

## Book VIII

### 1

WE have now discussed the physical characteristics of animals and their methods of generation. Their habits and their modes of living vary according to their character and their food.

In the great majority of animals there are traces of psychical qualities or attitudes, which qualities are more markedly differentiated in the case of human beings. For just as we pointed out resemblances in the physical organs, so in a number of animals we observe gentleness or fierceness, mildness or cross temper, courage, or timidity, fear or confidence, high spirit or low cunning, and, with regard to intelligence, something equivalent to sagacity. Some of these qualities in man, as compared with the corresponding qualities in animals, differ only quantitatively: that is to say, a man has more or less of this quality, and an animal has more or less of some other; other qualities in man are represented by analogous and not identical qualities: for instance, just as in man we find knowledge, wisdom, and sagacity, so in certain animals there exists some other natural potentiality akin to these. The truth of this statement will be the more clearly apprehended if we have regard to the phenomena of childhood: for in children may be observed the traces and seeds of what will one day be settled psychological habits, though psychologically a child hardly differs for the time being from an animal; so that one is quite justified in saying that, as regards man and animals, certain psychical

qualities are identical with one another, whilst others resemble, and others are analogous to, each other.

Nature proceeds little by little from things lifeless to animal life in such a way that it is impossible to determine the exact line of demarcation, nor on which side thereof an intermediate form should lie. Thus, next after lifeless things in the upward scale comes the plant, and of plants one will differ from another as to its amount of apparent vitality; and, in a word, the whole genus of plants, whilst it is devoid of life as compared with an animal, is endowed with life as compared with other corporeal entities. Indeed, as we just remarked, there is observed in plants a continuous scale of ascent towards the animal. So, in the sea, there are certain objects concerning which one would be at a loss to determine whether they be animal or vegetable. For instance, certain of these objects are fairly rooted, and in several cases perish if detached; thus the pinna is rooted to a particular spot, and the solen (or razor-shell) cannot survive withdrawal from its burrow. Indeed, broadly speaking, the entire genus of testaceans have a resemblance to vegetables, if they be contrasted with such animals as are capable of progression.

In regard to sensibility, some animals give no indication whatsoever of it, whilst others indicate it but indistinctly. Further, the substance of some of these intermediate creatures is fleshlike, as is the case with the so-called tethya (or ascidians) and the acalephae (or sea-anemones); but the sponge is in every respect like a vegetable. And so throughout the entire animal scale there is a graduated differentiation in amount of vitality and in capacity for motion.

A similar statement holds good with regard to habits of life. Thus of plants that spring from seed the one function seems to be the reproduction of their own particular species, and the sphere of action with certain animals is similarly limited. The faculty of reproduction, then, is common to all alike. If sensibility be superadded, then their lives will differ from one another in respect to sexual intercourse through the varying amount of pleasure derived therefrom, and also in regard to modes of parturition and ways of rearing their

young. Some animals, like plants, simply procreate their own species at definite seasons; other animals busy themselves also in procuring food for their young, and after they are reared quit them and have no further dealings with them; other animals are more intelligent and endowed with memory, and they live with their offspring for a longer period and on a more social footing.

The life of animals, then, may be divided into two acts-procreation and feeding; for on these two acts all their interests and life concentrate. Their food depends chiefly on the substance of which they are severally constituted; for the source of their growth in all cases will be this substance. And whatsoever is in conformity with nature is pleasant, and all animals pursue pleasure in keeping with their nature.

## 2

Animals are also differentiated locally: that is to say, some live upon dry land, while others live in the water. And this differentiation may be interpreted in two different ways. Thus, some animals are termed terrestrial as inhaling air, and others aquatic as taking in water; and there are others which do not actually take in these elements, but nevertheless are constitutionally adapted to the cooling influence, so far as is needful to them, of one element or the other, and hence are called terrestrial or aquatic though they neither breathe air nor take in water. Again, other animals are so called from their finding their food and fixing their habitat on land or in water: for many animals, although they inhale air and breed on land, yet derive their food from the water, and live in water for the greater part of their lives; and these are the only animals to which as living in and on two elements the term 'amphibious' is applicable. There is no animal taking in water that is terrestrial or aerial or that derives its food from the land, whereas of the great number of land animals inhaling air many get their food from the water; moreover some are so peculiarly organized that if they be shut off altogether from the water they cannot possibly live, as for instance, the so-called sea-turtle, the crocodile,

the hippopotamus, the seal, and some of the smaller creatures, such as the fresh-water tortoise and the frog: now all these animals choke or drown if they do not from time to time breathe atmospheric air: they breed and rear their young on dry land, or near the land, but they pass their lives in water.

But the dolphin is equipped in the most remarkable way of all animals: the dolphin and other similar aquatic animals, including the other cetaceans which resemble it; that is to say, the whale, and all the other creatures that are furnished with a blow-hole. One can hardly allow that such an animal is terrestrial and terrestrial only, or aquatic and aquatic only, if by terrestrial we mean an animal that inhales air, and if by aquatic we mean an animal that takes in water. For the fact is the dolphin performs both these processes: he takes in water and discharges it by his blow-hole, and he also inhales air into his lungs; for, by the way, the creature is furnished with this organ and respire thereby, and accordingly, when caught in the nets, he is quickly suffocated for lack of air. He can also live for a considerable while out of the water, but all this while he keeps up a dull moaning sound corresponding to the noise made by air-breathing animals in general; furthermore, when sleeping, the animal keeps his nose above water, and he does so that he may breathe the air. Now it would be unreasonable to assign one and the same class of animals to both categories, terrestrial and aquatic, seeing that these categories are more or less exclusive of one another; we must accordingly supplement our definition of the term 'aquatic' or 'marine'. For the fact is, some aquatic animals take in water and discharge it again, for the same reason that leads air-breathing animals to inhale air: in other words, with the object of cooling the blood. Others take in water as incidental to their mode of feeding; for as they get their food in the water they cannot but take in water along with their food, and if they take in water they must be provided with some organ for discharging it. Those blooded animals, then, that use water for a purpose analogous to respiration are provided with gills; and such as take in water when catching their prey, with the blow-hole. Similar

remarks are applicable to molluscs and crustaceans; for again it is by way of procuring food that these creatures take in water.

Aquatic in different ways, the differences depending on bodily relation to external temperature and on habit of life, are such animals on the one hand as take in air but live in water, and such on the other hand as take in water and are furnished with gills but go upon dry land and get their living there. At present only one animal of the latter kind is known, the so-called cordylus or water-newt; this creature is furnished not with lungs but with gills, but for all that it is a quadruped and fitted for walking on dry land.

In the case of all these animals their nature appears in some kind of a way to have got warped, just as some male animals get to resemble the female, and some female animals the male. The fact is that animals, if they be subjected to a modification in minute organs, are liable to immense modifications in their general configuration. This phenomenon may be observed in the case of gelded animals: only a minute organ of the animal is mutilated, and the creature passes from the male to the female form. We may infer, then, that if in the primary conformation of the embryo an infinitesimally minute but absolutely essential organ sustain a change of magnitude one way or the other, the animal will in one case turn to male and in the other to female; and also that, if the said organ be obliterated altogether, the animal will be of neither one sex nor the other. And so by the occurrence of modification in minute organs it comes to pass that one animal is terrestrial and another aquatic, in both senses of these terms. And, again, some animals are amphibious whilst other animals are not amphibious, owing to the circumstance that in their conformation while in the embryonic condition there got intermixed into them some portion of the matter of which their subsequent food is constituted; for, as was said above, what is in conformity with nature is to every single animal pleasant and agreeable.

Animals then have been categorized into terrestrial and aquatic in three ways, according to their assumption of air or of water, the temperament of their bodies, or the character of their food; and the

mode of life of an animal corresponds to the category in which it is found. That is to say, in some cases the animal depends for its terrestrial or aquatic nature on temperament and diet combined, as well as upon its method of respiration; and sometimes on temperament and habits alone.

Of testaceans, some, that are incapable of motion, subsist on fresh water, for, as the sea water dissolves into its constituents, the fresh water from its greater thinness percolates through the grosser parts; in fact, they live on fresh water just as they were originally engendered from the same. Now that fresh water is contained in the sea and can be strained off from it can be proved in a thoroughly practical way. Take a thin vessel of moulded wax, attach a cord to it, and let it down quite empty into the sea: in twenty-four hours it will be found to contain a quantity of water, and the water will be fresh and drinkable.

Sea-anemones feed on such small fishes as come in their way. The mouth of this creature is in the middle of its body; and this fact may be clearly observed in the case of the larger varieties. Like the oyster it has a duct for the outlet of the residuum; and this duct is at the top of the animal. In other words, the sea-anemone corresponds to the inner fleshy part of the oyster, and the stone to which the one creature clings corresponds to the shell which encases the other.

The limpet detaches itself from the rock and goes about in quest of food. Of shell-fish that are mobile, some are carnivorous and live on little fishes, as for instance, the purple murex-and there can be no doubt that the purple murex is carnivorous, as it is caught by a bait of fish; others are carnivorous, but feed also on marine vegetation.

The sea-turtles feed on shell-fish-for, by the way, their mouths are extraordinarily hard; whatever object it seizes, stone or other, it crunches into bits, but when it leaves the water for dry land it browses on grass). These creatures suffer greatly, and oftentimes die when they lie on the surface of the water exposed to a scorching sun; for, when once they have risen to the surface, they find a difficulty in sinking again.

Crustaceans feed in like manner. They are omnivorous; that is to say, they live on stones, slime, sea-weed, and excrement-as for instance the rock-crab-and are also carnivorous. The crawfish or spiny-lobster can get the better of fishes even of the larger species, though in some of them it occasionally finds more than its match. Thus, this animal is so overmastered and cowed by the octopus that it dies of terror if it become aware of an octopus in the same net with itself. The crawfish can master the conger-eel, for owing to the rough spines of the crawfish the eel cannot slip away and elude its hold. The conger-eel, however, devours the octopus, for owing to the slipperiness of its antagonist the octopus can make nothing of it. The crawfish feeds on little fish, capturing them beside its hole or dwelling place; for, by the way, it is found out at sea on rough and stony bottoms, and in such places it makes its den. Whatever it catches, it puts into its mouth with its pincer-like claws, like the common crab. Its nature is to walk straight forward when it has nothing to fear, with its feelers hanging sideways; if it be frightened, it makes its escape backwards, darting off to a great distance. These animals fight one another with their claws, just as rams fight with their horns, raising them and striking their opponents; they are often also seen crowded together in herds. So much for the mode of life of the crustacean.

Molluscs are all carnivorous; and of molluscs the calamary and the sepia are more than a match for fishes even of the large species. The octopus for the most part gathers shellfish, extracts the flesh, and feeds on that; in fact, fishermen recognize their holes by the number of shells lying about. Some say that the octopus devours its own species, but this statement is incorrect; it is doubtless founded on the fact that the creature is often found with its tentacles removed, which tentacles have really been eaten off by the conger.

Fishes, all without exception, feed on spawn in the spawning season; but in other respects the food varies with the varying species. Some fishes are exclusively carnivorous, as the cartilaginous genus, the conger, the channa or Serranus, the tunny, the bass, the syno-

don or Dentex, the amia, the sea-perch, and the muraena. The red mullet is carnivorous, but feeds also on sea-weed, on shell-fish, and on mud. The grey mullet feeds on mud, the dascyllus on mud and offal, the scarus or parrot-fish and the melanurus on sea-weed, the saupe on offal and sea-weed; the saupe feeds also on zostera, and is the only fish that is captured with a gourd. All fishes devour their own species, with the single exception of the cestreus or mullet; and the conger is especially ravenous in this respect. The cephalus and the mullet in general are the only fish that eat no flesh; this may be inferred from the facts that when caught they are never found with flesh in their intestines, and that the bait used to catch them is not flesh but barley-cake. Every fish of the mullet-kind lives on sea-weed and sand. The cephalus, called by some the 'chelon', keeps near in to the shore, the peraeas keeps out at a distance from it, and feeds on a mucous substance exuding from itself, and consequently is always in a starved condition. The cephalus lives in mud, and is in consequence heavy and slimy; it never feeds on any other fish. As it lives in mud, it has every now and then to make a leap upwards out of the mud so as to wash the slime from off its body. There is no creature known to prey upon the spawn of the cephalus, so that the species is exceedingly numerous; when, however, the is full-grown it is preyed upon by a number of fishes, and especially by the acharnas or bass. Of all fishes the mullet is the most voracious and insatiable, and in consequence its belly is kept at full stretch; whenever it is not starving, it may be considered as out of condition. When it is frightened, it hides its head in mud, under the notion that it is hiding its whole body. The synodon is carnivorous and feeds on molluscs. Very often the synodon and the channa cast up their stomachs while chasing smaller fishes; for, be it remembered, fishes have their stomachs close to the mouth, and are not furnished with a gullet.

Some fishes then, as has been stated, are carnivorous, and carnivorous only, as the dolphin, the synodon, the gilt-head, the selachians, and the molluscs. Other fishes feed habitually on mud or sea-weed or sea-moss or the so-called stalk-weed or growing plants; as for instance, the phycis, the goby, and the rock-fish; and, by the way, the



only meat that the phycis will touch is that of prawns. Very often, however, as has been stated, they devour one another, and especially do the larger ones devour the smaller. The proof of their being carnivorous is the fact that they can be caught with flesh for a bait. The mackerel, the tunny, and the bass are for the most part carnivorous, but they do occasionally feed on sea-weed. The sargue feeds on the leavings of the trigle or red mullet. The red mullet burrows in the mud, when it sets the mud in motion and quits its haunt, the sargue settles down into the place and feeds on what is left behind, and prevents any smaller fish from settling in the immediate vicinity.

Of all fishes the so-called scarus, or parrot, wrasse, is the only one known to chew the cud like a quadruped.

As a general rule the larger fishes catch the smaller ones in their mouths whilst swimming straight after them in the ordinary position; but the selachians, the dolphin, and all the cetacea must first turn over on their backs, as their mouths are placed down below; this allows a fair chance of escape to the smaller fishes, and, indeed, if it were not so, there would be very few of the little fishes left, for the speed and voracity of the dolphin is something marvellous.

Of eels a few here and there feed on mud and on chance morsels of food thrown to them; the greater part of them subsist on fresh water. Eel-breeders are particularly careful to have the water kept perfectly clear, by its perpetually flowing on to flat slabs of stone and then flowing off again; sometimes they coat the eel-tanks with plaster. The fact is that the eel will soon choke if the water is not clear as his gills are peculiarly small. On this account, when fishing for eels, they disturb the water. In the river Strymon eel-fishing takes place at the rising of the Pleiads, because at this period the water is troubled and the mud raised up by contrary winds; unless the water be in this condition, it is as well to leave the eels alone. When dead the eel, unlike the majority of fishes, neither floats on nor rises to the surface; and this is owing to the smallness of the stomach. A few eels are supplied with fat, but the greater part have no fat whatsoever. When removed from the water they can live for five or six days; for a longer period if

north winds prevail, for a shorter if south winds. If they are removed in summer from the pools to the tanks they will die; but not so if removed in the winter. They are not capable of holding out against any abrupt change; consequently they often die in large numbers when men engaged in transporting them from one place to another dip them into water particularly cold. They will also die of suffocation if they be kept in a scanty supply of water. This same remark will hold good for fishes in general; for they are suffocated if they be long confined in a short supply of water, with the water kept unchanged-just as animals that respire are suffocated if they be shut up with a scanty supply of air. The eel in some cases lives for seven or eight years. The river-eel feeds on his own species, on grass, or on roots, or on any chance food found in the mud. Their usual feeding-time is at night, and during the day-time they retreat into deep water. And so much for the food of fishes.

### 3

Of birds, such as have crooked talons are carnivorous without exception, and cannot swallow corn or bread-food even if it be put into their bills in tit-bits; as for instance, the eagle of every variety, the kite, the two species of hawks, to wit, the dove-hawk and the sparrow-hawk-and, by the way, these two hawks differ greatly in size from one another-and the buzzard. The buzzard is of the same size as the kite, and is visible at all seasons of the year. There is also the phene (or lammergeier) and the vulture. The phene is larger than the common eagle and is ashen in colour. Of the vulture there are two varieties: one small and whitish, the other comparatively large and rather more ashen-coloured than white. Further, of birds that fly by night, some have crooked talons, such as the night-raven, the owl, and the eagle-owl. The eagle-owl resembles the common owl in shape, but it is quite as large as the eagle. Again, there is the eleus, the Aegolian owl, and the little horned owl. Of these birds, the eleus is somewhat larger than the barn-door cock, and the Aegolian owl is of about the same size as the eleus, and both these birds hunt the

jay; the little horned owl is smaller than the common owl. All these three birds are alike in appearance, and all three are carnivorous.

Again, of birds that have not crooked talons some are carnivorous, such as the swallow. Others feed on grubs, such as the chaffinch, the sparrow, the 'batis', the green linnet, and the titmouse. Of the titmouse there are three varieties. The largest is the finch-titmouse--for it is about the size of a finch; the second has a long tail, and from its habitat is called the hill-titmouse; the third resembles the other two in appearance, but is less in size than either of them. Then come the becca-fico, the black-cap, the bull-finch, the robin, the epilais, the midget-bird, and the golden-crested wren. This wren is little larger than a locust, has a crest of bright red gold, and is in every way a beautiful and graceful little bird. Then the anthus, a bird about the size of a finch; and the mountain-finch, which resembles a finch and is of much the same size, but its neck is blue, and it is named from its habitat; and lastly the wren and the rook. The above-enumerated birds and the like of them feed either wholly or for the most part on grubs, but the following and the like feed on thistles; to wit, the linnet, the thraupis, and the goldfinch. All these birds feed on thistles, but never on grubs or any living thing whatever; they live and roost also on the plants from which they derive their food.

There are other birds whose favourite food consists of insects found beneath the bark of trees; as for instance, the great and the small pie, which are nicknamed the woodpeckers. These two birds resemble one another in plumage and in note, only that the note of the larger bird is the louder of the two; they both frequent the trunks of trees in quest of food. There is also the greenpie, a bird about the size of a turtle-dove, green-coloured all over, that pecks at the bark of trees with extraordinary vigour, lives generally on the branch of a tree, has a loud note, and is mostly found in the Peloponnese. There is another bird called the 'grub-picker' (or tree-creeper), about as small as the penduline titmouse, with speckled plumage of an ashen colour, and with a poor note; it is a variety of the woodpecker.

There are other birds that live on fruit and herbage, such as the wild pigeon or ringdove, the common pigeon, the rock-dove, and the turtle-dove. The ring-dove and the common pigeon are visible at all seasons; the turtledove only in the summer, for in winter it lurks in some hole or other and is never seen. The rock-dove is chiefly visible in the autumn, and is caught at that season; it is larger than the common pigeon but smaller than the wild one; it is generally caught while drinking. These pigeons bring their young ones with them when they visit this country. All our other birds come to us in the early summer and build their nests here, and the greater part of them rear their young on animal food, with the sole exception of the pigeon and its varieties.

The whole genus of birds may be pretty well divided into such as procure their food on dry land, such as frequent rivers and lakes, and such as live on or by the sea.

Of water-birds such as are web-footed live actually on the water, while such as are split-footed live by the edge of it-and, by the way, water-birds that are not carnivorous live on water-plants, (but most of them live on fish), like the heron and the spoonbill that frequent the banks of lakes and rivers; and the spoonbill, by the way, is less than the common heron, and has a long flat bill. There are furthermore the stork and the seamew; and the seamew, by the way, is ashen-coloured. There is also the schoenilus, the cinclus, and the white-rump. Of these smaller birds the last mentioned is the largest, being about the size of the common thrush; all three may be described as 'wag-tails'. Then there is the scaldris, with plumage ashen-grey, but speckled. Moreover, the family of the halcyons or kingfishers live by the waterside. Of kingfishers there are two varieties; one that sits on reeds and sings; the other, the larger of the two, is without a note. Both these varieties are blue on the back. There is also the trochilus (or sandpiper). The halcyon also, including a variety termed the cerylus, is found near the seaside. The crow also feeds on such animal life as is cast up on the beach, for the bird is omnivorous. There are also the white gull, the cepphus, the aethyia, and the charadrius.

Of web-footed birds, the larger species live on the banks of rivers and lakes; as the swan, the duck, the coot, the grebe, and the teal—a bird resembling the duck but less in size—and the water-raven or cormorant. This bird is the size of a stork, only that its legs are shorter; it is web-footed and is a good swimmer; its plumage is black. It roosts on trees, and is the only one of all such birds as these that is found to build its nest in a tree. Further there is the large goose, the little gregarious goose, the vulpanser, the horned grebe, and the pelopos. The sea-eagle lives in the neighbourhood of the sea and seeks its quarry in lagoons.

A great number of birds are omnivorous. Birds of prey feed on any animal or bird, other than a bird of prey, that they may catch. These birds never touch one of their own genus, whereas fishes often devour members actually of their own species.

Birds, as a rule, are very spare drinkers. In fact birds of prey never drink at all, excepting a very few, and these drink very rarely; and this last observation is peculiarly applicable to the kestrel. The kite has been seen to drink, but he certainly drinks very seldom.

#### 4

Animals that are coated with tessellates—such as the lizard and the other quadrupeds, and the serpents—are omnivorous: at all events they are carnivorous and graminivorous; and serpents, by the way, are of all animals the greatest gluttons.

Tessellated animals are spare drinkers, as are also all such animals as have a spongy lung, and such a lung, scantily supplied with blood, is found in all oviparous animals. Serpents, by the by, have an insatiate appetite for wine; consequently, at times men hunt for snakes by pouring wine into saucers and putting them into the interstices of walls, and the creatures are caught when inebriated. Serpents are carnivorous, and whenever they catch an animal they extract all its juices and eject the creature whole. And, by the way, this is done by all other creatures of similar habits, as for instance the spider; only that the spider sucks out the juices of its prey outside, and the

serpent does so in its belly. The serpent takes any food presented to him, eats birds and animals, and swallows eggs entire. But after taking his prey he stretches himself until he stands straight out to the very tip, and then he contracts and squeezes himself into little compass, so that the swallowed mass may pass down his outstretched body; and this action on his part is due to the tenuity and length of his gullet. Spiders and snakes can both go without food for a long time; and this remark may be verified by observation of specimens kept alive in the shops of the apothecaries.

## 5

Of viviparous quadrupeds such as are fierce and jag-toothed are without exception carnivorous; though, by the way, it is stated of the wolf, but of no other animal, that in extremity of hunger it will eat a certain kind of earth. These carnivorous animals never eat grass except when they are sick, just as dogs bring on a vomit by eating grass and thereby purge themselves.

The solitary wolf is more apt to attack man than the wolf that goes with a pack.

The animal called 'glanus' by some and 'hyaena' by others is as large as a wolf, with a mane like a horse, only that the hair is stiffer and longer and extends over the entire length of the chine. It will lie in wait for a man and chase him, and will inveigle a dog within its reach by making a noise that resembles the retching noise of a man vomiting. It is exceedingly fond of putrefied flesh, and will burrow in a graveyard to gratify this propensity.

The bear is omnivorous. It eats fruit, and is enabled by the suppleness of its body to climb a tree; it also eats vegetables, and it will break up a hive to get at the honey; it eats crabs and ants also, and is in a general way carnivorous. It is so powerful that it will attack not only the deer but the wild boar, if it can take it unawares, and also the bull. After coming to close quarters with the bull it falls on its back in front of the animal, and, when the bull proceeds to butt, the bear seizes hold of the bull's horns with its front paws, fastens

its teeth into his shoulder, and drags him down to the ground. For a short time together it can walk erect on its hind legs. All the flesh it eats it first allows to become carrion.

The lion, like all other savage and jag-toothed animals, is carnivorous. It devours its food greedily and fiercely, and often swallows its prey entire without rending it at all; it will then go fasting for two or three days together, being rendered capable of this abstinence by its previous surfeit. It is a spare drinker. It discharges the solid residuum in small quantities, about every other day or at irregular intervals, and the substance of it is hard and dry like the excrement of a dog. The wind discharged from off its stomach is pungent, and its urine emits a strong odour, a phenomenon which, in the case of dogs, accounts for their habit of sniffing at trees; for, by the way, the lion, like the dog, lifts its leg to void its urine. It infects the food it eats with a strong smell by breathing on it, and when the animal is cut open an overpowering vapour exhales from its inside.

Some wild quadrupeds feed in lakes and rivers; the seal is the only one that gets its living on the sea. To the former class of animals belong the so-called castor, the satyrium, the otter, and the so-called latak, or beaver. The beaver is flatter than the otter and has strong teeth; it often at night-time emerges from the water and goes nibbling at the bark of the aspens that fringe the riversides. The otter will bite a man, and it is said that whenever it bites it will never let go until it hears a bone crack. The hair of the beaver is rough, intermediate in appearance between the hair of the seal and the hair of the deer.

## 6

Jag-toothed animals drink by lapping, as do also some animals with teeth differently formed, as the mouse. Animals whose upper and lower teeth meet evenly drink by suction, as the horse and the ox; the bear neither laps nor sucks, but gulps down his drink. Birds, a rule, drink by suction, but the long necked birds stop and elevate

their heads at intervals; the purple coot is the only one (of the long-necked birds) that swallows water by gulps.

Horned animals, domesticated or wild, and all such as are not jag-toothed, are all frugivorous and graminivorous, save under great stress of hunger. The pig is an exception, it cares little for grass or fruit, but of all animals it is the fondest of roots, owing to the fact that its snout is peculiarly adapted for digging them out of the ground; it is also of all animals the most easily pleased in the matter of food. It takes on fat more rapidly in proportion to its size than any other animal; in fact, a pig can be fattened for the market in sixty days. Pig-dealers can tell the amount of flesh taken on, by having first weighed the animal while it was being starved. Before the fattening process begins, the creature must be starved for three days; and, by the way, animals in general will take on fat if subjected previously to a course of starvation; after the three days of starvation, pig-breeders feed the animal lavishly. Breeders in Thrace, when fattening pigs, give them a drink on the first day; then they miss one, and then two days, then three and four, until the interval extends over seven days. The pigs' meat used for fattening is composed of barley, millet, figs, acorns, wild pears, and cucumbers. These animals-and other animals that have warm bellies-are fattened by repose. (Pigs also fatten the better by being allowed to wallow in mud. They like to feed in batches of the same age. A pig will give battle even to a wolf.) If a pig be weighed when living, you may calculate that after death its flesh will weigh five-sixths of that weight, and the hair, the blood, and the rest will weigh the other sixth. When suckling their young, swinelike all other animals-get attenuated. So much for these animals.

## 7

Cattle feed on corn and grass, and fatten on vegetables that tend to cause flatulency, such as bitter vetch or bruised beans or bean-stalks. The older ones also will fatten if they be fed up after an incision has been made into their hide, and air blown thereinto. Cattle will fatten also on barley in its natural state or on barley finely winnowed,



or on sweet food, such as figs, or pulp from the wine-press, or on elm-leaves. But nothing is so fattening as the heat of the sun and wallowing in warm waters. If the horns of young cattle be smeared with hot wax, you may mold them to any shape you please, and cattle are less subject to disease of the hoof if you smear the horny parts with wax, pitch, or olive oil. Herded cattle suffer more when they are forced to change their pasture ground by frost than when snow is the cause of change. Cattle grow all the more in size when they are kept from sexual commerce over a number of years; and it is with a view to growth in size that in Epirus the so-called Pyrrhic kine are not allowed intercourse with the bull until they are nine years old; from which circumstance they are nicknamed the 'unbullied' kine. Of these Pyrrhic cattle, by the way, they say that there are only about four hundred in the world, that they are the private property of the Epirote royal family, that they cannot thrive out of Epirus, and that people elsewhere have tried to rear them, but without success.

## 8

Horses, mules, and asses feed on corn and grass, but are fattened chiefly by drink. Just in proportion as beasts of burden drink water, so will they more or less enjoy their food, and a place will give good or bad feeding according as the water is good or bad. Green corn, while ripening, will give a smooth coat; but such corn is injurious if the spikes are too stiff and sharp. The first crop of clover is unwholesome, and so is clover over which ill-scented water runs; for the clover is sure to get the taint of the water. Cattle like clear water for drinking; but the horse in this respect resembles the camel, for the camel likes turbid and thick water, and will never drink from a stream until he has trampled it into a turbid condition. And, by the way, the camel can go without water for as much as four days, but after that when he drinks, he drinks in immense quantities.

## 9

The elephant at the most can eat nine Macedonian medimni of fodder at one meal; but so large an amount is unwholesome. As a general rule it can take six or seven medimni of fodder, five medimni of wheat, and five mareas of wine-six cotylae going to the maris. An elephant has been known to drink right off fourteen Macedonian metretae of water, and another metretae later in the day.

Camels live for about thirty years; in some exceptional cases they live much longer, and instances have been known of their living to the age of a hundred. The elephant is said by some to live for about two hundred years; by others, for three hundred.

## 10

Sheep and goats are graminivorous, but sheep browse assiduously and steadily, whereas goats shift their ground rapidly, and browse only on the tips of the herbage. Sheep are much improved in condition by drinking, and accordingly they give the flocks salt every five days in summer, to the extent of one medimnus to the hundred sheep, and this is found to render a flock healthier and fatter. In fact they mix salt with the greater part of their food; a large amount of salt is mixed into their bran (for the reason that they drink more when thirsty), and in autumn they get cucumbers with a sprinkling of salt on them; this admixture of salt in their food tends also to increase the quantity of milk in the ewes. If sheep be kept on the move at midday they will drink more copiously towards evening; and if the ewes be fed with salted food as the lambing season draws near they will get larger udders. Sheep are fattened by twigs of the olive or of the oleaster, by vetch, and bran of every kind; and these articles of food fatten all the more if they be first sprinkled with brine. Sheep will take on flesh all the better if they be first put for three days through a process of starving. In autumn, water from the north is more wholesome for sheep than water from the south. Pasture grounds are all the better if they have a westerly aspect.

Sheep will lose flesh if they be kept overmuch on the move or be subjected to any hardship. In winter time shepherds can easily distinguish the vigorous sheep from the weakly, from the fact that the vigorous sheep are covered with hoar-frost while the weakly ones are quite free of it; the fact being that the weakly ones feeling oppressed with the burden shake themselves and so get rid of it. The flesh of all quadrupeds deteriorates in marshy pastures, and is the better on high grounds. Sheep that have flat tails can stand the winter better than long-tailed sheep, and short-fleeced sheep than the shaggy-fleeced; and sheep with crisp wool stand the rigour of winter very poorly. Sheep are healthier than goats, but goats are stronger than sheep. (The fleeces and the wool of sheep that have been killed by wolves, as also the clothes made from them, are exceptionally infested with lice.)

## 11

Of insects, such as have teeth are omnivorous; such as have a tongue feed on liquids only, extracting with that organ juices from all quarters. And of these latter some may be called omnivorous, inasmuch as they feed on every kind of juice, as for instance, the common fly; others are blood-suckers, such as the gadfly and the horse-fly, others again live on the juices of fruits and plants. The bee is the only insect that invariably eschews whatever is rotten; it will touch no article of food unless it have a sweet-tasting juice, and it is particularly fond of drinking water if it be found bubbling up clear from a spring underground.

So much for the food of animals of the leading genera.

## 12

The habits of animals are all connected with either breeding and the rearing of young, or with the procuring a due supply of food; and these habits are modified so as to suit cold and heat and the variations of the seasons. For all animals have an instinctive perception of the changes of temperature, and, just as men seek shelter in

houses in winter, or as men of great possessions spend their summer in cool places and their winter in sunny ones, so also all animals that can do so shift their habitat at various seasons.

Some creatures can make provision against change without stirring from their ordinary haunts; others migrate, quitting Pontus and the cold countries after the autumnal equinox to avoid the approaching winter, and after the spring equinox migrating from warm lands to cool lands to avoid the coming heat. In some cases they migrate from places near at hand, in others they may be said to come from the ends of the world, as in the case of the crane; for these birds migrate from the steppes of Scythia to the marshlands south of Egypt where the Nile has its source. And it is here, by the way, that they are said to fight with the pygmies; and the story is not fabulous, but there is in reality a race of dwarfish men, and the horses are little in proportion, and the men live in caves underground. Pelicans also migrate, and fly from the Strymon to the Ister, and breed on the banks of this river. They depart in flocks, and the birds in front wait for those in the rear, owing to the fact that when the flock is passing over the intervening mountain range, the birds in the rear lose sight of their companions in the van.

Fishes also in a similar manner shift their habitat now out of the Euxine and now into it. In winter they move from the outer sea in towards land in quest of heat; in summer they shift from shallow waters to the deep sea to escape the heat.

Weakly birds in winter and in frosty weather come down to the plains for warmth, and in summer migrate to the hills for coolness. The more weakly an animal is the greater hurry will it be in to migrate on account of extremes of temperature, either hot or cold; thus the mackerel migrates in advance of the tunnies, and the quail in advance of the cranes. The former migrates in the month of Boedromion, and the latter in the month of Maemacterion. All creatures are fatter in migrating from cold to heat than in migrating from heat to cold; thus the quail is fatter when he emigrates in autumn than when he arrives in spring. The migration from cold countries

is contemporaneous with the close of the hot season. Animals are in better trim for breeding purposes in spring-time, when they change from hot to cool lands.

Of birds, the crane, as has been said, migrates from one end of the world to the other; they fly against the wind. The story told about the stone is untrue: to wit, that the bird, so the story goes, carries in its inside a stone by way of ballast, and that the stone when vomited up is a touchstone for gold.

The cushat and the rock-dove migrate, and never winter in our country, as is the case also with the turtle-dove; the common pigeon, however, stays behind. The quail also migrates; only, by the way, a few quails and turtle-doves may stay behind here and there in sunny districts. Cushats and turtle-doves flock together, both when they arrive and when the season for migration comes round again. When quails come to land, if it be fair weather or if a north wind is blowing, they will pair off and manage pretty comfortably; but if a southerly wind prevail they are greatly distressed owing to the difficulties in the way of flight, for a southerly wind is wet and violent. For this reason bird-catchers are never on the alert for these birds during fine weather, but only during the prevalence of southerly winds, when the bird from the violence of the wind is unable to fly. And, by the way, it is owing to the distress occasioned by the bulkiness of its body that the bird always screams while flying; for the labour is severe. When the quails come from abroad they have no leaders, but when they migrate hence, the glottis flits along with them, as does also the landrail, and the eared owl, and the corncrake. The corncrake calls them in the night, and when the birdcatchers hear the croak of the bird in the nighttime they know that the quails are on the move. The landrail is like a marsh bird, and the glottis has a tongue that can project far out of its beak. The eared owl is like an ordinary owl, only that it has feathers about its ears; by some it is called the night-raven. It is a great rogue of a bird, and is a capital mimic; a bird-catcher will dance before it and, while the bird is

mimicking his gestures, the accomplice comes behind and catches it. The common owl is caught by a similar trick.

As a general rule all birds with crooked talons are short-necked, flat-tongued, and disposed to mimicry. The Indian bird, the parrot, which is said to have a man's tongue, answers to this description; and, by the way, after drinking wine, the parrot becomes more saucy than ever.

Of birds, the following are migratory--the crane, the swan, the pelican, and the lesser goose.

### 13

Of fishes, some, as has been observed, migrate from the outer seas in towards shore, and from the shore towards the outer seas, to avoid the extremes of cold and heat.

Fish living near to the shore are better eating than deep-sea fish. The fact is they have more abundant and better feeding, for wherever the sun's heat can reach vegetation is more abundant, better in quality, and more delicate, as is seen in any ordinary garden. Further, the black shore-weed grows near to shore; the other shore-weed is like wild weed. Besides, the parts of the sea near to shore are subjected to a more equable temperature; and consequently the flesh of shallow-water fishes is firm and consistent, whereas the flesh of deep-water fishes is flaccid and watery.

The following fishes are found near into the shore--the synodon, the black bream, the merou, the gilthead, the mullet, the red mullet, the wrasse, the weaver, the callionymus, the goby, and rock-fishes of all kinds. The following are deep-sea fishes--the trygon, the cartilaginous fishes, the white conger, the serranus, the erythrinus, and the glaucus. The braize, the sea-scorpion, the black conger, the muraena, and the piper or sea-cuckoo are found alike in shallow and deep waters. These fishes, however, vary for various localities; for instance, the goby and all rock-fish are fat off the coast of Crete. Again, the tunny is out of season in summer, when it is being preyed on by its

own peculiar louse-parasite, but after the rising of Arcturus, when the parasite has left it, it comes into season again. A number of fish also are found in sea-estuaries; such as the saupe, the gilthead, the red mullet, and, in point of fact, the greater part of the gregarious fishes. The bonito also is found in such waters, as, for instance, off the coast of Alopeconnesus; and most species of fishes are found in Lake Bistonis. The coly-mackerel as a rule does not enter the Euxine, but passes the summer in the Propontis, where it spawns, and winters in the Aegean. The tunny proper, the pelamys, and the bonito penetrate into the Euxine in summer and pass the summer there; as do also the greater part of such fish as swim in shoals with the currents, or congregate in shoals together. And most fish congregate in shoals, and shoal-fishes in all cases have leaders.

Fish penetrate into the Euxine for two reasons, and firstly for food. For the feeding is more abundant and better in quality owing to the amount of fresh river-water that discharges into the sea, and moreover, the large fishes of this inland sea are smaller than the large fishes of the outer sea. In point of fact, there is no large fish in the Euxine excepting the dolphin and the porpoise, and the dolphin is a small variety; but as soon as you get into the outer sea the big fishes are on the big scale. Furthermore, fish penetrate into this sea for the purpose of breeding; for there are recesses there favourable for spawning, and the fresh and exceptionally sweet water has an invigorating effect upon the spawn. After spawning, when the young fishes have attained some size, the parent fish swim out of the Euxine immediately after the rising of the Pleiads. If winter comes in with a southerly wind, they swim out with more or less of deliberation; but, if a north wind be blowing, they swim out with greater rapidity, from the fact that the breeze is favourable to their own course. And, by the way, the young fish are caught about this time in the neighbourhood of Byzantium very small in size, as might have been expected from the shortness of their sojourn in the Euxine. The shoals in general are visible both as they quit and enter the Euxine. The trichiae, however, only can be caught during their entry, but are never visible during their exit; in point of fact, when a trichia is

caught running outwards in the neighbourhood of Byzantium, the fishermen are particularly careful to cleanse their nets, as the circumstance is so singular and exceptional. The way of accounting for this phenomenon is that this fish, and this one only, swims northwards into the Danube, and then at the point of its bifurcation swims down southwards into the Adriatic. And, as a proof that this theory is correct, the very opposite phenomenon presents itself in the Adriatic; that is to say, they are not caught in that sea during their entry, but are caught during their exit.

Tunny-fish swim into the Euxine keeping the shore on their right, and swim out of it with the shore upon their left. It is stated that they do so as being naturally weak-sighted, and seeing better with the right eye.

During the daytime shoal-fish continue on their way, but during the night they rest and feed. But if there be moonlight, they continue their journey without resting at all. Some people accustomed to sea-life assert that shoal-fish at the period of the winter solstice never move at all, but keep perfectly still wherever they may happen to have been overtaken by the solstice, and this lasts until the equinox.

The coly-mackerel is caught more frequently on entering than on quitting the Euxine. And in the Propontis the fish is at its best before the spawning season. Shoal-fish, as a rule, are caught in greater quantities as they leave the Euxine, and at that season they are in the best condition. At the time of their entrance they are caught in very plump condition close to shore, but those are in comparatively poor condition that are caught farther out to sea. Very often, when the coly-mackerel and the mackerel are met by a south wind in their exit, there are better catches to the southward than in the neighbourhood of Byzantium. So much then for the phenomenon of migration of fishes.

Now the same phenomenon is observed in fishes as in terrestrial animals in regard to hibernation: in other words, during winter fishes take to concealing themselves in out of the way places, and quit their places of concealment in the warmer season. But, by the



way, animals go into concealment by way of refuge against extreme heat, as well as against extreme cold. Sometimes an entire genus will thus seek concealment; in other cases some species will do so and others will not. For instance, the shell-fish seek concealment without exception, as is seen in the case of those dwelling in the sea, the purple murex, the ceryx, and all such like; but though in the case of the detached species the phenomenon is obvious—for they hide themselves, as is seen in the scallop, or they are provided with an operculum on the free surface, as in the case of land snails—in the case of the non-detached the concealment is not so clearly observed. They do not go into hiding at one and the same season; but the snails go in winter, the purple murex and the ceryx for about thirty days at the rising of the Dog-star, and the scallop at about the same period. But for the most part they go into concealment when the weather is either extremely cold or extremely hot.

## 14

Insects almost all go into hiding, with the exception of such of them as live in human habitations or perish before the completion of the year. They hide in the winter; some of them for several days, others for only the coldest days, as the bee. For the bee also goes into hiding: and the proof that it does so is that during a certain period bees never touch the food set before them, and if a bee creeps out of the hive, it is quite transparent, with nothing whatsoever in its stomach; and the period of its rest and hiding lasts from the setting of the Pleiads until springtime.

Animals take their winter-sleep or summer-sleep by concealing themselves in warm places, or in places where they have been used to lie concealed.

## 15

Several blooded animals take this sleep, such as the pholidotes or tessellates, namely, the serpent, the lizard, the gecko, and the river crocodile, all of which go into hiding for four months in the depth of winter, and during that time eat nothing. Serpents in general burrow under ground for this purpose; the viper conceals itself under a stone.

A great number of fishes also take this sleep, and notably, the hip-purus and coracinus in winter time; for, whereas fish in general may be caught at all periods of the year more or less, there is this singularity observed in these fishes, that they are caught within a certain fixed period of the year, and never by any chance out of it. The muraena also hides, and the orphus or sea-perch, and the conger. Rock-fish pair off, male and female, for hiding (just as for breeding); as is observed in the case of the species of wrasse called the thrush and the owzel, and in the perch.

The tunny also takes a sleep in winter in deep waters, and gets exceedingly fat after the sleep. The fishing season for the tunny begins at the rising of the Pleiads and lasts, at the longest, down to the setting of Arcturus; during the rest of the year they are hid and enjoying immunity. About the time of hibernation a few tunnies or other hibernating fishes are caught while swimming about, in particularly warm localities and in exceptionally fine weather, or on nights of full moon; for the fishes are induced (by the warmth or the light) to emerge for a while from their lair in quest of food.

Most fishes are at their best for the table during the summer or winter sleep.

The primas-tunny conceals itself in the mud; this may be inferred from the fact that during a particular period the fish is never caught, and that, when it is caught after that period, it is covered with mud and has its fins damaged. In the spring these tunnies get in motion and proceed towards the coast, coupling and breeding, and the females are now caught full of spawn. At this time they are considered

as in season, but in autumn and in winter as of inferior quality; at this time also the males are full of milt. When the spawn is small, the fish is hard to catch, but it is easily caught when the spawn gets large, as the fish is then infested by its parasite. Some fish burrow for sleep in the sand and some in mud, just keeping their mouths outside.

Most fishes hide, then, during the winter only, but crustaceans, the rock-fish, the ray, and the cartilaginous species hide only during extremely severe weather, and this may be inferred from the fact that these fishes are never by any chance caught when the weather is extremely cold. Some fishes, however, hide during the summer, as the glaucus or grey-back; this fish hides in summer for about sixty days. The hake also and the gilthead hide; and we infer that the hake hides over a lengthened period from the fact that it is only caught at long intervals. We are led also to infer that fishes hide in summer from the circumstance that the takes of certain fish are made between the rise and setting of certain constellations: of the Dog-star in particular, the sea at this period being upturned from the lower depths. This phenomenon may be observed to best advantage in the Bosphorus; for the mud is there brought up to the surface and the fish are brought up along with it. They say also that very often, when the sea-bottom is dredged, more fish will be caught by the second haul than by the first one. Furthermore, after very heavy rains numerous specimens become visible of creatures that at other times are never seen at all or seen only at intervals.

## 16

A great number of birds also go into hiding; they do not all migrate, as is generally supposed, to warmer countries. Thus, certain birds (as the kite and the swallow) when they are not far off from places of this kind, in which they have their permanent abode, betake themselves thither; others, that are at a distance from such places, decline the trouble of migration and simply hide themselves where they are. Swallows, for instance, have been often found in holes, quite denuded of their feathers, and the kite on its first emergence from torpidity

has been seen to fly from out some such hiding-place. And with regard to this phenomenon of periodic torpor there is no distinction observed, whether the talons of a bird be crooked or straight; for instance, the stork, the owzel, the turtle-dove, and the lark, all go into hiding. The case of the turtledove is the most notorious of all, for we would defy any one to assert that he had anywhere seen a turtle-dove in winter-time; at the beginning of the hiding time it is exceedingly plump, and during this period it moults, but retains its plumpness. Some cushats hide; others, instead of hiding, migrate at the same time as the swallow. The thrush and the starling hide; and of birds with crooked talons the kite and the owl hide for a few days.

## 17

Of viviparous quadrupeds the porcupine and the bear retire into concealment. The fact that the bear hides is well established, but there are doubts as to its motive for so doing, whether it be by reason of the cold or from some other cause. About this period the male and the female become so fat as to be hardly capable of motion. The female brings forth her young at this time, and remains in concealment until it is time to bring the cubs out; and she brings them out in spring, about three months after the winter solstice. The bear hides for at least forty days; during fourteen of these days it is said not to move at all, but during most of the subsequent days it moves, and from time to time wakes up. A she-bear in pregnancy has either never been caught at all or has been caught very seldom. There can be no doubt but that during this period they eat nothing; for in the first place they never emerge from their hiding-place, and further, when they are caught, their belly and intestines are found to be quite empty. It is also said that from no food being taken the gut almost closes up, and that in consequence the animal on first emerging takes to eating arum with the view of opening up and distending the gut.

The dormouse actually hides in a tree, and gets very fat at that period; as does also the white mouse of Pontus.

(Of animals that hide or go torpid some slough off what is called their 'old-age'. This name is applied to the outermost skin, and to the casing that envelops the developing organism.)

In discussing the case of terrestrial vivipara we stated that the reason for the bear's seeking concealment is an open question. We now proceed to treat of the tessellates. The tessellates for the most part go into hiding, and if their skin is soft they slough off their 'old-age', but not if the skin is shell-like, as is the shell of the tortoise-for, by the way, the tortoise and the fresh water tortoise belong to the tessellates. Thus, the old-age is sloughed off by the gecko, the lizard, and above all, by serpents; and they slough off the skin in springtime when emerging from their torpor, and again in the autumn. Vipers also slough off their skin both in spring and in autumn, and it is not the case, as some aver, that this species of the serpent family is exceptional in not sloughing. When the serpent begins to slough, the skin peels off at first from the eyes, so that any one ignorant of the phenomenon would suppose the animal were going blind; after that it peels off the head, and so on, until the creature presents to view only a white surface all over. The sloughing goes on for a day and a night, beginning with the head and ending with the tail. During the sloughing of the skin an inner layer comes to the surface, for the creature emerges just as the embryo from its afterbirth.

All insects that slough at all slough in the same way; as the silphe, and the empis or midge, and all the coleoptera, as for instance the cantharus-beetle. They all slough after the period of development; for just as the afterbirth breaks from off the young of the vivipara so the outer husk breaks off from around the young of the vermipara, in the same way both with the bee and the grasshopper. The cicada the moment after issuing from the husk goes and sits upon an olive tree or a reed; after the breaking up of the husk the creature issues out, leaving a little moisture behind, and after a short interval flies up into the air and sets a chirping.

Of marine animals the crawfish and the lobster slough sometimes in the spring, and sometimes in autumn after parturition. Lobsters

have been caught occasionally with the parts about the thorax soft, from the shell having there peeled off, and the lower parts hard, from the shell having not yet peeled off there; for, by the way, they do not slough in the same manner as the serpent. The crawfish hides for about five months. Crabs also slough off their old-age; this is generally allowed with regard to the soft-shelled crabs, and it is said to be the case with the testaceous kind, as for instance with the large 'granny' crab. When these animals slough their shell becomes soft all over, and as for the crab, it can scarcely crawl. These animals also do not cast their skins once and for all, but over and over again.

So much for the animals that go into hiding or torpidity, for the times at which, and the ways in which, they go; and so much also for the animals that slough off their old-age, and for the times at which they undergo the process.

## 18

Animals do not all thrive at the same seasons, nor do they thrive alike during all extremes of weather. Further animals of diverse species are in a diverse way healthy or sickly at certain seasons; and, in point of fact, some animals have ailments that are unknown to others. Birds thrive in times of drought, both in their general health and in regard to parturition, and this is especially the case with the cushat; fishes, however, with a few exceptions, thrive best in rainy weather; on the contrary rainy seasons are bad for birds-and so by the way is much drinking-and drought is bad for fishes. Birds of prey, as has been already stated, may in a general way be said never to drink at all, though Hesiod appears to have been ignorant of the fact, for in his story about the siege of Ninus he represents the eagle that presided over the auguries as in the act of drinking; all other birds drink, but drink sparingly, as is the case also with all other spongy-lunged oviparous animals. Sickness in birds may be diagnosed from their plumage, which is ruffled when they are sickly instead of lying smooth as when they are well.

## 19

The majority of fishes, as has been stated, thrive best in rainy seasons. Not only have they food in greater abundance at this time, but in a general way rain is wholesome for them just as it is for vegetation-for, by the way, kitchen vegetables, though artificially watered, derive benefit from rain; and the same remark applies even to reeds that grow in marshes, as they hardly grow at all without a rainfall. That rain is good for fishes may be inferred from the fact that most fishes migrate to the Euxine for the summer; for owing to the number of the rivers that discharge into this sea its water is exceptionally fresh, and the rivers bring down a large supply of food. Besides, a great number of fishes, such as the bonito and the mullet, swim up the rivers and thrive in the rivers and marshes. The sea-gudgeon also fattens in the rivers, and, as a rule, countries abounding in lagoons furnish unusually excellent fish. While most fishes, then, are benefited by rain, they are chiefly benefited by summer rain; or we may state the case thus, that rain is good for fishes in spring, summer, and autumn, and fine dry weather in winter. As a general rule what is good for men is good for fishes also.

Fishes do not thrive in cold places, and those fishes suffer most in severe winters that have a stone in their head, as the chromis, the basse, the sciaena, and the braize; for owing to the stone they get frozen with the cold, and are thrown up on shore.

Whilst rain is wholesome for most fishes, it is, on the contrary, unwholesome for the mullet, the cephalus, and the so-called marinus, for rain superinduces blindness in most of these fishes, and all the more rapidly if the rainfall be superabundant. The cephalus is peculiarly subject to this malady in severe winters; their eyes grow white, and when caught they are in poor condition, and eventually the disease kills them. It would appear that this disease is due to extreme cold even more than to an excessive rainfall; for instance, in many places and more especially in shallows off the coast of Nauplia, in the Argolid, a number of fishes have been known to be caught out

at sea in seasons of severe cold. The gilthead also suffers in winter; the acharnas suffers in summer, and loses condition. The coracine is exceptional among fishes in deriving benefit from drought, and this is due to the fact that heat and drought are apt to come together.

Particular places suit particular fishes; some are naturally fishes of the shore, and some of the deep sea, and some are at home in one or the other of these regions, and others are common to the two and are at home in both. Some fishes will thrive in one particular spot, and in that spot only. As a general rule it may be said that places abounding in weeds are wholesome; at all events, fishes caught in such places are exceptionally fat: that is, such fishes a a habit all sorts of localities as well. The fact is that weed-eating fishes find abundance of their special food in such localities, and carnivorous fish find an unusually large number of smaller fish. It matters also whether the wind be from the north or south: the longer fish thrive better when a north wind prevails, and in summer at one and the same spot more long fish will be caught than flat fish with a north wind blowing.

The tunny and the sword-fish are infested with a parasite about the rising of the Dog-star; that is to say, about this time both these fishes have a grub beside their fins that is nicknamed the 'gadfly'. It resembles the scorpion in shape, and is about the size of the spider. So acute is the pain it inflicts that the sword-fish will often leap as high out of the water as a dolphin; in fact, it sometimes leaps over the bulwarks of a vessel and falls back on the deck. The tunny delights more than any other fish in the heat of the sun. It will burrow for warmth in the sand in shallow waters near to shore, or will, because it is warm, disport itself on the surface of the sea.

The fry of little fishes escape by being overlooked, for it is only the larger ones of the small species that fishes of the large species will pursue. The greater part of the spawn and the fry of fishes is destroyed by the heat of the sun, for whatever of them the sun reaches it spoils.



Fishes are caught in greatest abundance before sunrise and after sunset, or, speaking generally, just about sunset and sunrise. Fishermen haul up their nets at these times, and speak of the hauls then made as the 'nick-of-time' hauls. The fact is, that at these times fishes are particularly weak-sighted; at night they are at rest, and as the light grows stronger they see comparatively well.

We know of no pestilential malady attacking fishes, such as those which attack man, and horses and oxen among the quadrupedal vivipara, and certain species of other genera, domesticated and wild; but fishes do seem to suffer from sickness; and fishermen infer this from the fact that at times fishes in poor condition, and looking as though they were sick, and of altered colour, are caught in a large haul of well-conditioned fish of their own species. So much for sea-fishes.

## 20

River-fish and lake-fish also are exempt from diseases of a pestilential character, but certain species are subject to special and peculiar maladies. For instance, the sheat-fish just before the rising of the Dog-star, owing to its swimming near the surface of the water, is liable to sunstroke, and is paralysed by a loud peal of thunder. The carp is subject to the same eventualities but in a lesser degree. The sheatfish is destroyed in great quantities in shallow waters by the serpent called the dragon. In the balerus and tilon a worm is engendered about the rising of the Dog-star, that sickens these fish and causes them to rise towards the surface, where they are killed by the excessive heat. The chalcis is subject to a very violent malady; lice are engendered underneath their gills in great numbers, and cause destruction among them; but no other species of fish is subject to any such malady.

If mullein be introduced into water it will kill fish in its vicinity. It is used extensively for catching fish in rivers and ponds; by the Phoenicians it is made use of also in the sea.

There are two other methods employed for catch-fish. It is a known fact that in winter fishes emerge from the deep parts of rivers and, by the way, at all seasons fresh water is tolerably cold. A trench accordingly is dug leading into a river, and wattled at the river end with reeds and stones, an aperture being left in the wattling through which the river water flows into the trench; when the frost comes on the fish can be taken out of the trench in weels. Another method is adopted in summer and winter alike. They run across a stream a dam composed of brushwood and stones leaving a small open space, and in this space they insert a weel; they then coop the fish in towards this place, and draw them up in the weel as they swim through the open space.

Shell-fish, as a rule, are benefited by rainy weather. The purple murex is an exception; if it be placed on a shore near to where a river discharges, it will die within a day after tasting the fresh water. The murex lives for about fifty days after capture; during this period they feed off one another, as there grows on the shell a kind of sea-weed or sea-moss; if any food is thrown to them during this period, it is said to be done not to keep them alive, but to make them weigh more.

To shell-fish in general drought is unwholesome. During dry weather they decrease in size and degenerate in quality; and it is during such weather that the red scallop is found in more than usual abundance. In the Pyrrhaean Strait the clam was exterminated, partly by the dredging-machine used in their capture, and partly by long-continued droughts. Rainy weather is wholesome to the generality of shellfish owing to the fact that the sea-water then becomes exceptionally sweet. In the Euxine, owing to the coldness of the climate, shellfish are not found: nor yet in rivers, excepting a few bivalves here and there. Univalves, by the way, are very apt to freeze to death in extremely cold weather. So much for animals that live in water.

## 21

To turn to quadrupeds, the pig suffers from three diseases, one of which is called *branchos*, a disease attended with swellings about the windpipe and the jaws. It may break out in any part of the body; very often it attacks the foot, and occasionally the ear; the neighbouring parts also soon rot, and the decay goes on until it reaches the lungs, when the animal succumbs. The disease develops with great rapidity, and the moment it sets in the animal gives up eating. The swineherds know but one way to cure it, namely, by complete excision, when they detect the first signs of the disease. There are two other diseases, which are both alike termed *craurus*. The one is attended with pain and heaviness in the head, and this is the commoner of the two, the other with diarrhoea. The latter is incurable, the former is treated by applying wine fomentations to the snout and rinsing the nostrils with wine. Even this disease is very hard to cure; it has been known to kill within three or four days. The animal is chiefly subject to *branchos* when it gets extremely fat, and when the heat has brought a good supply of figs. The treatment is to feed on mashed mulberries, to give repeated warm baths, and to lance the under part of the tongue.

Pigs with flabby flesh are subject to measles about the legs, neck, and shoulders, for the pimples develop chiefly in these parts. If the pimples are few in number the flesh is comparatively sweet, but if they be numerous it gets watery and flaccid. The symptoms of measles are obvious, for the pimples show chiefly on the under side of the tongue, and if you pluck the bristles off the chine the skin will appear suffused with blood, and further the animal will be unable to keep its hind-feet at rest. Pigs never take this disease while they are mere sucklings. The pimples may be got rid of by feeding on this kind of spelt called *tiphe*; and this spelt, by the way, is very good for ordinary food. The best food for rearing and fattening pigs is chick-peas and figs, but the one thing essential is to vary the food as much as possible, for this animal, like animals in general lights in a change of diet; and it is said that one kind of food blows the animal out, that

another superinduces flesh, and that another puts on fat, and that acorns, though liked by the animal, render the flesh flaccid. Besides, if a sow eats acorns in great quantities, it will miscarry, as is also the case with the ewe; and, indeed, the miscarriage is more certain in the case of the ewe than in the case of the sow. The pig is the only animal known to be subject to measles.

## 22

Dogs suffer from three diseases; rabies, quinsy, and sore feet. Rabies drives the animal mad, and any animal whatever, excepting man, will take the disease if bitten by a dog so afflicted; the disease is fatal to the dog itself, and to any animal it may bite, man excepted. Quinsy also is fatal to dogs; and only a few recover from disease of the feet. The camel, like the dog, is subject to rabies. The elephant, which is reputed to enjoy immunity from all other illnesses, is occasionally subject to flatulency.

## 23

Cattle in herds are liable to two diseases, foot, sickness and craurus. In the former their feet suffer from eruptions, but the animal recovers from the disease without even the loss of the hoof. It is found of service to smear the horny parts with warm pitch. In craurus, the breath comes warm at short intervals; in fact, craurus in cattle answers to fever in man. The symptoms of the disease are drooping of the ears and disinclination for food. The animal soon succumbs, and when the carcass is opened the lungs are found to be rotten.

## 24

Horses out at pasture are free from all diseases excepting disease of the feet. From this disease they sometimes lose their hooves: but after losing them they grow them soon again, for as one hoof is decaying it is being replaced by another. Symptoms of the malady are a sinking in and wrinkling of the lip in the middle under the nostrils, and in the case of the male, a twitching of the right testicle.

Stall-reared horses are subject to very numerous forms of disease. They are liable to disease called 'eileus'. Under this disease the animal trails its hind-legs under its belly so far forward as almost to fall back on its haunches; if it goes without food for several days and turns rabid, it may be of service to draw blood, or to castrate the male. The animal is subject also to tetanus: the veins get rigid, as also the head and neck, and the animal walks with its legs stretched out straight. The horse suffers also from abscesses. Another painful illness afflicts them called the 'barley-surfeit'. There is a softening of the palate and heat of the breath; the animal may recover through the strength of its own constitution, but no formal remedies are of any avail.

There is also a disease called nymphia, in which the animal is said to stand still and droop its head on hearing flute-music; if during this ailment the horse be mounted, it will run off at a gallop until it is pulled. Even with this rabies in full force, it preserves a dejected spiritless appearance; some of the symptoms are a throwing back of the ears followed by a projection of them, great languor, and heavy breathing. Heart-ache also is incurable, of which the symptom is a drawing in of the flanks; and so is displacement of the bladder, which is accompanied by a retention of urine and a drawing up of the hooves and haunches. Neither is there any cure if the animal swallow the grape-beetle, which is about the size of the sphondyle or knuckle-beetle. The bite of the shrewmouse is dangerous to horses and other draught animals as well; it is followed by boils. The bite is all the more dangerous if the mouse be pregnant when she bites, for the boils then burst, but do not burst otherwise. The cicigna-called 'chalcis' by some, and 'zignis' by others-either causes death by its bite or, at all events, intense pain; it is like a small lizard, with the colour of the blind snake. In point of fact, according to experts, the horse and the sheep have pretty well as many ailments as the human species. The drug known under the name of 'sandarace' or realgar, is extremely injurious to a horse, and to all draught animals; it is given to the animal as a medicine in a solution of water, the liquid being filtered through a colander. The mare when pregnant apt to miscarry when disturbed by the odour of an extinguished candle; and a sim-

ilar accident happens occasionally to women in their pregnancy. So much for the diseases of the horse.

The so-called hippomanes grows, as has stated, on the foal, and the mare nibbles it off as she licks and cleans the foal. All the curious stories connected with the hippomanes are due to old wives and to the venders of charms. What is called the 'polium' or foal's membrane, is, as all the accounts state, delivered by the mother before the foal appears.

A horse will recognize the neighing of any other horse with which it may have fought at any previous period. The horse delights in meadows and marshes, and likes to drink muddy water; in fact, if water be clear, the horse will trample in it to make it turbid, will then drink it, and afterwards will wallow in it. The animal is fond of water in every way, whether for drinking or for bathing purposes; and this explains the peculiar constitution of the hippopotamus or river-horse. In regard to water the ox is the opposite of the horse; for if the water be impure or cold, or mixed up with alien matter, it will refuse to drink it.

## 25

The ass suffers chiefly from one particular disease which they call 'melis'. It arises first in the head, and a clammy humour runs down the nostrils, thick and red; if it stays in the head the animal may recover, but if it descends into the lungs the animal will die. Of all animals on its of its kind it is the least capable of enduring extreme cold, which circumstance will account for the fact that the animal is not found on the shores of the Euxine, nor in Scythia.

## 26

Elephants suffer from flatulence, and when thus afflicted can void neither solid nor liquid residuum. If the elephant swallow earth-mould it suffers from relaxation; but if it go on taking it steadily, it will experience no harm. From time to time it takes to swallowing stones. It suffers also from diarrhoea: in this case they administer

draughts of lukewarm water or dip its fodder in honey, and either one or the other prescription will prove a costive. When they suffer from insomnia, they will be restored to health if their shoulders be rubbed with salt, olive-oil, and warm water; when they have aches in their shoulders they will derive great benefit from the application of roast pork. Some elephants like olive oil, and others do not. If there is a bit of iron in the inside of an elephant it is said that it will pass out if the animal takes a drink of olive-oil; if the animal refuses olive-oil, they soak a root in the oil and give it the root to swallow. So much, then, for quadrupeds.

## 27

Insects, as a general rule, thrive best in the time of year in which they come into being, especially if the season be moist and warm, as in spring.

In bee-hives are found creatures that do great damage to the combs; for instance, the grub that spins a web and ruins the honeycomb: it is called the 'cleros'. It engenders an insect like itself, of a spider-shape, and brings disease into the swarm. There is another insect resembling the moth, called by some the 'pyraustes', that flies about a lighted candle: this creature engenders a brood full of a fine down. It is never stung by a bee, and can only be got out of a hive by fumigation. A caterpillar also is engendered in hives, of a species nicknamed the teredo, or 'borer', with which creature the bee never interferes. Bees suffer most when flowers are covered with mildew, or in seasons of drought.

All insects, without exception, die if they be smeared over with oil; and they die all the more rapidly if you smear their head with the oil and lay them out in the sun.

## 28

Variety in animal life may be produced by variety of locality: thus in one place an animal will not be found at all, in another it will be small, or short-lived, or will not thrive. Sometimes this sort of difference is observed in closely adjacent districts. Thus, in the territory of Miletus, in one district cicadas are found while there are none in the district close adjoining; and in Cephalenia there is a river on one side of which the cicada is found and not on the other. In Pordoselene there is a public road one side of which the weasel is found but not on the other. In Boeotia the mole is found in great abundance in the neighbourhood of Orchomenus, but there are none in Lebadia though it is in the immediate vicinity, and if a mole be transported from the one district to the other it will refuse to burrow in the soil. The hare cannot live in Ithaca if introduced there; in fact it will be found dead, turned towards the point of the beach where it was landed. The horseman-ant is not found in Sicily; the croaking frog has only recently appeared in the neighbourhood of Cyrene. In the whole of Libya there is neither wild boar, nor stag, nor wild goat; and in India, according to Ctesias-no very good authority, by the way-there are no swine, wild or tame, but animals that are devoid of blood and such as go into hiding or go torpid are all of immense size there. In the Euxine there are no small molluscs nor testaceans, except a few here and there; but in the Red Sea all the testaceans are exceedingly large. In Syria the sheep have tails a cubit in breadth; the goats have ears a span and a palm long, and some have ears that flap down to the ground; and the cattle have humps on their shoulders, like the camel. In Lycia goats are shorn for their fleece, just as sheep are in all other countries. In Libya the long-horned ram is born with horns, and not the ram only, as Homer' words it, but the ewe as well; in Pontus, on the confines of Scythia, the ram is without horns.

In Egypt animals, as a rule, are larger than their congeners in Greece, as the cow and the sheep; but some are less, as the dog, the wolf, the hare, the fox, the raven, and the hawk; others are of pretty much the same size, as the crow and the goat. The difference, where



it exists, is attributed to the food, as being abundant in one case and insufficient in another, for instance for the wolf and the hawk; for provision is scanty for the carnivorous animals, small birds being scarce; food is scanty also for the hare and for all frugivorous animals, because neither the nuts nor the fruit last long.

In many places the climate will account for peculiarities; thus in Illyria, Thrace, and Epirus the ass is small, and in Gaul and in Scythia the ass is not found at all owing to the coldness of the climate of these countries. In Arabia the lizard is more than a cubit in length, and the mouse is much larger than our field-mouse, with its hind-legs a span long and its front legs the length of the first finger-joint. In Libya, according to all accounts, the length of the serpents is something appalling; sailors spin a yarn to the effect that some crews once put ashore and saw the bones of a number of oxen, and that they were sure that the oxen had been devoured by serpents, for, just as they were putting out to sea, serpents came chasing their galleys at full speed and overturned one galley and set upon the crew. Again, lions are more numerous in Libya, and in that district of Europe that lies between the Achelous and the Nessus; the leopard is more abundant in Asia Minor, and is not found in Europe at all. As a general rule, wild animals are at their wildest in Asia, at their boldest in Europe, and most diverse in form in Libya; in fact, there is an old saying, 'Always something fresh in Libya.'

It would appear that in that country animals of diverse species meet, on account of the rainless climate, at the watering-places, and there pair together; and that such pairs will often breed if they be nearly of the same size and have periods of gestation of the same length. For it is said that they are tamed down in their behaviour towards each other by extremity of thirst. And, by the way, unlike animals elsewhere, they require to drink more in wintertime than in summer: for they acquire the habit of not drinking in summer, owing to the circumstance that there is usually no water then; and the mice, if they drink, die. Elsewhere also bastard-animals are born to heterogeneous pairs; thus in Cyrene the wolf and the bitch will

couple and breed; and the Laconian hound is a cross between the fox and the dog. They say that the Indian dog is a cross between the tiger and the bitch, not the first cross, but a cross in the third generation; for they say that the first cross is a savage creature. They take the bitch to a lonely spot and tie her up: if the tiger be in an amorous mood he will pair with her; if not he will eat her up, and this casualty is of frequent occurrence.

## 29

Locality will differentiate habits also: for instance, rugged highlands will not produce the same results as the soft lowlands. The animals of the highlands look fiercer and bolder, as is seen in the swine of Mount Athos; for a lowland boar is no match even for a mountain sow.

Again, locality is an important element in regard to the bite of an animal. Thus, in Pharos and other places, the bite of the scorpion is not dangerous; elsewhere-in Caria, for instances-where scorpions are venomous as well as plentiful and of large size, the sting is fatal to man or beast, even to the pig, and especially to a black pig, though the pig, by the way, is in general most singularly indifferent to the bite of any other creature. If a pig goes into water after being struck by the scorpion of Caria, it will surely die.

There is great variety in the effects produced by the bites of serpents. The asp is found in Libya; the so-called 'septic' drug is made from the body of the animal, and is the only remedy known for the bite of the original. Among the silphium, also, a snake is found, for the bite of which a certain stone is said to be a cure: a stone that is brought from the grave of an ancient king, which stone is put into water and drunk off. In certain parts of Italy the bite of the gecko is fatal. But the deadliest of all bites of venomous creatures is when one venomous animal has bitten another; as, for instance, a viper's after it has bitten a scorpion. To the great majority of such creatures man's is fatal. There is a very little snake, by some entitled the 'holly-snake', which is dreaded by even the largest serpents. It is about

an ell long, and hairy-looking; whenever it bites an animal, the flesh all round the wound will at once mortify. There is in India a small snake which is exceptional in this respect, that for its bite no specific whatever is known.

## 30

Animals also vary as to their condition of health in connexion with their pregnancy.

Testaceans, such as scallops and all the oyster-family, and crustaceans, such as the lobster family, are best when with spawn. Even in the case of the testacean we speak of spawning (or pregnancy); but whereas the crustaceans may be seen coupling and laying their spawn, this is never the case with testaceans. Molluscs are best in the breeding time, as the calamary, the sepia, and the octopus.

Fishes, when they begin to breed, are nearly all good for the table; but after the female has gone long with spawn they are good in some cases, and in others are out of season. The maenis, for instance, is good at the breeding time. The female of this fish is round, the male longer and flatter; when the female is beginning to breed the male turns black and mottled, and is quite unfit for the table; at this period he is nicknamed the 'goat'.

The wrasses called the owzel and the thrush, and the smarís have different colours at different seasons, as is the case with the plumage of certain birds; that is to say, they become black in the spring and after the spring get white again. The phycis also changes its hue: in general it is white, but in spring it is mottled; it is the only sea-fish which is said make a bed for itself, and the female lays her spawn in this bed or nest. The maenis, as was observed, changes its colour as does the smarís, and in summer-time changes back from whitish to black, the change being especially marked about the fins and gills. The coracine, like the maenis, is in best condition at breeding time; the mullet, the basse, and scaly fishes in general are in bad condition at this period. A few fish are in much the same condition at all times, whether with spawn or not, as the glaucus. Old fishes also are

bad eating; the old tunny is unfit even for pickling, as a great part of its flesh wastes away with age, and the same wasting is observed in all old fishes. The age of a scaly fish may be told by the size and the hardness of its scales. An old tunny has been caught weighing fifteen talents, with the span of its tail two cubits and a palm broad.

River-fish and lake-fish are best after they have discharged the spawn in the case of the female and the milt in the case of the male: that is, when they have fully recovered from the exhaustion of such discharge. Some are good in the breeding time, as the saperdis, and some bad, as the sheat-fish. As a general rule, the male fish is better eating than the female; but the reverse holds good of the sheat-fish. The eels that are called females are the best for the table: they look as though they were female, but they really are not so.