

CHAPTER 3

STRUGGLE FOR EXISTENCE

EVERY GENERATION OF ORGANISMS SEES MORE BORN THAN THERE ARE RESOURCES AVAILABLE TO SUPPORT ALL, LEADING TO COMPETITION IN THE GAME OF SURVIVAL AMONG THOSE WITHIN SPECIES, AND, TO A LESSER DEGREE, BETWEEN INDIVIDUALS IN DIFFERENT SPECIES.



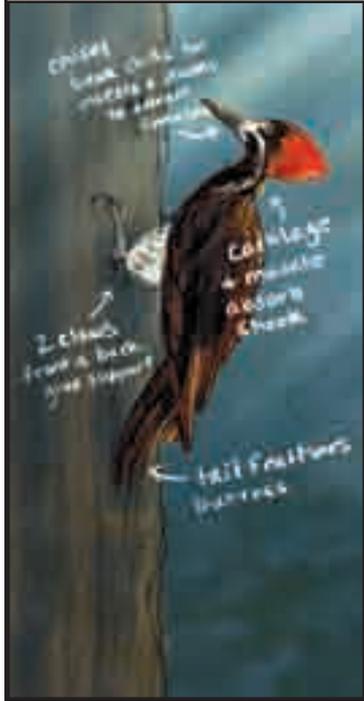
Amongst organic beings in a state of nature there is some individual variability: indeed I am not aware that this has ever been disputed.

But the mere existence of individual variability and of some few well-marked varieties, though necessary as the foundation for the work, helps us but little in understanding how species arise in nature.



How have all those exquisite adaptations of one part of the organisation to another part, and to the conditions of life, and of one organic being to another being, been perfected?

We see these beautiful co-adaptations most plainly in the woodpecker and the mistletoe;



and only a little less plainly in the humblest parasite which clings to the hairs of a quadruped or feathers of a bird;



in the structure of the beetle which dives through the water;

in the plumed seed which is wafted by the gentlest breeze;



in short, we see beautiful adaptations everywhere and in every part of the organic world...

But Mr. Darwin, how is it that varieties, which you have called incipient species, become ultimately converted into good and distinct species, which in most cases obviously differ from each other far more than do the varieties of the same species?



All these results follow from the struggle for life...



Owing to this struggle, variations, however slight and from whatever cause proceeding, if they be in any degree profitable to the individuals of a species, in their infinitely complex relations to other organic beings and to their physical conditions of life, will tend to the preservation of such individuals,

and will generally be inherited by the offspring.

The offspring, also, will thus have a better chance of surviving, for, of the many individuals of any species which are periodically born, but a small number can survive. I have called this principle, by which each slight variation, if useful, is preserved, by the term Natural Selection, in order to mark its relation to man's power of selection.



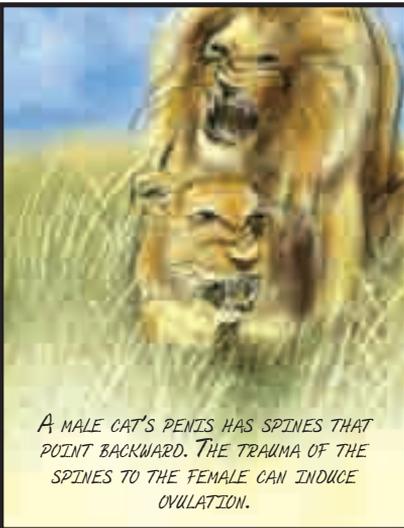
*We behold the face of nature
bright with gladness...*



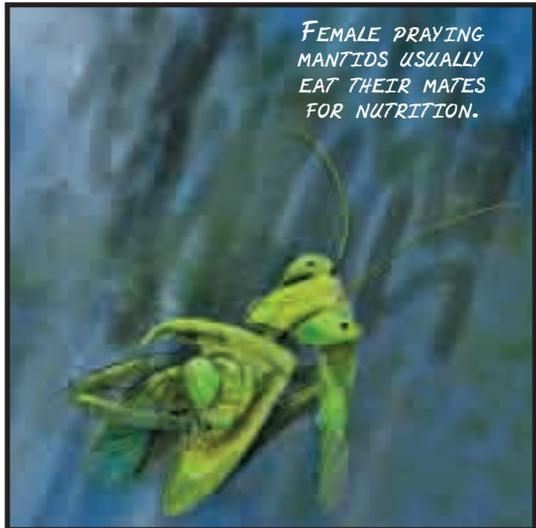
*We do not see, or we forget, that the
birds which are idly singing round us
mostly live on insects or seeds, and are
thus constantly destroying life.*



*...or we forget how largely these songsters,
or their eggs, or their nestlings, are
destroyed by birds and beasts of prey.*



*A MALE CAT'S PENIS HAS SPINES THAT
POINT BACKWARD. THE TRAUMA OF THE
SPINES TO THE FEMALE CAN INDUCE
OVULATION.*



*FEMALE PRAYING
MANTIDS USUALLY
EAT THEIR MATES
FOR NUTRITION.*

A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase.



Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year;



otherwise, on the principle of geometrical increase, its numbers would quickly become so inordinately great that no country could support the product.

The elephant is reckoned the slowest breeder of all known animals, and I have taken some pains to estimate its probable minimum rate of natural increase;

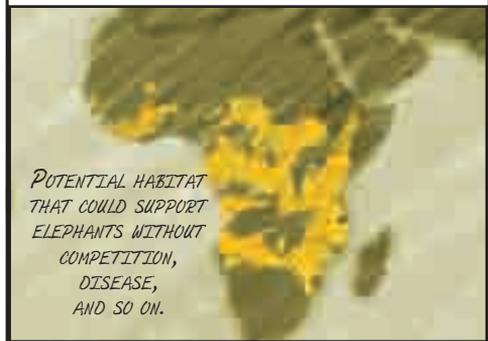


it will be safest to assume that it begins breeding when 30 years old, and goes on breeding till 90 years old, bringing forth six young in the interval, and surviving till 100 years old; if this be so, after a period of from 740 to 750 years there would be nearly 19 million elephants alive, descended from the first pair.

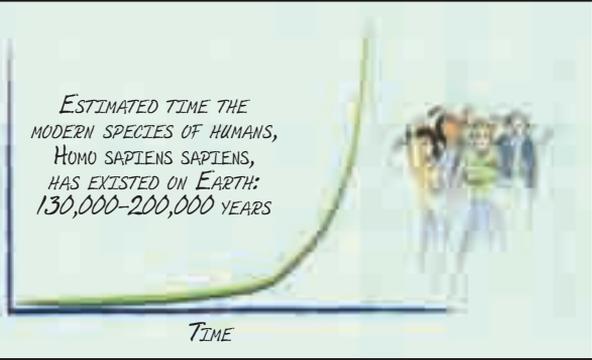
ESTIMATED NUMBER OF ELEPHANTS THROUGHOUT AFRICA IN 2007: 689,671



ESTIMATED TIME THE MODERN SPECIES OF AFRICAN ELEPHANTS HAS EXISTED ON EARTH: AROUND 7.6 MILLION YEARS



Even slow-breeding man has doubled in 25 years,



and at this rate in less than 1,000 years, there would literally not be standing-room for his progeny.

Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence,



either one individual with another of the same species,



or with the individuals of distinct species,



or with the physical conditions of life.



It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage.

...Cases could be given of introduced plants which have become common throughout whole islands in a period of less than 10 years.

...No one supposes that the fertility of the animals or plants has been suddenly and temporarily increased in any sensible degree.

The obvious explanation is that the conditions of life have been highly favourable, and that there has constantly been less destruction of the old and young, and that nearly all the young have been enabled to breed. Their geometrical ratio of increase, the result of which never fails to be surprising, simply explains their extraordinarily rapid increase and wide diffusion in their new homes.



NATURE OF THE CHECKS TO INCREASE



With plants there is a vast destruction of seeds, but, from some observations which I have made, it appears that the seedlings suffer most from germinating in ground already thickly stocked with other plants.



Seedlings, also, are destroyed in vast numbers by various enemies; for instance, on a piece of ground three feet long and two wide, dug and cleared, and where there could be no choking from other plants,

I marked all the seedlings of our native weeds as they came up,



and out of 357 no less than 295 were destroyed, chiefly by slugs and insects.



Climate plays an important part in determining the average numbers of a species, and periodical seasons of extreme cold or drought seem to be the most effective of all checks.



...In so far as climate chiefly acts in reducing food, it brings on the most severe struggle between the individuals...which subsist on the same kind of food.



...But very frequently it is not the obtaining food, but the serving as prey to other animals, which determines the average numbers of a species...

When a species, owing to highly favourable circumstances, increases inordinately in numbers in a small tract, epidemics—at least, this seems generally to occur with our game animals—often ensue...



LONDON, 1854

*THE BACTERIUM RESPONSIBLE FOR CHOLERA, **VIBRIO CHOLERAE**, CAME FROM THIS PUMP AND KILLED 500 PEOPLE.*

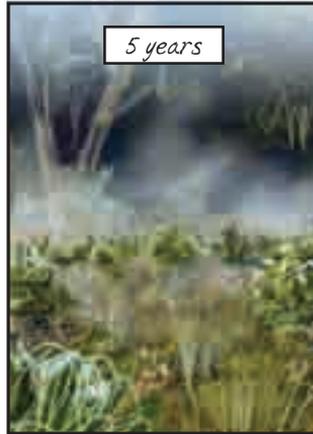


...And here comes in a sort of struggle between the parasite and its prey.

Many cases are on record showing how complex and unexpected are the checks and relations between organic beings, which have to struggle together in the same country.

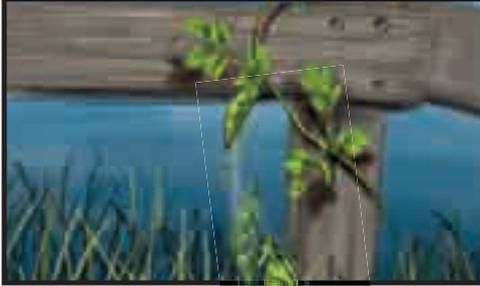


Every one has heard that when an American forest is cut down, a very different vegetation springs up; but it has been observed that ancient Indian ruins in the southern United States...now display the same beautiful diversity and proportion of kinds as in the surrounding virgin forest.

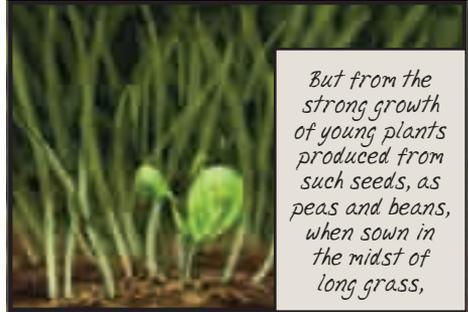


What a struggle must have gone on during long centuries between the several kinds of trees, each annually scattering its seeds by the thousand; what war between insect and insect—between insects, snails, and other animals with birds and beasts of prey—all striving to increase, all feeding on each other, or on the trees, their seeds and seedlings, or on the other plants which first clothed the ground and thus checked the growth of the trees!

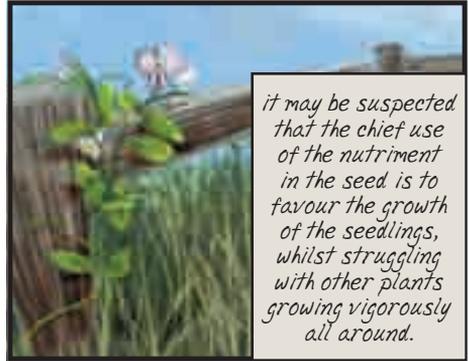
We can dimly see why the competition should be most severe between allied forms, which fill nearly the same place in the economy of nature; but probably in no one case could we precisely say why one species has been victorious over another in the great battle of life.



The store of nutriment laid up within the seeds of many plants seems at first sight to have no sort of relation to other plants.



But from the strong growth of young plants produced from such seeds, as peas and beans, when sown in the midst of long grass,



it may be suspected that the chief use of the nutriment in the seed is to favour the growth of the seedlings, whilst struggling with other plants growing vigorously all around.

Plants and animals most remote in the scale of nature, are bound together by a web of complex relationships.



When we reflect on this struggle, we may console ourselves with the full belief, that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply.