

arouse in them the desire to elevate themselves? Every growth of nature begins less in the external force applied than the vital principle asserting itself within. It is the undercurrent that helps to break up the ice; the sap, as well as the sunshine, that brings out the green leaves of spring. I doubt if any class can be really elevated, unless it has first indicated the power to raise itself; and the first thing to make it worthy of respect, is, to teach it to respect itself."—*English Journal of Education*.

## SCIENCE.

### Instinct.

(Continued from our last.)

The beautiful fiction, not without meaning, that the pelican, in the ardour of its love for its young, in order to save them from death, tears open its own blood, is indeed not to be taken to the letter, for the blood, with which the white breast-feathers of this bird are sometimes seen to be sprinkled, when it is feeding its young with the fish which it brings in its pouch, comes from the wounded fish, or, in rare cases, it is its own blood, from the slight wounds which the young pelicans make with their sharp beaks in the pouch of their parent, into which, while they are yet young, they reach as into a dish. But for the rest it is no fiction, but experience daily shows, that maternal affection in the animal world is stronger than the necessities of the body and the pain of death. That it is not, so to say, a relationship of bodily elements, of flesh and blood, perhaps, which subsists between the mother and the young, born of her, but the impulse, the instinct of a love, coming from another and higher source, which gives its force to maternal affection, we are taught by the tenderness of animals towards those helpless little ones which a higher, a divine Providence has committed to their charge. Between the wag-tail and the poor little motherless cuckoo, which came in the egg into her nest and under her wings, there is no flesh and blood relationship; nevertheless the tender foster mother wears herself almost to death in seeking to satisfy her hungry foster child. A celebrated naturalist, (Bechstein) once saw, in the autumn, when it was so late in the season that there was frost and even ice at nights, a wag-tail at a sunny brook, running and flying to and fro with great diligence. Whoever knows how irresistibly the migratory impulse seizes this bird, when the time is come when all its tribe departs, and when, at the approach of winter, its food begins to fail, he will perceive that there was something unusual in the prolonged tarry with us, of a bird that lives upon insects, far into October, when in the open air scarcely a solitary fly is to be seen. Accordingly, it appeared singular to the above mentioned observer, and he followed the little animal as it bore away an insect in its beak, as if it were foraging for its young. He saw from the opening in a hollow tree, the head of a tolerably large bird extended eagerly to seize the food which its foster parent brought. It was a young cuckoo, whose real mother had by some means deposited its egg in the wag-tail's nest in the tree. The young bird had grown, had become completely fledged on the head and neck, but at the same time had become a prisoner, for the opening was too small to let his body through. But the tender foster mother would rather have died with her nursing than have forsaken it in its need.

What maternal care and fidelity can exceed that which the working classes of bees and ants show towards the eggs and the young of their queens; what patience of a human instructor can exceed that which the female turkey exercises towards the chickens of a strange family, which she has been made to hatch. In the great Nursery of Nature, those creatures are not to be pitied, which, in our eyes, seem the most helpless and forsaken, for it is precisely these which are cared for the most generously and tenderly.

In a quite otherwise remarkable form does instinct appear, as the impulse and instrument of an all upholding Providence, when the object sought is not the welfare of individuals or families, but the well-being of living creatures collectively. The force, which then moves the animal world, stands in so opposite and contradictory a relation to the instinct of self-preservation, that it often leads myriads of individuals, for the welfare of a whole country, to their own sure destruction. All the powers of men and of those of animals which come to the aid of man, in keeping down the multiplication of the white cabbage-butterfly, so destructive to our vegetable gardens, are often insufficient; if the increase went on without interruption, our cabbage crop would be utterly annihilated. For this mischief, however, Nature has her powerful remedies. Whole clouds of these butterflies, which produce this destructive caterpillar may be seen quitting, all at once, the region of which they were the plague, and taking a course which, for the most part, terminates in the ocean. Such a caravan, giving itself to the fishes for food, continued, according to the observations of Lindley, several days, and kept its direction unchanged toward the sea. Kalm saw butterflies of this description over the waters of the British channel. The swarms of locusts, when their number have grown formidable, take at last their way towards the sea or the desert, and the same has been remarked of other kinds of injurious insects. The lemmings too, the field-mice of the high north, when they have become too numerous for their home, collect in immense flocks and move in a straight line, often toward an arm of the sea or to rivers, in which they find their grave. Even in the most favourable circumstances, only a very small portion of these emigrants return home. As a living body, in the growth of its limbs, acts, by its own inward power, certain limits to itself: so is

this done also by the animated whole, by means of the force of instinct, inspiring its members. The water of a fountain rises through the pressure of a higher column of water, to a certain point, but when the agency of this pressure ceases, it tumbles ceaselessly down to the ground.

The force, which as instinct connects individuals in relations of mutual service, and with them, tends to the weal of the whole, not only controls the individual parts of the external world, but shows itself active also in the interior of every animated body, fashioning every element and organ of the same to the collective purpose of its life. As every part serves all other parts, so all at last help the activity of the animating soul.

The same thing which instinct achieves in obvious ways in regard to beings of external nature, is accomplished by the forming principle in its more hidden and inner circle. The bird must build a nest for the eggs which she is to hatch; a nest, the more carefully made, the more tender the situation of the young is, who come forth from her eggs. As the young the singing bird come blind and unfledged into the world, the old birds must obtain for them such nourishment as is best adapted to their first stage of life, and in this case, a remarkable delicacy of instinct develops itself in birds fed from the beak, as the food which the parent birds brings to their new born young is different from that which they provide several days after, and this again differs from that which they procure for them at a more advanced period. All these obvious expressions of a building instinct, and of the instinct of maternal love disappear in the case of the quadrupeds; an animal of this class needs not the arrangement of a nest for the hatching of eggs, for its young become ready for birth, not without, but within, its own body; it requires no instinct to lead it to seek their first nourishment for its young, for that nourishment without its own outwardly visible aid is prepared, as mother's milk, in the vessels of its own body.

But on the other hand, man, highly endowed as he is, must, through the thoughtful industry of his hands, provide himself clothing for his body, which shall cover him only lightly in the hot season of the year, and protect him from the cold in winter, while the plumage of the goose and the duck, as well as the fur of many quadrupeds, takes an increased thickness at the approach of winter, which in spring is exchanged for a lighter natural garment. What dress of man, prepared of the choicest stuffs and fashioned with the highest art, can compare in beauty and splendour with the plumage in which many birds, sparkling in all the colours of jewels, appear at the time of their nuptials, and how poor, besides, would man's winter wardrobe especially look, if for the fabrication and decoration of his garments he could not avail himself of the wool and fine furs with which the forming power of Nature furnishes animals without their co-operation. Man must take great pains to form the weapons he uses in war, or to prepare the tools with which wood and stone are wrought; the weapons of the stag grow out of his own body, and so is it with the wood-sawing wasp and the shell-fish, which, with its file-shaped mouth, works its way into the rock. That which is accomplished in man and in the animal, in the former by understanding, and in the latter by instinct, in ways outwardly perceptible, enters still more fully into the hidden, inner circle of forming and fashioning forces in the plant. The plant needs no artificial arrangement of storerooms, no gathering of food for the seed or the germ which it leaves behind it when it dies, but to the grain of wheat and the eye of the potato is furnished from its first formation an abundance of nourishment that fully suffices for the development of the germ.

Here the agencies of instinct, which manifest themselves among animals in an impulse to wander forth for food, and to annual migrations, and in the art of preparing their abodes, are transferred to the inner parts and elements of the individual plant or animal body, without suffering any change of their nature and purpose. For when every substance which the animal takes for food, so soon as it enters into the circle of its life, finds its way through all the regions of the body to its destined place; the lime to the bones, the silica to the hair, the iron to the blood, the sulphur and phosphorus to the brain and nerves, and thence to the bone—shall it be less wonderful than the migrations of the swiftly and lightly moving bird to the place of its birth and its food? When whole masses of material elements that have become worthless, press toward the surface of the body in order to escape by the perspiration of the skin, and to lose themselves in the ocean of air, is it not the same impulse which collects so many hurtful insects, to whole clouds, and guides them off into the sea, so that the land may be freed from the burthen of their excess? We admire the generous excitement which is communicated to an ant-hill or a beehive the instant any external force has broken into it, or when any danger threatens the same from internal enemies. But when, upon a limb being wounded, or a bone broken in the body of an animal, all the forces and fluids of the same instantly in flaming haste unite to heal the wound or the fracture; and when this endeavour is successful, when in the deceased state of the body, the storm of a fever is raised, which when it is powerful enough, decomposes and drives away the morbid particles—shall this, in a less degree, command our admiration? The spider prepares ingenious nets to catch the prey, which serves it for food; is the structure of the several secretory organs, which fashion themselves in the body, in order to produce bile in the liver, and bone in the membrane of the bones, out of the elements which have been introduced through the blood—is not this structure as ingenious, and are the fine webs and formation of which the animal body is made, and which are perpetually renovated, inferior to the web of the spider or to the buildings of the bee or the beaver?