerable answers to the demand that our happiness depend upon our conduct, there remains only one agent capable of satisfying it, however imperfectly, on a widespread scale - the State. Its ever more comprehensive welfare programs, necessarily administered without much regard for the moral quality of beneficiaries, sometimes seem to increase dissatisfaction and restlessness rather than happiness. Its criminal codes do attempt to adjust the severity of the penalty to the enormity of the deed. Despite the difficulties of apprehending the lawbreaker and of so assessing all the circumstances of his crime that he receives a perfectly fair sentence, they remain the one visible, although partial, answer to the ancient demand for a moral world in which virtue is rewarded and evil punished. If we adopt the principle that the evil-doer is not to be made uncomfortable, but only reformed or otherwise prevented from repeating his crimes, justice seems to retreat a few steps farther from the world, and our confidence in its moral governance is still further weakened. Those who cherish the ideal of justice, which is allied

to the aesthetic sense because, like beauty, it depends upon proportions, will feel increasingly lonely in a society that is losing its moral imperatives.

Fortunately, the punishment of a criminal is not incompatible with his reformation, and may indeed be the means to achieve it. To punish is to inflict suffering, which, in a mind not devoid of imagination nor wholly hardened in brutality, often stimulates thought and effects changes in attitudes and values that alter the course of a life. Suffering inflicted by the injured party is revenge and may be disproportionate to the wrong that has been done to him. When the punishment is decreed by an impartial judge, it is more likely to be commensurate with the crime and, therefore, just. Nevertheless, perfect justice is so difficult to achieve by us, to whom our neighbors' minds are opaque, that we can understand why religious leaders have preferred to leave it to the operation of an impersonal karmic process or the infallible judgment of an emniscient God. But those who claim that God sentences certain sinners to endure everlasting agony dishonor their God by making him appear unjust. Justice implies a certain proportion between a good action and its reward, or a wicked deed and its punishment; but between a finite sin and infinitely prolonged suffering no proportion can exist.

The deterministic interpretation of human conduct makes it easier to resist enemies and punish offenders without hating them. We reflect that disharmonies and evils abound not only in human societies but likewise in the wider natural world. Occasionally, many evil trends converge upon some unfortunate individual, most often one poorly born and educated but at times upon one with all

the advantages that status and wealth can give, who then becomes an affront to his humanity. Although he may strut and boast, he is the victim of influences beyond his control. Nevertheless, we must hold him responsible for his misdeeds and penalize him as they deserve, not with hatred, but profoundly saddened by the thought that this miserable person has, despite himself, become the vehicle of evils whose roots go back into the distant past.

Responsibility is, primarily, concern for the consequences of one's own acts. Its manifestations include faithful compliance with promises in matters great and small, fulfillment of contracts and obligations, and acceptance of culpability for what we do wrong, instead of blaming others. At one extreme, responsibility is revealed by remembering to post a letter that has been entrusted to us and by punctually im keeping engagements; at the other, by conscientiously discharging some large civic duty and, above all, by caring adequately for the children that we bring into the world. Like other sentiments, the feeling of responsibility is vastly expansible. From its primary function of making us company erate of the direct consequences of our own acts, it may grow until we feel responsible for the welfare of our community, for the conservation of nature, or even, in exceptional cases, for the future of mankind. We may even develop a sense of guilt for evils that arose long before we were born, and which we could hardly, by our utmost efforts, eradicate. Such an expanded feeling of responsibility reveals a noble spirit with a sensitive conscience, but, unless accompanied by exceptional ability and energy, it is mostly ineffectual. What we chiefly need is a more

widely diffused responsibility for the consequences of our own conduct. If enough people could develop this measure of responsibility, some of our larger problems might become manageable.

## MIND AND BODY

The true lover of freedom loves it absolutely. He is not content to be free himself while those around him are in bondage. Slavery, tyrannical governments, and oppressive laws are abhorrent to him, even when they do not affect him directly, and the sight of caged animals distresses him. One who wishes freedom only for himself is probably seeking license rather than liberty.

Many devotees of freedom, especially philosophers and saints. regard it as essentially a condition of the mind or spirit. The slave or prisoner whose spirit rises above his circumstances may consider himself free. Implicit in the debates between libertarians and determinists is the assumption that freedom is, above all, an attribute of the mind rather than of the body. Whatever our metaphysical views, we often speak and act as though we were each a duality of mind and body. We say "I think or wish this or that," but "My body serves me well." We regard the mind as master and the body as servant or slave, the instrument supplied by nature to support the mind. Too often men have proved harsh masters, overworking, mistreating, even mutilating their bodies, subjecting them mercilessly to an imperious will. Yet if they are not careful, they may become slaves of their slaves, a paradoxical situation that also arises when the animals or machines that serve or enrich us require so much attention that we are virtually enslaved to them. For one to be truly free, both his body and his mind must be free, as two partners working together in concord,

or, more correctly, two parts or aspects of the same integrated psychophysical entity, harmoniously attuned. When either part unreasonably dominates the other, freedom is impaired, and will not satisfy one who loves it unreservedly.

When we contemplate ourselves, it appears that the body exists for the mind's sake, to provide for it a "local habitation and a name. " to nourish and protect it, and, through the sensory organs, to bring it experiences that enrich it. A mindless body would seem to exist blankly, serving no purpose at all, unless it could, as an automaton, minister to some other being endowed with feeling and thought. But when from ourselves we turn to the animals around us, especially the less intelligent of them, the relation between mind and body appears to be reversed. Now the mind seems to exist for the body's sake, to help it satisfy its needs and avoid perils. The mind appears to be the body's servant, not its master, as with us. This was undoubtedly also the situation in our remote ancestors; to effect the inversion of the relationship that we have noticed required a long and hazardous, the tracing of which should help us to understand why today the human mind and body are so delicately balanced that either readily gains ascendancy, to the other's detriment.

As long as an animal's whole behavioral repertoire consists of automatisms or reflex acts, such as a frog's ejection of its tongue to seize a passing fly, sensations and memories of sensations are hardly needed yet may be present. At this stage we hesitate to speak of mind, although, if the animal has a central sensorium or brain, the rudiments of mind are present. When an

animal seeks food by a more sustained search, aided by memories of past successes along with some ability to adjust procedures to varying circumstances, anticipation of the pleasure of eating may reinforce its effort, while pangs of hunger will prohibit rest while nourishment is a greater need. Although it may understand no more than most of us do why certain vegetable or animal products are beneficial to its organism and others harmful, the pleasant flavor of the former, the disagreeable taste of the latter, usually guide it to proper choices in its natural habitat. Memories of past pains will make the animal avoid objects that may lacerate its flesh. Anticipation of pleasant sensations will spur its search for a mate. At a certain stage, the whole system of animal behavior appears to be built, not upon understanding of the biological effects of its activities along with the will to preserve the body and multiply the genes that gave it form, but upon sensations that when pleasant promote an activity and when painful inhibit it.

Similarly, the emotions or passions grew powerful, under the action of natural selection, because they intensify certain responses that may save the animal's life or heighten its reproductive effort. As was pointed out in chapter 2, when a mammal is threatened, its adrenal glands pour into its bloodstream hormones that not only prepare it for immediate strenuous action but arouse feelings of anger, rage, or fear. The secretions of the reproductive organs incite desire and, in the presence of sexual rivals, jealousy or pugnacity. The survival value of the passions is evident, for whatever an animal does, it does more vigorously

under the influence of the appropriate emotion: rage makes it fight more fiercely; fear accelerates its flight; lust intensifies its urge to reproduce. Nevertheless, as intelligence increases and social situations become more complex, passions that plunge us into immediate, unreflecting action become less useful and often undesirable. Although today, as in past ages, prompt, unreflecting response to sudden danger may save our lives, more often a more deliberate, reasoned course will serve us better in a difficult situation; but passions inherited from remote ancestors often precipitate action that we shall later regret.

As long as the mind remained the body's servant, the system of rewarding it with pleasant sensations when it kept the animal sound and healthy, punishing it with pain when it failed to do so, worked well enough. But as the mind grew stronger and tried to assert its independence of its former master, troubles began. The wily, still immature mind presently discovered that it could force the body to yield pleasure even by behavior harmful to it, as by overeating, ingesting substances that cause exhilaration followed by stupor, overindulgence in sex, or a life of luxurious indolence that makes muscles flaccid and organic functions languid. Such treatment of the body is conspicuous among savages in periods of abundance and of opulent barbarians but it has by no means disappeared from modern civilization, including many of its more intelligent members.

As though to add insult to injury, such excesses are commonly blamed upon the "flesh," when the fault lies with the mind rather than the body. Gluttony, as Erich Fromm recognized, springs from

the mind's craving for gustatory pleasure rather than the organism's demand for nourishment. The body often revolts against the first draughts of strong liquor, the first puffs of tobacco smoke; but the mind, influenced by social pressures and false notions of what is manly or beneficial, persists in forcing these poisons upon the resisting organism, often until it is so thoroughly vitiated that it cannot rest without them. As to sex, the body is, as we have admitted, often excessively importunate; but the mind, by means of lascivious talk and scenes and imaginings, frequently excites the body to an unnatural degree, exacerbating an already difficult situation. The sensual mind plays upon its body as an untrained person plays a musical instrument, with a heavy hand producing cacophonous tunes and finally ruining the apparatus. From such abuses, what might have remained an admirable organism becomes obese or emaciated, plagued with functional disorders, often malodorous and thoroughly disgusting. And How can a mind be free when attached to an enslaved, debased body?

Extremes often meet. At first sight, nothing could be farther removed from the confirmed sensualist than the relentless ascetic, who abhors his body and shrinks from its pleasant sensations, at times even those of its distance receptors, such as the eyes and ears that are the principal windows through which beauty and knowledge enter. Whereas the sensualist forces his body to yield an inordinate amount of pleasurable sensations, the fanatical ascetic often uses diabolic ingenuity to make it yield painful sensations, treating it with such unrestrained harshness as no

civilized community, to treat a domestic animal. When his body is debilitated and bleeding, scabious and vermin-infested, the ascetic imagines that he has liberated his soul from it as far as possible, short of death. On the contrary, it appears that, feeling himself enthralled by his body, he has proceeded to enthrall it, and has ended by becoming more deeply enslaved by his body, which occupies his thoughts to an abnormal degree. As far as I know, such stern practices are not as frequent now as they formerly were, when men believed that imitating the suffering of their Savior entitled them to heavenly bliss.

In addition to the sensualist and the harsh ascetic, the extremely ambitious mind often enslaves its body, overworking it, forcing it to perform feats of strength or endurance beyond its natural range, depriving it of needed rest and nourishment, or subjecting it the extreme hardships while it seeks power, wealth, knowledge, fame, or glory, as in war, politics, business, science, exploration, athletics, or some other field. Long ago the Greeks, who originated the Olympic games, recognized that athleticism could injure the body. Although a body compelled to give its all to the service of the mind's relentless purpose seems to have been thoroughly subugated and tamed, perhaps the mind itself is far from free but enthralled to its own delusions about what really matters.

We have already noticed the evolutionary inversion of the relation of a mind to its body, which in a measure is repeated in the ontology of each individual human. At first the mind is interested chiefly in things that might affect its body's welfare,

above all food and dangers. As it matures and finally becomes spiritual, the mind is increasingly occupied with matters that have little immediate importance to the body. Although in the beginning it was largely engrossed in sensations, it becomes ever more interested in the relations between things, and its understanding of these relations may strongly affect, if not the quality, at least the desirability of sensations; as when some pleasure, eagerly sought by an unperceptive mind, becomes unacceptable or repugnant when it is realized that this satisfaction is bought at the price of another creature's suffering, or that indulgence in it will surely or probably bring an excess of sorrow. Conversely, a sensation, too trifling to be sought for its own sake, or even painful, may be welcomed if its anticipated effects are highly desirable. This sensitivity to the wider relations of our deeds, this capacity to have the quality or acceptability of our sensations profoundly altered by understanding of their antecedents or consequences, especially as they affect other sentient beings, is the essence of spirituality.

The emancipated mind ranges ever farther from its body. The awakened spirit is centrifugal, soaring ever outward toward the farthest reaches of the Universe and seeking to fathom the hidden springs of its evolution. Although the mystic's characterization of the human spirit as infinite may be an exaggeration, it certainly strives toward infinity; nothing finite seems able permanently to satisfy its outward and upward yearning. In contrast to the centrifugal, expansive mind, the body is centripetal, insulating itself as far as it can from its environment by enclosing itself in selectively permeable integuments, drawing

into itself whatever it needs for growth and survival, and relinquishing to the outer world only waste products that it can no longer use. Just as the Sun has a dual action, sending its rays speeding in all directions toward the farthest reaches of the Universe and, at the same time, drawing into itself, by means of its strong gravitational field, all the matter in surrounding space, including planets millions of miles away that avoid capture only by circulating rapidly in their orbits; so a human being combines a centrifugal mind with a centripetal body.

Despite the contrasting natures of mind and body, or, more probably, because of their differences, they complement and need each other. The mind needs its body as a base of operations; in its highest flights, it is supported by this persisting organic foundation. Even more than in the natural setting where the partnership arose, the body needs its mind to fulfill its original function and guide it through the complexities and surprises of our artificial modern world. Neither can be free in the fullest sense while the other is in thrall. The mind that tries to enslave its body to its whims, its ambitions, or its exaggerated sensual cravings will presently find the body retaliating with unhappy consequences. When they work as unconstrained partners, the body governing its internal functions under the direction of its genes, the mind attending to external relations with the use of the flexibility that the genes have given it, freedom is most complete.

Our freedom would be more precarious if both mind and body did not have great powers of recuperation, so that they do not

lie passive under the blows of fortune but fall to rise again. The body heals its wounds, mends broken bones, overcomes pathogenes that infect it, often at the same time building resistance to future invasions by the same noxious organisms. The mind's recuperative powers parallel those of the body and often exceed them. By overcoming disappointments, disillusions, rebuffs of every sort, it grows in strength and resoluteness; just as, by fighting off infections, the body improves its resistance to diseases. From great reverses the mind can often salvage a nugget of knowledge or wisdom that compensates for its losses. It can proclaim, with Marcus Aurelius, that to have suffered this blow is not my misfortune, but it is my good fortune that I can bear it nobly. For the preservation of its freedom, the mind's greatest resources are faith and hope - faith that by perseverance it will attain its goals; hope that the future will be better than the past. As long as it can preserve a hopeful outlook, it is never held in bondage by circumstance.

It is sometimes claimed that, since one's body belongs to himself alone, every person has the right to do as he pleases with it, at least in so far as this does not interfere with the equal right of others. This is an irresponsible doctrine based upon false premises. Although it is true that the materials of which a body is made — its carbon, hydrogen, oxygen, nitrogen, and other elements — belong to this body alone, at least temporarily, its form is the common property of mankind, held, with

minor variations, by every human being. This form is not the

exclusive possession of any individual but a configuration that we share with many others. Each of us holds the human form in trust and is responsible for it to the rest of mankind. It is our duty so to treat it that nobody need be ashamed of sharing it with us, as may happen when, through overindulgence or neglect, we permit it to become disgustingly obese or filthy, or we use it in any way that dishonors it. A mind bound to a corporeal form from which it shrinks can hardly feel free.

## ULTIMATE FREEDOM

Freedom has many aspects. Although for philosophers the most interesting question about freedom has been the degree in which our volitions escape determination by the past, practical people measure freedom by their success in making their decisions effective. We wish to be free to choose our careers, go where we please, speak and write what we think; we wish to be free from hunger and fear, disease and vexations, and above all from tyrannical governments, the cause of so many ills. We imagine that, could we realize all the freedoms to and freedoms from that we deem desirable, we would be in paradise.

Before long, we learn that freedom brings its own perplexities. Already as a schoolboy in the lower grades, I became aware of one of them, even if I did not put it into words. During the long summer vacation, when I was free to roam about a farm and, within reason, do as I pleased, I sometimes found the hours dragging slowly and would ask "Mother, what can I do today?" Her suggestions were not always eagerly accepted. In school, where activities were scheduled, I was spared the task of deciding what to do. At any stage in life, to have too many enticing alternatives may impose a vexing burden upon deliberation. When we must make an important commitment, we may fall into an agony of indecision, dreading to become responsible for a wrong choice, even when it will hardly affect anyone but ourselves. Hence the fear of freedom, with its momentous political consequences, of which Erich Fromm wrote.

Freedom is not an isolated facet of our existence. Its value depends upon what we do with it, how it is integrated into the whole pattern of a life. Without some motivation deep, strong, and enduring enough to determine the whole tenor of our lives, our ability to choose in particular instances of minor importance will bestead us little, so that, unless economic or social forces hold us to some routine, our freedom may become a liability rather than an asset. To be helpful, freedom must subserve some determination. Not freedom to choose in a vacuum, but the ability to delay action until, by careful deliberation, we decide which of all feasible courses will best advance our dominant purpose, is the true foundation of our liberty. What we might designate the depth or purity of our freedom depends upon this dominant purpose.

Doubtless what we all most ardently desire is happiness, a most important ingredient of which, for any thoughtful person, is a sense of fulfillment, a feeling that our lives are not being frittered away but are becoming what we most wish them to be that they are meaningful or significant. But the paths that we choose to lead us to happiness and fulfillment are as diverse as our temperaments: a harmonious family life, wealth, power, knowledge, pleasure, fame, adventure, tranquillity, or some combination of these, are among those commonly preferred. Our most painstakingly deliberated decisions are made with reference to these major objectives. We become increasingly what we will to be.

If each of us were a first cause and the author of his own being, then to follow whatever motive or motives we made dominant in ourselves would be perfect freedom. Since we are obviously far

from being our own creators, this approach to freedom is barred to us. Nevertheless, the closer we can bring our dominant motives to the source of our being, or to something beneficent that is far greater and more enduring than ourselves, the freer we might consider ourselves to be. At least, many earnest thinkers have felt this way. To the pious theist, freedom consists in obedience to God's will. If we can make our will conform to his will, the divine will becomes our will. For Kant, freedom was independence of everything except the moral law; only one who made all his volitions conform to it could be considered free. For the Stoics of old, freedom consisted in willing cooperation with the <a href="Logos">Logos</a> or constructive reason immanent in the Universe. For Spinoza, freedom resided in the power of reason to control the emotions, which it does the more effectively the more it rejoices in the blessedness that comes from the intellectuallove of God.

A difficulty with these prescriptions for freedom is that they permit such a wide range of interpretations that they fail to provide adequate guidance. Even if we do not join the pantheists in equating God with the Universe, we must admit that we do not know enough to delimit God from the Universe, to tell where one ends and the other begins. Our knowledge is restricted to phenomena, and we can only conjecture what lies beyond or beneath them. If we assume that the Universe, with all its splendor and beauty and joy, with all its ugliness and horror and suffering, is just what God wills it to be, then, whether we deliberately increase the glory and happiness or the horror and

suffering, we can equally claim that we conform to God's will.

If, on the other hand, we assert that the joy and beauty were willed by God, whereas terror and misery entered the world, despite his intention, in consequence of the freedom of creatures, we should give reasons for this belief. Perhaps the only reason that we can assign is that we prefer a Deity who is wholly benevolent to one who is indifferent to the sufferings of creatures. The source of this preference is within us, and perhaps this is where we should look for guidance.

Spinoza, Locke, and other philosophers have held that to be free is to regulate one's life by reason rather than to permit it to be swayed by passion. Reason is concerned with means rather than with ends; it is an instrument and not a motive. Most of our objectives are attained more readily when we use our reason or intelligence than when we depend upon emotion alone, but reason does not determine the objectives. Locke believed that the proper use of reason is to promote the happiness of the individual; that the rational pursuit of felicity is freedom. What finally determines the will is the desire for enduring happiness, not the aspiration to be rational as an end in itself. A misanthrope, constitutionally incapable of happiness, might find some bitter compensation in torturing or annihilating mankind and proceed quite rationally to accomplish his diabolical purpose. If freedom consists in rational behavior, he can claim to be as free as any one else.

To be free in the fullest sense, my decision must be deter-

mined not only by me, rather than by anything outside myself, but also by what is most central and enduring in me rather than by some transitory whim or passion. It must be an expression of my inmost nature. In broadest terms, what am I, what is any living thing? To what do we owe the wonder and the glory and the tragedy of being alive? In view of the latest discoveries in cytogenetics, some might say that we owe it to our genes, to the "coil of life" that bears them. But the earliest things that might be called alive lacked nuclei, in which the genes of all more advanced organisms are situated, and we cannot be certain that their activities were regulated by them. The double helix of DNA is the product of a long evolution. We owe our origin to something more ancient, widespread, and fundamental.

Obviously, we would not be here without matter, which composes our bodies and, in a manner obscure to us, supports our conscious life. But a chaotic swarm of atoms could never constitute a living thing, for life above all requires organization. Some process, apparently set in motion by the atoms themselves, was needed to arrange them in the complex patterns that are inseparable from life. Atoms are social beings, in favorable circumstances readily joining their neighbors to form molecules, which tend to become ever larger, with a greater variety of elements arranged in more intricate patterns. From this synthetic tendency life arose in the tepid waters, rich in solutes, of our cooling planet, about three thousand million years ago.

Since this process joins scattered elements in harmonious union, let us call it harmonization. It is a continuing process,

building its materials into patterns that become ever larger, more diversified yet more coherent, with each part more dependent upon the others. Every living, growing thing is an example of harmonization. Consider a green plant. It begins as a single cell in one of the ovules in the pistil of a flower. The cell absorbs nourishment from surrounding tissue and divides repeatedly until, by the time the seed is ripe, it has formed an embryo, consisting of one or two seed leaves or cotyledons, a plumule that will form the shoot, an abbreviated stem, and a rudimentary root—as one can see in an acorn, a bean, and many another seed.

If it falls upon moist soil, the seed germinates; escaping from the seed coats, it spreads the cotyledons to absorb sunlight, thereby beginning the new plant's lifelong labor of photosynthesis. Of all the countless chemical processes, this is the most significant and beneficent, for it is the indispensable foundation of all the life on this planet, except the minute fraction nourished by the chemosynthesis of certain bacteria, and it is a perfect example of harmonization. Capturing the energy in sunlight by means of the chlorophyll in its green cells, the plant combines two simple, widespread materials, water and carbon dioxide, to make sugar, at the same time releasing the oxygen which, until this process began in the far distant past, was apparently so rare in Earth's atmosphere that animals such as we know today could not have respired and lived. The sugar that is the primary product of photosynthesis may be condensed into grains of starch, and with the addition of nitrogen and other elements that the plant absorbs from the soil, tity is transformed into amino acids and

proteins.

The plant uses the products of its photosynthesis to form new cells and organs, until it becomes a herb, a vine, or a great spreading tree, with a tall trunk, many branches, innumerable leaves, and, finally, flowers and fruits, all dependent upon roots ramifying through the soil and absorbing water and salts to supply the aerial parts. The growth of a green plant, the transformation of a tiny seed into a large organism whose many diverse organs are bound into a coherent whole by their mutual interactions and mutual dependency, is an excellent example of harmonization.

An animal is a less perfect example of harmonization than a green plant, for instead of starting the process with simple inorganic materials, it must eat vegetable products and dissolve them into their component sugars, amino acids, and vitamins before it can build them into its own tissues. Yet growth is everywhere harmonization, and animals, especially the more advanced types, carry this constructive process farther than plants do. They contain a greater diversity of organs, capable of more varied functions, and all more closely dependent upon each other, for they cannot replace lost parts with the ease that most plants can, and the loss of even a single organ may permanently impair them or cause their death. With sensory organs such as plants lack, a central sensorium or brain, the ability to move from place to place and perform a variety of activities, they appear to raise life to a level unattainable by plants. Not vegetation alone, not animals alone, but both together give its highest significance to life on this planet; for the beauty of land and sea and sky,

of the lovely vegetable forms themselves, would seem to be wasted without eyes to see, ears to hear, minds to enjoy, cherish, and try to understand.

Sensory organs and mind continue, each at its own level, the constructive process of harmonization that built the body. When we see, many distinct excitations, caused by rays of light falling upon a multitude of retinal cells, are integrated in a single visual impression, perhaps of a bird. When we hear, many different vibrations, set up by sound waves of diverse lengths and frequencies impinging upon the tympanum, are by a similar process fused into a coherent melody, the bird's song. By continued harmonization, the visual image and the auditory impression, which enter the brain by wholly different paths, are synthesized into a unity, the idea of a singing bird. Just as a halftone reproduction of a photograph is made up of many distinct dots, so a visual or auditory impression is composed of a vast number of discrete nervous excitations, so closely articulated that they enter consciousness as an integrated whole.

Our efforts to know and to understand proceed in the same fashion. Our ideas of many different feathered creatures, differing greatly in size and form and color, are harmonized into the concept, or universal, "bird." Certain features common to creatures so diverse as birds, mammals, fishes, insects, and worms prompt us to unite them all in the concept "animal." Activities, such as growth, respiration, and reproduction, shaed by both plants and animals, lead us to form the more in-

clusive concept "life." And so we proceed, step by step, harmonizing the impressions provided by our senses, along with interpretations forged in the mind, into a science or a philosophy, a comprehensive world view.

If, now, I were asked what I am, I would reply "a particular example of the universal process of harmonization." From widespread elements it has formed me, in body and mind. In my body it no longer operates with the intensity that it did while I was a growing boy, but it still restores my tissues, heals lesions, and, I hope, is as active as it ever was when I see, hear, feel, and think. This sentence that I write, this book that I am trying to compose, are fruits of harmonization, for their many discrete units are bound together into the most coherent pattern that I can make of them.

For our first example, I chose the growth of a green plant, for nothing is more characteristic of the process, or more revealing. But harmonization is by no means confined to the living world; it is truly universal. Before it could originate life, it had a wast preliminary task to perform. Acting by means of graviantation, it gathered enormous amount of matter, thinly diffused over an immense expanse of space, into a number of compact, nearly spherical bodies, the Sun and planets and their satellites, and it set these bodies in motion relative to each other in a pattern so well balanced, so stable, that it continues scarcely altered for millions of years. The solar system is the grandest creation of harmonization that we know in some detail, although, in its main features, it is much simpler than a human body, perhaps even than an amoeba's.

Operating on a small scale, harmonization builds atoms into molecules, which even in inorganic matter may become quite complex. Aligning atoms or molecules row upon row, plane upon plane, like well-drilled soldiers, it forms crystals, which, by their symmetry, color, and glitter, reveal that the same process that produces order also creates beauty. Not until harmonization had formed a fairly stable environment, neither too hot nor too cold, rich in plastic materials, and with a continuing source of available energy, could it proceed to originate life, so fragile yet so enduring.

The movement that brought order into chaos, gave rise to life, and pervades every living creature determines the nature of freedom, we are free whenever our uncoerced activity conforms to harmonization, the process that fashioned us in body and mind and constitutes our inmost nature. A free decision is one that is truly our own, and what could be more truly ours than that which springs spontaneously from the uncorrupted depths of our being? Whenever the motive of our decision, in some important matter, is love of order or harmony in any of its varied aspects, our volition is uncoerced and free; whenever we are motivated by hatred, anger, greed, jealousy, mx destructive fury, or some other disruptive passion, we are not free but subservient to psychic reactions that have been forced upon our lineage in the course of evolution, as will presently be explained.

It follows from this that to be free is to be moral.

Morality carries into our relations with the beings that surround us the movement that created our bodies and gives coherence to

our thoughts. It is the effort to establish, among the members of a living community, harmonious, mutually helpful interactions such the organs of as unite, a healthy organism into a smoothly functioning whole. Because each individual is an independent agent with inclinations and values of his own, the life of a community can probably never become so harmoniously integrated as that of an animal in fullest health; yet this is the end toward which the most idealistic morality seems to strive, and, as the example of the organism makes clear, it is not incompatible with the performance of the most varied functions by different members, but rather depends upon such individuality and division of labor. Arising in the fertile depths of matter, harmonization ascends by stages through the living world to the spiritual and moral level. Viewed in broad perspective, morality is harmonization at an advanced stage.

By a different route, we have reached a conclusion not greatly different from that of Kant, who declared that a free will and a will under moral laws are identical. But the conception of morality as an advanced stage of harmonization gives moral effort definite a more direction than was supplied by Kant's Categorial Imperative, which asserts that the maxim according to which we act should always be one that we can will to become as universal as a law of nature. This, as C. D. Broad pointed out, is a second-order principle, in conformity to which specific rules of conduct should be chosen. As a directive principle it is rather similar to the Golden Rule, which enjoins us to do unto others as we would have them do unto us, but fails to specify the treatment. Perhaps certain others would not wish to be treated in ways that I would welcome.

Harmonization gives a more definite direction to moral endeavor.

It impels us to choose the course that, as far as we can foresee, will contribute most to the harmony of the living community. To be sure, a mind far from omniscient trying to chart a course through a perplexing world will sometimes fail to recognize the best alternative— a risk that one runs whatever ethical doctrine he accepts. But as long as our motives are pure and we do all in our power to promote concord, we are free from domination by secondary modifications foreign to our inmost nature.

Not only morality in the narrow sense but a wide range of creative activities are modes of harmonization. The painter creates by combining forms and colors in a harmonious pattern; the poet does the same with words and the images or feelings that they convey. The philosopher's endeavor is to build a coherent system of concepts; the inventor, the builder, and the engineer do something similar with more tangible materials. To raise and educate children is a creative undertaking that calls for some of our finest qualities and, when successful in producing a responsible, lovable person, brings great satisfaction. Gardening is a creative activity that yields prompter rewards, even to those without exceptional talents. It is no accident that in one or another of the many creative activities available to us we find happiness, for such activities are a free expression of our inmost nature, its extension into the world of things and of ideas.

Doubtless the reader has been wondering how I could apply the term "harmonization" to a process that, in spite of having created many things of the highest value, has filled the world with strife

and made animals, including man, capable of violence and destruction. Would it not have been more correct to attribute to the genes that govern our development both our creative impulses and our destructive fury? Is it not arbitrary to consider the former a truer expression of our inmost selves than the latter? Are we really less free when we hate and harm than when we lovingly foster and protect?

The genes, as was earlier pointed out, did not start the process of harmonization but are its products. They do not determine the nature of growth, which is a pure expression of harmonization, so much as direct it to yield the forms and functions that fit each species to thrive in its particular environment. The genes are responsible for the diversity of the living world, with its vast multiplicity of contrasting and often conflicting types, rather than for its unity, of which the foundation is the basic similarity of harmonization in every living thing. As the channel of a river directs, but does not impel, the flow of water through it, so the genes guide the growth of organisms.

The regions of the Universe where life can arise in any form that we would recognize as such are extremely restricted. Only one of the nine planets in the solar system, our own, appears to support it abundantly at the present time. Possibly in past ages Mars bore a thriving community of living things, of which some remnants may still persist on its arid soil, beneath a thin, impoverished atmosphere — a question that space explorations now in progress may soon answer. The surfaces of Venus and Mercury are too hot for vital processes that need an aqueous medium; the outer

planets are too cold. Even if only one in a million of the stars in the Universe illuminates and warms a life-bearing planet, the countless billions of them in thousands of galaxies may in aggregate provide energy for an immense multitude of living organisms, with forms unimaginable by us. Nevertheless, it is evident that life is very thinly scattered through the immensity of space, and only an infinitesimal fraction of the matter in the Universe can, in any cosmic epoch, enter the living state.

As though to compensate for the rarity of life in the Universe at large, it becomes excessively abundant wherever it finds favorable conditions, as on much of Earth's surface. One might suppose that the goal of matter is to form living bodies, and that, whenever it can, it does so with ungovernable intensity. So many living things arise, so close together, that they jostle each other for space and compete stubbornly for energy, to procure which some destroy others. Harmonization, which creates us and all the beautiful things that we enjoy, must certainly be considered a beneficent process, but, by its lack of moderation, it involves the living world in hideous struggles. The very intensity of the impulsion toward order and goodness becomes, secondarily, the cause of disorder and evil. If the creative movement were more restrained, it might produce more that is wholly good.

In the resulting maelstrom of eating and being eaten, of competing fiercely for living space and mates, the genes' capacity to mutate and alter every character of the organisms they govern had results that might have been predicted. Every alteration that conferred an advantage over competitors, that improved an animal's ability to procure a meal or to avoid becoming a meal, would in-

crease its chances for survival and be favored by natural selection. Gradually, through the generations, animals became armed with an amazing array of offensive and defensive weapons, including fangs, horns, beaks, talons, spines, poison glands, and delusive snares. The predators became adapted for the long pursuit, the sudden spring from ambush, the crushing blow, the lethal embrace, while their victims developed fleetness, tough carapaces, offensive odors and tastes, or forms and colors that made them difficult to detect while they remained immobile. The habitual use of these weapons and means of defense was bound to color deeply the psychic life of their possessors. Man and his prehuman ancestors, for ages not only efficient predators but probably rather frequent victims of the larger carnivores, became heavily infected with a whole gamut of passions: rage, hatred, greed, envy, jealousy; fear, suspicion, and vengefulness.

Wherever they occur, these passions are obviously not an expression of harmonization, which determines the original nature of living things. In a world where no more animals were born than could nourish themselves without preying on each other, all might dwell together in such concord as Isaiah envisioned. They would have neither offensive weapons nor defensive armor, nor the psychic attitudes appropriate for their use. Friendship and trust, rather than hatred and fear, would prevail throughout the living community. Violent, disturbing passions were forced upon our ancestors by the struggle to survive in an overcrowded world, and many of us still live in hereditary bondage to them.

The contrast between our inmost nature and the modifications

two interpretations of freedom. For moralists who contend that morality cannot exist in the absence of free will, freedom is, above all, an uncaused choice of whether to conform to our primary nature and act righteously or our secondary nature and behave in ways harmful to self and others. It seems, however, that we necessarily obey whichever aspect of our duplex nature happens to be stronger at the moment of reaching a decision, and our choice is not as indeterminate as it often appears to be. On a more Avoiding this baffling question, we might say that profound view, freedom is simply conformity to our inmost nature, so that, whenever this is overruled by our passonate secondary nature, we are not free but in bondage to incongruous modifications forced upon us by the necessity to survive. According to this interpretation, only when we escape from the harsh rule of these imposed attributes and permit our choices to be governed by the friendly, creative impulses that express our primary nature are we free. To act creatively, motivated by love of order, of beauty, of knowledge, of harmony in any of its varied aspects is ultimate freedom, life's flowering. We owe it to the cosmic process that gave us minds capable of foreseeing choice in splendidly endowed bodies to use our exceptional powers to raise life to levels higher than the blind evolutionary forces of mutation and natural selection can lift it.

imposed upon it by the evolutionary struggle to survive permits

## THE CONTINUING CONFLICT

The behavior of animals, including the most social of the insects and birds, is largely if not wholly innate, determined by their genes. Although it appears that most of them, not excepting industrious ants and termites in their teeming cities, seek small pleasures, little conflict seems to arise between the inclinations of the individual and the demands of its society. Governed by the same genic complex, individual and society have been molded to each other by reciprocal interactions continued for countless generations under the pressure of natural selection. It is hardly an exaggeration to say that the moral code of a social animal is written in its chromosomes.

With man, it is far otherwise. The patterns of human societies are not determined by the genetic constitution of the individuals who compose them, as in other animals. Although in numerous social insects a new colony is founded by a single individual or pair who can hardly have learned all the details of the society typical of their species, no human couple could establish a society like that into which they were born without long training in its mores. Like all animal societies, human societies have slowly evolved through many generations, but the continuity indispensable for their evolution is that of tradition, even more than that of the

germ plasm. The amazing diversity of cultures, especially of those called primitive, is only to a minor degree an expression of genetic diversity. The more pacific or warlike care-lacter of societies, the milder or harsher temper of their institutions, may indeed reflect innate differences in the people. Diverse environments, which may have favored settled habits or restless wandering, are responsible for much of the diversity of human cultures. But their amazing contrasts are due chiefly to long series of innovations, in beliefs, rites, customs, and artifacts, which originate in the minds of their members as randomly and unpredictably as mutations in the genes, and, like the latter, persist if compatible with survival but are sooner or later eliminated if they jeopardize the existence of the society.

Although the forms of human societies are not determined by the genetic constitutions of their members, the spontaneous inclinations of their members are, in large measure, so determined. As a consequence of this divergence, man's spontaneous impulses do not conform to the patterns of his societies as well as do those of animals in which both individual behavior and social pattern are genetically determined. Man's social adaptation is far from perfect, his behavior often detrimental to his neighbors. Because it is not canalized by innate patterns of behavior, the aggressiveness that he shares with other vertebrate animals often assumes peculiarly harmful forms. In many birds and mammals, disputes over terri-

tory, mates, or food are settled by ritualized posturing and vocalizations; the most persistent rather than the most violent individual usually wins, and the loser only exceptionally suffers physical injury. A territorial conflict between neighboring bands of howling monkeys is a logomachy, in which the adult male contestants roar loudly, without coming to grips. Among birds, tiny blue honeycreepers, confronting each other in a tree, call, pivot from side to side, and flip their wings for many minutes, until at last one tires and flies away, without losing a feather. The more social the animal, the less likely it is to fight violently with other members of its group. Often innate inhibitions prevent severe injury to social companions. The eyes are the most vulnerable parts of many animals, and, with their sharp bills, birds could easily blind their rivals, yet they seldom, if ever, do so. Of the countless times that I have seen domestic hens peck their social inferiors, never once was the blow directed toward the eyes.

Man lacks such innate checks to his aggressiveness. Boys who resort to fisticuffs are taught not to punch their adversaries in the abdomen, not to scratch or pull hair; but these socially imposed restraints are ignored by women who pass from angry words to physical conflict. Yet of all animals, man, who has invented such deadly weapons, most needs checks to his aggressiveness that are innate and irresistible rather than more precariously established by an often defective education.

To enjoy the advantages conferred by higher rank, animals instinctively try to rise in the hierarchy or "peck order" widespread among the more social vertebrates. The dominant individuals, who have first choice of food and mates, display their superiority by usually mild persecution of subordinates, as by pecking, nipping, or displacing them at sources of food. Persecution severe enough to disrupt the group, or cause the death of subordinates, is incompatible with the maintenance of a hierarchy; a solitary animal lacks social status. Sometimes the dominant bird or mammal acts as peace-maker, intervening in fights between subordinates. In man, the innate drive to rise in the hierarchy and dominate associates has taken a peculiar turn that is evidently a social development rather than behavior programmed by his genes. As far as we know, man alone, when, by ability, assertiveness, royal birth, or some combination of these attributes, he rises high in a social hierarchy, were his subordinates as tools to enhance his own "glory" or power.

Often this exploitation takes advantage of man's aggressiveness, coupled with his lack of innate inhibitions against maiming or killing other humans. The dominant individual—barbarian chief, king, or dictator—tries to augment his power, wealth, and fame by arming his subordinates to invade and conquer neighboring territories. He cares not how many of his subjects are crippled or killed, how many women are widowed and how many children orphaned, how great the des-

truction of cities and farms; his thirst for fame and glory overrides all other considerations. He may, like Alexander of Macedonia at the site of Troy, lament the absence of a Homer to celebrate his exploits. Even more astonishing than the military feats of the great conquerors of history is their immense, callous egotism. Nevertheless, the men whom they expoit as expendable means for the advancement of their selfish projects, as pawns in their play for power, far from execrating them as the unfeeling monsters that they are, extol them as heroes and worship them as superior beings. The pliability of men's aggressiveness, the ease with which it is directed against distant, unknown people who have done them no harm, is one of the most calamitous aspects of an innate trait, and certainly one of the most curious of biological phenomena.

Vast as has been the misery caused by man's aggressiveness and the ensuing wars, that caused by the genes' persistent effort to multiply themselves has possibly been greater.
Wars have been intermittent and mostly local; in some countries, whole generations have been spared their horror. In
every generation and practically every culture, the sexual
drive conflicts with social order. For harmony, the proper
nurture of children, and the preservation of the race, every
known culture, including the most primitive, has tried to
regulate the relations of the sexes more or less strictly,
to make them conform to an approved pattern. And everywhere

the excessively strong sexual urge has rebelled against this pattern. In no department of human life is the incompatibility of the genetic endowment with social institutions, of instinctive drives with high ideals, more painfully evident.

The failure of sex to conform to the comprehensive pattern of an animal's life is not peculiar to man. Most species of birds are monogamous, the male and female cooperating in the nurture of the young. Without such cooperation, certain large sea birds, including albatrosses, are unable to raise even a single chick. Although one might suppose that, in animals which breed most successfully in monogamous pairs, the innate pattern of behavior would impose strict matrimonial occur rather frequently among birds of the fidelity, lapses from such fidelity, especially by male birds, north temperate zone and are revealed by DNA fingerprinting. sometimes occur. Some females resist their importunities; a the males' importunities, a female Laysan albatross will permit herself to be mauled rather than submit to a male other than her mate. It appears that, through a large segment of the animal kingdom, the sexual impulse, the overt expression of the genes' persistent urge to multiply copies of themselves, stubbornly resists harmonious integration in a behavioral pattern, even that which most conduces to the prosperity of the species and, accordingly, the perpetuation of these same genes.

Among birds, sexual irregularities appear rarely to have serious consequences, as by disrupting pair bonds or causing feelings of guilt. In man, it is far otherwise. It would be superfluous to elaborate upon the tragic effects of sexual misbehavior among humans, which are only too well known:

broken marriages, blighted lives of unwed mothers, children cast into the world without proper homes, the social burden of caring for fatherless waifs, the strain of millions of unwanted births upon a world struggling to adjust its population to its resources.

It would be wrong to blame the genes for all man's socially disastrous behavior, much of which springs from temptations and stresses to which society itself exposes him.

Innate drives that we share with other vertebrates may make it difficult for us to avoid unlawful sexual behavior, to restrain aggressive impulses, or to repress violence when we are injured or insulted; they hardly impel us to acquire superfluous property by dishonest means, lie and scheme to attain high office, or persecute people whose beliefs differ from ours. Nevertheless, the deep-rooted innate drives are the most difficult to confine within a social frame and account for a major part of our aberrations.

It is widely held that morality is a strictly human attribute, that only man is moral. Animals whose behavior is innate, governed by their genes, need no external rules to make
them conform more or less strictly to the pattern proper to
their species. Without exhortation, instruction, or threats
of punishment, some of them behave, in their relations with
mates, offspring, and neighbors, in a manner that often puts
to shame our own faltering morality. We are moral, in the
strict sense of the word that moral philosophers approve,

because our genes fail to support the behavior that our cultures demand. Our moral sentiments have grown out of the incompatibility of our genetic constitution and our social needs. Duty is the sentiment that society has cultivated to compensate for this divergence, the check upon impulses rebellious to society's demands, the goad to recalcitrant wills, the bridge that joins inclination to obligation. If animals lack a sense of duty, it is to comply with their innate patterns of behavior is always the path easiest for them—which is doubtfully true. Man, lacking an innate pattern adequate for his welfare, would be lost without the social pattern, yet his failures to conform to it would be far more frequent without the moral pressure that he feels as duty.

duct that fails to conform to recognized standards, or, prhaps more rarely, to the more exacting principles that a thoughtful mind has adopted. Very often, uncontrollable innate drives are responsible for our guilt. Sin, in the strict sense, is the transgression of rules of conduct that are believed to be divine commandments. When the rules conflict too violently with natural impulses, as in puritanical religions, the sense of sin, of human vileness and unworthiness, can become oppressively acute. The divergence between what the genes make us and what religion or society demands that we be becomes a terrifying chasm.

Many societies have sternly repressed aberrant behavior, and some of them, like republican Rome, have become great according to the values of their times. Now, nearly everywhere, we witness a relaxation of standards, an attitude of permissiveness toward conduct that society has long stigmatized as improper. Whether such lapses are now more frequent than in past generations is questionable; what is beyond dispute is that they are viewed more indulgently by our contemporaries than, by our grandparents or great grandparents. Conduct that would have horrified them now escapes condemnation. Tacitly or openly, people side with the genes against traditional rules of conduct.

The dangers of extreme permissiveness are obvious. The relaxation of standards tends not only to disintegrate society but to multiply the type of person who cannot, or will not, control his impulses. Viewed biologically, it enables genotypes deficient in self-control to increase more rapidly than those with greater control. The growing proportion of irresponsible individuals will accelerate the growth of evils that the declining percentage of thoughtful, responsible people will be ever less able to correct.

If it were possible, by relaxing all inhibitions and giving free play to innate drives, to revert to the condition of instinct-guided animals whose innate patterns of behavior steer them well enough, this course might have much to recommend it. Our moral rules, or their equivalent, would then

of he

be inscribed in our chromosomes; avoiding the stressful need to control natural impulses, we might be ignorant of the imperatives of duty and the gnawings of guilt. However, evolution is an essentially irreversible process, such a course, which would be the reversal of a long age of human evolution, is hardly feasible. By attempting to follow it, man would probably destroy himself, along with his planet as an abode of life, before he could regain pristine innocence.

The only feasible alternative is to continue in the course that human evolution has followed since at least early Neolithic times, and probably much longer, which is the supersedence of genetic control of behavior by social control, in which intelligence plays an increasingly important role. By endowing us with minds able to learn, reason, foresee, and plan, the genes themselves have promoted this course, which natural selection has supported, because intelligence, well employed, can enhance survival, guiding vulnerable animals through nature's vicissitudes with a flexibility that stereotyped innate patterns of behavior can hardly achieve. Intelligence has been human genes' most potent instrument for their own multiplication, making them far more numerous than those of any other animal of comparable size. Now their very success in replicating themselves threatens to be their own undoing, by overburdening the environment with their immense multitude. This imminent peril is a consequence of the greatest inconsistency in human evolution, man's most glaring maladaptation, his failure to achieve, along with growing intelligence, full rational control over all that pertains to his reproduction.

Not ignominous surrender to blind biologic impulses implanted in us by despotic genes, but ever greater rational control over every aspect of behavior, including, above all, reproduction, is the course that humanity must take for its own salvation and that of the natural world which supports it. As we are now constituted, this course involves conflict between social norms or ideals and innate drives that are still imperiously strong. Nevertheless, we should be encouraged to pursue it by the knowledge that this is the direction that man's evolution took long ago, when innate patterns of behavior began to disintegrate in the measure that social or rational control grew, and with intelligent support it should continue along the same path. Above all, it is necessary to have laws and social institutions that favor the reproduction of the self-controlled while they reduce the multiplication of the irresponsible - which, lamentably, is just the opposite of the policies of some contemporary governments. Evolution is at best a slow process, its effects rarely perceptible in a dozen generations. But if mankind can avoid wrecking its environment, it has a long future, and, if it so wills, can continue to evolve in the direction that will reduce the conflict between its genetic constitution and the ideals of a stable, just, and compassionate society.

Our first responsibility is to the genes that give us splendid endowments, physical and mental, along with consid-

Genes are highly stable submicroscopic structures. The lineage that became man and that which became chimpanzee diverged from a primate stock millions of years age. In body and mind we differ enormously from these apes. Nevertheless, these who should know tell us that about 90 percent of our genes are represented in chimpanzees, our closest relatives. Although genes may mutate spontaneously, this might be difficult to prove. Most mutations occur when their constituent atoms are knocked about by short-wave or "hard" radiations, such as x-rays or are violently agitated by heat, and most of these randomly occurring alterations prove to be harmful. In contract to genes, minds are restless and flexible, eager to take advantage of situations that promise increased comfort or security. Not surprisingly, minds and genes, frequently in conflict. Each of us might be compared to a legislative assembly, a congress or parliament, in which conservative and progressive parties are about equally represented. Although often at odds, the parties may agree on measures clearly beneficial to the nation. The conflict of interests is, on the whole, calutary, favoring the retention of the best in the past but permitting cautious innovations and solid progress.

Becoming increasingly free from genetic control, the minds of hominids began, several million years ago, to lead the way in the evolution of man. Among momentous advances was the manufacture of tools by chipping flints into useful forms, and doubtless, also, the fabrication of articles composed of vegetable materials that have vanished without traces. Artifacts that increased survival favored the retention of mutations that

improved the dexterity of the hands that created them, and of the minds that visualized them and guided the hands, that fashioned them. Closely associated with these advances was the improvement of the upright posture that freed the forelimbs for activities other than walking. Mental ability, manual dexterity, and upright posture have been so closely associated in the making of man that one could hardly have advanced without the other two. So equipped, our ancestors undertook projects that required the cooperation of a number of individuals able to communicate intelligently, such as the erection of shelters and moving heavy bodies. This need promoted the development of language, by vocal organs whose perfection was strictly dependent upon genic mutations. All these developments that have made us human beings prove that minds and genes can cooperate to promote survival, and should give us hope should help humankind that further cooperation, led by foreseeing minds, to correct trends that threaten its decline.

Although we may be dissatisfied with our conservative genes for not keeping us better adjusted to changing circumstances for which thay are, at least indirectly, responsible, we should be grateful to them for endowing us so splendidly in body and mind, along with considerable capacity to compensate for imperfections for which we blame them, as by making eyeglasses to correct widespread imperfect vision. We should demonstrate our deep appreciation of the genes' gifts by providing what they need to make us and our children healthy, efficient organisms. If we supply enough wholesome food, maintain a healthful environment, and avoid hampering them with harmful

substances and habits, they will, in most cases, accomplish their tasks best without our interference, although occasionally medical intervention will be halpful.

We can trust our genes to regulate our internal affairs, s as their special province, we must often resist their intrusion into our external affairs, where their archaism may lead us actray. They have given us minds to guide us through the maze of social and environmental relations, and it is our responsibility to use them, often sternly repressing innate drives that perhaps were formerly necessary for individual and racial survival, and are stubbornly retained in the vastly altered circumstances of modern life. If we or our descendants can perfect this division of powers toward which the whole course of human evolution points, leaving to our genes primary control of our internal affairs while intelligence, tempered by love, directs our external affairs, including the adjustment of population to its resources, man will at last assume control of his destiny. The mitigation of the conflict between what despotic genes drive us to do and what intelligence and love tell us to do should bring happier, less stressful lives to future generations.

## FREEDOM, HAPPINESS, AND THEIR PROSPECTS

Although men shout and fight for freedom, what they most desire is happiness. They will endure almost any government, no matter how autocratic, under which they are fairly prosperous, secure, and content. When taxation becomes oppressive, poverty and famine stalk the land, and they are harassed by arbitrary abuses, they begin to hope that greater freedom will bring greater happiness. In an orderly, moderately prosperous country, agitation for a change in the form of government, which typically starts with cries for freedom, generally comes from a few malcontents and misfits, who probably would not be satisfied with any government in which they did not themselves enjoy power. Even the revolution that freed the thirteen North American colonies from British rule was disapproved by a substantial minority of the colonists.

Likewise in our private lives, most of us do not think much about freedom when we are prosperous and happy— the chief exceptions being a few philosophers concerned with political theories or the metaphysical problem of free will. But when we have difficulty adjusting ourselves to our circumstances, when our decisions do not have the expected results and we are dejected, we may wonder why we did not choose otherwise and ask whether we are driven by an inexorable necessity that the ancients would have called Fate.

Both freedom and happiness have a genetic foundation. Some people have such fortunate temperaments, such cheerful natures,

that they can be happy even in adversity, and in surroundings
that would depress most of us. Others, the melancholy types, are,
despite fair health and favorable circumstances, constitutionally
incapable of much happiness, an affliction probably caused by
glandular imbalances for which the genes are ultimately responsible.

The source of our freedom from blind determination by the past is our unique human ability to delay action while we deliberate, making an ideal excursion into the future before we select a course that will affect our welfare. Consistently to enjoy this freedom, we must be able to calm passions that clamor for immediate action. Our ability to subjugate importunate passions depends upon their strength relative to that of mental centers capable of subduing them. This varies greatly with individuals and is evidently determined largely by heredity, which gives fortunate people a high degree of self-control, while others are goaded by intense passions into unpremeditated actions that may bring sorrow and shame. In this way our genes, by restricting our freedom, threaten our happiness.

Another way in which the genes menace not only freedom and happiness but the very survival of civilization is their persistence in multiplying themselves without regard for the planet's ability to support the resulting population. As the world becomes ever more crowded, it will become increasingly difficult to move freely, to escape environmental pollution and dwell in congenial surroundings, or to choose a satisfying occupation. Governmental control of almost every aspect of life will necessarily become more stringent. Even in the absence of widespread famine, food and other

necessities will become increasingly scarce, causing much unrest. An over-exploited environment will become ever less capable of meeting the increasing demands made upon it, with the usual consequence of such a situation, a population crash the more severe the denser the population has become. The resulting shock could well throw humanity back into a state of barbarism or savagery, as gloomy prophets predict.

The primary source of these threats to our freedom and happiness, our very survival, is the archaic despotism of our genes, which stubbornly retain ancient prerogatives inconsistent with the present condition of civilized humanity. Doubtless the survival of an animal in a state of nature is promoted by its swift, emotionally charged reactions to surprises; but for man in a civilized society a more deliberate, thoughtful response is nearly always more satisfactory. Accordingly, it would be appropriate for the genes to diminish the intensity of human passions. Above all, they should reduce the strength and persistence of the reproductive urge, which if not repressed or thwarted yields a birthrate wholly disproportionate to man's need of recruitment and is the major cause of the ills that now afflict humanity and the planet that bears us.

To wring concessions from despots, whether they sit visibly on thrones or rule from hidden seats of power, has never been easy.

Often heroic measures are needed to make them yield to reasonable demands. But how can we move the silent autocrats that reside within us yet never communicate directly with us, that have never

been known to respond to a single pleas of those whom they govern?

Nature has its own way of dealing with genes that fail to keep their subjects well adjusted to the actual conditions of their existence. By eliminating the organisms that bear them, it frees the population of the poorly adapted genes — a harsh but effective method known as natural selection. When the maladaptation takes the form of excessive fecundity, elimination by natural selection is peculiarly difficult, for, if otherwise as well adapted as the less prolific genotypes of the same species, the more fecund types can better withstand the heavy mortality for which their immoderate breeding is largely responsible. Nevertheless, by means difficult to analyze, a restrained birthrate can be achieved, especially by birds and mammals that have long been established in stable habitats, such as tropical rain forests.

Natural selection has all but ceased to act upon man in civilized communities where medicine has become highly competent and
every effort is made to shield individuals from the effects of
their own imcompetence and folly. Our very virtues, our sympathy
and compassion, militate against the establishment of a population
of responsible citizens enjoying the maximum of freedom and happiness that our precarious human state permits. Responsible people
have few children so that they can rear them well, and perhaps
also in response to the need to stabilize the population. But, in
and out of wedlock, the passionate, the rash, the thoughtless and
irresponsible, continue to beget more children than they want and
can care for, burdening the community with their support and
counteracting the abnegation of those who, for the public good,

deny themselves desired descendants.

By private beneficence and public aid, the unwanted children of the shiftless and responsible are raised to maturity, too often to beget still more offspring in the same thoughtless manner in which they were conceived, thereby raising the ration of the incompetent and irresponsible to the competent and responsible who prop them up, and placing an ever heavier burden upon the latter. It is a tragic paradox that some of our noblest sentiments prompt us to act in a manner that tends to weaken or destroy the genetic foundations of these sentiments in the population as a whole. Although it is true that such attitudes as compassion for the unfortunate and responsibility for the welfare of the community owe much to education, the capacity to develop them has an innate foundation, which in some people is lamentably weak. Ethical ideals are not biology, but whenever they ignore biological principles they run a perilous course. Some of our notions about what consistutes true charity seem to need re-examination.

Aside from our children and other dependents, we have no more responsibility for the welfare of our contemporaries than for that of future generations. Some of the things we do today to alleviate the misfortunes of our contemporaries may bring much greater suffering upon our successors.

Of all national enterprises, none is more urgent than that of protecting the environment from the disastrous effects of an excessive population, preventing the curtailment of freedom that results from crowding, and raising the quality of citizens. Yet, in contrast to certain primitive communities, modern nations have commonly taken a laissez faire attitude toward this problem, as though it were too delicate or complex to touch. At best, they advise and help people to regulate the size of their families, while permitting married couples and even unmarried individuals to beget many babies by chance, to cooperate with or to ignore the national

endeavor to reduce the birthrate, as each sees fit. Although governments increasingly try to regulate the economy, not by appeals for cooperation but by more positive measures, they take a much laxer attitude toward one of the principal factors in the economy, the number of people it must support. They do not try to balance the national budget by permitting each individual to decide how much he will contribute to the public treasury, but they appear to assume that they can keep the population in balance with the economy and the ecology by permitting people to reproduce as they please.

It would certainly be more rationally consistent with a planned economy, as with a national effort to protect the environment, to regulate the birth rate no less than the tax rate or quotas of industrial and agricultural production. Nevertheless, such an attempt would be widely resisted as an intolerable abridgement of personal freedom; the howls of protest would reach the sky. A little reflection might change this attitude. In the first place, procreation is by no means invariably a free act, in the sense that it was undertaken after mature deliberation and the child was desired; all too often it is the result of blind biologic urges, an act of unquestioning compliance with the commands of autocratic genes. In such instances, the utmost that one could assert is that the despotism of the State that attempts to regulate births, which should be beneficent because it can assess the present situation as the genes cannot, conflicts with the blind, archaic despotism of the latter.

This argument might appeal more to a biologist or a philosopher than to the average citizen, who might be reminded

than the begetting of children. He mixes his genes, desirable and undesirable, with the gene pool of the general population, often transmitting them to a distant posterity and thereby helping to determine the character of the future race. He imposes upon his fellow citizens the financial burden of educating his children and providing for them welfare services that are becoming increasingly comprehensive and costly in modern States, the full value of which is rarely covered by the taxes he pays. He intensifies the problems caused by the growth of already dense populations. Is it not fantastic that, although a request for a gift of a thousand dollars from the public treasury would be ignored, by begetting a child one can force the public to make a much greater expenditure, and the more undesirable the child, the more he is likely to cost his community? What could be more unfair, or a greater abridgement of freedom, than by taxation to force citizens, who may be struggling to raise and educate a few children, to contribute to the education and welfare services of the more numerous progeny of less responsible parents? Only if a nation's survival demanded more manpower for defense could such a policy be justified.

that hardly anything that he does has greater public relevance

In a state of nature, parenthood is the measure of biological success. The animal who dies without progeny is a failure whose genes are eliminated from the gene pool of its species; the animal that procreates freely multiplies its genes and fulfils the biological purpose of its existence. Humans can contribute

substantially to the life of their species in ways other than procreation; the contributions of their minds may be more enduring than the contributions of their bodies. Moreover, in a regardless of negligent society in which children are often kept alive in spite of their parents, their number is no measure of parental zeal or competence; too often it is in direct proportion to the incompetence and profligacy of those who beget them. Parenthood should be regarded as a great privilege, not as an unconditional right of Teveryone, regardless of his merits. If to start a human life with the considered intention to make it happy and significant is one of the finest things a person can do, to initiate a life only to neglect it is one of the most contemptible. To be wanted, to be welcomed into the world as an honored guest, is every child's birthright. The child conceived by accident and reluctantly received has been dishonored before it opens its eyes.

To have responsibility without corresponding power places an individual or a State in an untenable situation. A State that makes itself responsible for the welfare of all its citizens from birth to death should be able to regulate the number of those whom it must protect, lest it find itself without sufficient resources to fulfill its commitments, as is happening in many countries, especially in Latin America. It might do this by licencing births, as it now licences marriages. A permit to beget a stated number of children should be issued with due consideration not only of the parents' genetic soundness or absence of serious heritable defects, their health, character, and ability to support their families but likewise of the nation's population trends. At the outset, the enforcement of a licencing law would not be

easy; but even if it took an effort comparable to that needed to win a major war, it might be worth the cost, as the most effective method of preventing the ecological and social disasters consequent upon uncontrolled population increase and the inevitable decline in human quality that must follow when the public-spirited and the responsible limit their birth rate and the selfish and irresponsible do not.

The legal regulation of births should become progressively easier as people become accustomed to it and recognize its benefits. The slight abridgement of personal liberty that it would involve would be amply compensated by its overall contribution to freedom and happiness, which are seriously compromised when dense populations restrict privacy and movement, pollute air and water and soil, threaten famine and shortages of essentials, and require increasing regimentation by government. Responsible, child-loving people whose dread of the consequences of the "population explosion" leads them to have fewer children than they desire might profit by being told by demographic experts how many they might have without fear of undesirable consequences. Perhaps, by a collective effort continued over a few generations, the genes' ancient, irrational tyranny over man's reproduction might be mitigated if not abolished.

Nothing would contribute more greatly to human freedom and happiness than the attenuation or elimination of the genetic factors that so often make it difficult or impossible to refrain from conduct that we know to be wrong because it is harmful to self, others, or our environment. To be rooted in our genes,

rather than dependent upon moral maxims that we learn in childhood and mental determinations that are often reached with
anguish, would make virtue more constant and dependable.

Spared the recurrent temptation to do wrong, we would become
unswervingly good, as blessed saints are reputed to be. According to some philosophers, we would then no longer be moral, because the distinctive feature of morality is freedom to choose
whether to follow or to disobey a rule of conduct. Our situation
would then resemble that of animals, whom we do not admit to be
moral because, even when their behavior is irreproachable, they
apparently act without inward struggles against contrary inclinations, without foreseeing and choosing between alternatives.

If we view morality as a halfway house along the road to perfect goodness, we can well afford to leave it behind us, becoming amoral or perhaps supermoral. Morality is, after all, not the end of life but a means to help us make it happy and rewarding, a safeguard against behavior that threatens to disintegrate society. Even if we were to become so \*\*\*\*\*\* firmly established in virtue that we no longer had to contend against contrary impulses, our situation would be quite different from that of animals who conform to an innate pattern of behavior that has been adjusted by natural selection to promote the prosperity of their species, however harshly it may impinge upon surrounding species. We would, no doubt, continue to look ahead and examine the probable consequences of our deeds. Lacking an innate pattern of behavior, living in a society far more complex than that of

any other animal, we would recognize competing claims upon our devotion to harmony and alternative paths to the same goal; having outgrown the choice between good and evil, we would need to choose between the less and the greater good. And we might extend our sphere of action to include the welfare of the whole living world and the planet that bears it, not just that of our own tribe or our own species. To give virtue such a firm innate foundation that we were rarely or never tempted to stray from it would not make morality obsolete but rather raise some of its distinctive features to a higher plane.

Although a fortunate heredity provides a sound foundation for freedom and responsibility, it does not by itself make us free and responsible. For this, education is indispensable. Probably training in responsibility should come first, for children can be given duties to perform before they are capable of understanding freedom. To permit a child to participate in the maintenance of his home, by the faithful performance of small but necessary tasks, helps him to become self-respecting and reliable. In an urban apartment, isolated from the sources of its necessities and the environment that supports it, to find chores that will train children in responsibility while they strengthen their muscles is more difficult than on a farm, especially one that produces a substantial share of the family's needs. The old-fashioned farm has made an inestimable contribution to such homely virtues as reponsibility, thrift, and industry that grow stale in the cities.

Freedom without self-control and responsibility is licence.

Prhaps the first thing that young people should know about free-

dom is that to be free does not mean to give uninhibited play to every whim that enters an undisciplined mind. One can be a slave to impulses that arise within oneself no less than to external powers. It is necessary to understand which of our so various and complex motives are expressions of our primary nature, of the very process that made us rational beings seeking happiness, and which were imposed upon us in the course of evolution by the struggle to survive in a perilous world and by the genes' uncompromising urge to multiply themselves at whatever cost. Only when we act in obedience to the former, as explained in the preceding chapter, can we be considered truly free. The habit of postponing action while we contemplate the probable consequences of alternative courses, which is the unique feature of human freedom, can be strengthened by practice. Young people should be encouraged to discuss with contemporaries the bearing not only of actions that might directly affect others but likewise those of a more personal nature. Above all, it is desirable to promote the growth of ideals, including that of freedom from the domination by the disruptive impulses, our heritage from the long ages when our ancestors lived as predators among more powerful predators, that from time to time surge up within us with imperious intensity. Is it not encouraging to remember that, without waiting for costly political and social changes, we can, by adequate training, greatly promote our children's freedom?

An adequate education for freedom and responsibility can hardly avoid consideration of sex, of all subjects the most difficult to sufficient treat with delicacy and tact. Too often sexual education

arouses wayward impulses hard for adolescents to control when, above all, it should make them acutely aware of the awful responsibility imposed upon them by their power to give life to beings no less susceptible to joy and sorrow, to elation and dejection, than they themselves are. To have some comprehension of the personal and social tragedies that may follow unbridled indulgence in sex is more urgent than knowledge of physiological details, some of which might wait until they are ready for marriage.

Although the noble ideal of chastity is falling into abeyance in contemporary society, it is too ancient and widely diffused among mankind — as is its behavioral equivalent among monogamous animals — to vanish for ever. To instil this ideal in the rising generation should help it to revive, with many benefits, including a reduction of the divorce rate. Perhaps the biologically sound conception that, when overcome by sexual desire, we are being used as agents or tools by genes for their own multiplication, not freely promoting rather than for our own welfare, should help us to assert our freedom by resisting them.

The growth of the sense of responsibility is not without subtle perils, for if overdeveloped it may lead to indecision and hesitancy that paralyzes action. Fear of reaching an unwise decision and becoming responsible for undesirable consequences may make us guilty of sins of omission instead of sins of commission. Only an omniscient and omnipotent being could be held responsible for every consequence of his acts. Since we are are neither, our inability to foresee or control all the effects of our deeds sets limits to our responsibility. If our thinking is honest and our motives pure, if we have carefully examined, to the best of our

ability, all pertinent circumstances, no more can be demanded of us. In fostering the feeling of responsibility among the young, as in all things, moderation is necessary.

Nothing is more urgent than to develop in young minds a vivid awareness of the uniqueness of their planet. If recent explorations of the solar system by means of unmanned space ships did no more than convince us that Earth is the fairest, most favored of the nine planets, apparently the only one on which life now flourishes abundantly, they are worth all the billions that have been spent on them. We would not deserve our position as dominant inhabitants of such a planet if we failed to show our gratitude for the privilege of dwelling upon it by doing all in our power to keep it flourishing, beautiful, and productive of life. By grateful appreciation of everything grand and lovely that Earth bears we not only give to our own lives a sense of fulfillment that is often lacking, but we impart higher significance to the planet itself, to the solar system and the cosmos of which it is a part. Without minds to contemplate and appreciate them, they would appear to exist barrenly. May it not be that the world process is, above all, an aeonian movement to actualize all the vast diversity of values that were latent in primal Being, and that our human senses and receptive minds make us important agents in this grand endeavor. Without false pride, we might regard ourselves as organs wherewith the cosmos contemplates and appreciates some of the values, such as sublimity and beauty and harmony in all its modes, that after long ages it has brought forth. Let us be loyal to the stupendous whole of which we are small but by no means insignificant parts, doing all in our power to promote every promising trend

that we detect in it, while we oppose every corrupting tendency.

If man awakes to a correct understanding of the world process and his place in it, cosmic loyalty may become his religion.

In this book I have deliberately avoided the subject of political or civil liberty, which I regard as of secondary importance. The character of the people, including private citizens no less than those in positions of authority, is more important than the form of the government. Men have been freer and happier under a wise, benevolent monarch than in a corrupt demessary republic. It was only the difficulty of ensuring a succession of excellent kings that led the classical philosophers, including Plato and Aristotle, to prefer democracy, not as the ideal form of government, but that in which foolish or wicked men were least likely to do great harm because power was shared by many. The framers of the constitution of the United States of America so carefully separated the powers of the executive, legislative, and judicial branches of the government because they feared that authority would be abused by ambitious or imperious politicians. Although generous statesmen have commonly tried to ensure liberty by legislation, philosophers have usually recommended a more personal approach to freedom. They have held that a man self-controlled, temperate, and just, not dominated by such disturbing passions as hatred, anger, greed, jealousy, lust, or selfish ambition, is in a very real sense free under any form of government, however autocratic. A country that contains enough such people will have no difficulty maintaining a liberal government, but where such citizens are few civil freedom is precarious.

The more thoughtful fraction of mankind has long been engaged in a revolt against a complex of genes which, on the one hand, is exceedingly favorable, giving us exceptionally versatile, enduring bodies bearing the most intelligent minds in the whole animal kingdom, but which, on the other hand, is stubbornly archaic, generating passions more appropriate for predatory animals than for members of a civilized community, and making it difficult for reason to control reproduction. If intelligence loses this contest with the genes, the world's population will soar to tens of billions, licentiousness and violence will run rampant through degenerating multitudes, until, in a ruined environment, a sudden crash will reduce humanity to a pitiful remnant, if not to extinction. If intelligence wins, man's future will be bright, with a population of moderate density living in harmony with the natural environment, enjoying such happiness and freedom as men have never known, and, in all probability, continuing to thrive through geologic ages. People already born will doubtless learn which of these alternatives will be realized.

## NOTES

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