



THE BIOLOGY OF SUMMER

ARGUMENT.—Life is rhythmic and is punctuated by the seasons. Summer is the crest of the annual wave. I. It is the time of intensest life, when both output and income of energy reach their maximum. The activity of unconscious plant-life is crowned in the flowers, and the growing brilliancy of colour is an index of increasing intensity. II. Conscious animal industry also reaches its climax, both in instinctive and intelligent activity, as in bees and birds. III. But the vigorous intensity of life is interrupted by sleep, weariness, and death. Yet Love is strongest after all.

I

THE tide which sets in with a rush in Spring reaches its high-water mark in Midsummer, and often makes for itself a new shore. The buds are replaced by hard-working leafy boughs whose activity during the day is intense; the budlike early flowers are succeeded by more liberal beauty; young things pass through adolescence to mature strength; and love is justified in her children. For Summer is the time of maximum output and income of energy, when the fires of life not only burn brightest, but are built up for another season; it is the time of intensest effort, rising even to madness, the time of richest beauty and fullest joy.

Although we are wont to associate Summer with rest and holiday-making, this is rather an urban than a rustic general-

isation. Midwinter is the countryman's resting time; in Midsummer he is hard at work. So with Nature, for in Summer most work is done, and the stores of energy are accumulated for another year. Whether we think of the green leaves in which the powers of light and of life co-operate to raise simple substances into complexity, the inorganic into the organic; or of the bees who so industriously visit the flowers and store up honey in the hive; or of the birds gathering food for their callow young; or of the haymakers busy in the heat of the day, we get the same impression of vigorous work, at the various planes of unconscious, instinctive, intelligent, and rational life. The biggest fact in the Biology of Summer is perhaps the most obvious one, that it is then that life comes nearest, or, what comes to the same thing, is most exposed to the source of almost all mundane energy—the sun. Thus the Biology of Summer has for its central problem—the influence of heat and light upon life. Now there is heat that burns, witness the steppe vegetation after the dry season; and there is light that kills, notably in the case of the disease germs or Bacteria which a forenoon of clear sunshine destroys so beneficently, but the general fact, demonstrable by numberless experiments, is that the heat and light of Summer renew the energies of living creatures. Indeed, we all depend from year to year on the power that green plants have of inducing the sunlight to help them to make food for us. At the very opposite end of the scale—for there is long gamut of life from wheat plant to man—is it not true that seeking the sun and seeking more life are synonymous for some of us? It is idle to point to the fact that London has about one-third less sunshine than Madrid, but certainly not less vitality; for it is obvious that London is mainly an area for uncorking sunshine bottled elsewhere. Every one knows how the pulse-register or sphygmograph proves that the sunshine vivifies the system. Quite irrespective of holiday-mood, of the delights of being free and hearing the birds sing and seeing the flowers in bloom, the sunlight quickens the pulse and man's life.

'O solemn-beating heart
 Of Nature! I have known that thou art
 Bound unto man's by cords he cannot sever.
 And what time they are slackened by him ever,
 So to attest his own supernal part,
 Still runneth thy vibration, fast and strong,
 The slackened cord along!'

And if in man—with his slackened cord—the sunlight still awakens the responses of vitality, how much more so in the animals who throb with every pulsation of Nature's heart! And if the sunlight find voice in the bravura of birds, how much more directly yet in the bustle of growing wheat!

The growing intensity of unconscious vegetable life is registered in the increasing brightness of floral colour. For although there are many bright flowers in early Spring,—the marsh marigold which raises its golden cups from the dark ditch, the bright yellow celandine which welcomes the swallow, the blue hyacinths, which make the wood-glade glorious,—'the heavens upbreking through the earth,' the laburnum with its 'dropping wells of fire,' the periwinkle and the ground ivy, and the golden daffodils whose dance 'outdoes the sparkling waves in glee,'—yet the broad fact is that as the days grow warmer and brighter, the colours increase in intensity. Although we may not accept the sagacious meteorologist's suggestion that the annual succession of colour corresponds to the colour-scheme of the rainbow, yet it seems demonstrable that red and purple, blue and violet flowers—in short, those of richer colour, become more numerous as the days lengthen.

Ruskin, following Goethe, defined the real nature of the flower, when he said, 'The leaf which loves the light has above all things the purpose of being married to another leaf, and having child-leaves, and children's children of leaves, to make the earth fair for ever. And when the leaves marry they put on wedding-ropes, and are more glorious than Solomon in all his glory, and they have feasts of honey, and we

call them flowers.' For we recognise that the petals are but transfigured leaves, and that the pollen-producing and seed-bearing parts are also modified leaves. The feasts of honey or nectar are overflows of sugar in more or less useful places; the fragrance may possibly correspond to a kind of essence of sweat, remotely analogous to the muskiness which exudes from the skins of some animals; and the beauty of the wedding-robcs, like that of some butterflies' wings, is in some cases due to waste-products, the ashes of the flowers' hidden fires.

It cannot be said that we have by any means attained to an understanding of either nectar or fragrance or colour; we are still children with flowers in our hands, just beginning to know something about them. We have at any rate got past the preliminary stage of giving their insect visitors the whole credit for evolving flowers, which is like crowning snakes for evolving the wisdom of the East; we are now busy trying to find out what nectar, fragrance, and pigments mean primarily in the life of the plant. The poet says, 'It must be the flag of my disposition, out of hopeful green stuff woven'; the religious mind says, 'It is the handkerchief of the Lord, a scented gift and remembrancer designedly dropt, bearing the owner's name someway in the corners'; the biologist says, 'Overflow of surplus sugar, sublimated sweat, and beauty for ashes;' but the flower in the crannied wall is a hieroglyphic still.

II

We have spoken of the unconscious work of the sunlit leaves, the results of which are seen in the filling of tubers and other storehouses, in the formation of next year's buds, in the making of seeds and fruits,—and again, indirectly, in the increased store of energy which is brought by plants within reach of animal life. The sunbeams dance over the meadow, but some of them are trapped, and their dance is lost in a dance of molecules which, changing partners in the maze, eventually sink into

complex combinations ; we can hardly see the grass for flowers, each is in a sense a fixed sunbeam ; the butterflies float from blossom to blossom, the sunbeam is in motion again. It is a ceaseless series of transformations of energy.

One of the main impressions of Summer is surely that of a busy animal life, swayed in great part by the twin impulses of Hunger and Love. There is eager endeavour after individual well-being, there is not less careful effort which secures the welfare of the young. The former varies from a keen struggle for existence to a gay pursuit of æsthetic luxuries ; the latter rises from physiologically necessary life-losing and instinctive industry to remarkable heights of what seems to us affectionate devotion. Whether we look out on plants or animals or men during the intense life of Summer, the old question rises to our lips, 'Warum treibt sich das Volk so und schreit?' and the answer ever fundamentally true, but changeable within limits for different existences, comes, 'Es will sich ernähren, Kinder zeugen, und die nähren so gut es vermag.'

The activity of the ants, bees, wasps, and other insects, represents Summer industry at a higher level than that in the leaves ; it is, we believe, conscious and instinctive. By which we mean that most of those activities, which it is one of the delights of Summer to watch, are performed without intelligent control, and are more or less independent of education and experience, in virtue of inherited cerebral mechanism, if such an ignorance-confessing phrase be admissible. The animals are, so to speak, constitutionally wound up to do what they do when suitable stimuli occur. In many of their activities they are conscious automata. But the beauty of it is that the results of this conscious automatism are often as perfect as the outcome of the most profound deliberation. It seems, as we look at the bee's honeycomb, the wasp's nest, the spider's web, that art is perfected in becoming most instinctive ; and surely the rationality of our world is at least as plain in the web or termitary as in the Forth Bridge or Eiffel Tower. 'A mouse is miracle enough to stagger sextillions of infidels.'

Animal industry in its instinctive forms gives one an impression of ease and spontaneity; they do not sweat nor whine, nor hesitate nor look puzzled. One has the same impression in watching a very perfect mechanism which performs its task without noise or jar. But just as the machine has certainly its wear and tear, however well concealed that may be, so it is with the instinctively industrious animals. Recent researches show that the nerve-cells of the bee's brain are, at the end of a hard day's work, unmistakably fatigued; and, more than this, a certain number seem gradually to go out of gear as the Summer's work continues; they die off until no more are left than are sufficient for the necessary vital functions. There are hints of the same sad fact even in man, and though our knowledge of the matter is very slight, we may dimly see why it is that we are doomed, not only to become 'old fogies,' but to die of 'old foginess' should we escape a more merciful ending. Along the same line of thought we may also perhaps advance to a better understanding of such facts as the saving reaction of daily and seasonal sleep.

Representing a higher grade of activity than that of the bees is the parental industry of the birds, for it is to a larger degree intelligent. We do not mean the building of nests, which we prefer to regard as an activity of Spring (often continued on into Summer), for that seems to us in the main instinctive, we mean rather the untiring activity which so many exhibit in protecting, feeding, and finally educating their young. The songsters are quieter than they were, the wild lyrics have given place to more measured psalms of life, partly, of course, because the ecstasy of passion is over for the season, partly, perhaps, because the birds have found keeping house a much more serious business than falling in love and getting married. But were it less familiar it would appear to us more beautiful—the manner in which the love of mates broadens into and is lost in the love of offspring. Yet not lost either, since it surely returns purified and strengthened. Every one knows that the two parent birds will work themselves thin in their untiring solicitude for the young

brood. We are not warranted in supposing that they think of their sacrifice, any more than of the welfare of the species,—they do not control their conduct in reference to an ideal, they are not moral, poor things,—but is there not something wonderful in it, something, as Socrates said, moving to tears, and yet consoling in our relations one with another?

III

But it must be noticed that the intensity of life, which seems to us so characteristic of Summer, is by no means unrelieved. Every one familiar with the country has noticed that in days of intense heat, the whole aspect of Nature occasionally suggests sleepiness, especially about noon. A few clouds hang motionless in a lofty blue sky, the air is tremulous over the hot earth, the birds are all hushed in the woods, the leaves droop after extreme transpiration, the labourers have lain down by the hedge-side, and there is scarce a sound save that of the grasshoppers, whose interrupted chirping makes a sort of background for the silence. Doubtless our own sleepiness exaggerates the impression, but when even the leaves fall asleep, few living things are likely to be wakeful. In fact, what we experience even in this country is a suggestion of the Summer slumbers—or *æstivation*—of mud-fish, amphibians, and crocodiles, when the waters dry up in the pools of tropical countries. We may corroborate this very strikingly by visiting half a dozen shore pools in the heat of the day when there is stillness like that of an Eastern city in siesta, and in the twilight when there is all the activity of a Donnybrook Fair.

There is another phenomenon which has often impressed us on a bright and breezy Summer day,—the sudden appearance of a dark cloud, which, though heavy with dust and rain, drifts rapidly across the sky. We can follow its shadow over the fields and the firth, and as it blots out the sun from us for a few long seconds, we feel a shiver of suspense. Of course this is a mere sentimentalism, but the precise physiology of the shiver

might be interesting, especially in reference to the connection between emotion and muscular movements. This cloud, no bigger than a man's hand, is the external counterpart of the tear which comes sometime to all of us to blot out God's sun. Its shadow is death's.

For in the midst of all the beauty and virility, all the bustle and gaiety of Summer days, he with the ever-harvesting sickle walks with swift feet. He mingles with the haymakers and one is carried senseless off the field ; he troubles the waters of the seaside town, and the ranks of the children who romped merrily on the sands are thinned ; he passes among the flocks, and many need no more shepherding ; he breathes upon the dancing day-flies, and they sink with the setting sun ; he touches the meadows with his skirts, and the grass withereth and the flower fadeth. But why in the midst of life is there so much death, against whom there is no standing nor defiance ? It is partly that at an early chapter in life's history immortality was pawned for love, and death was made a price for giving rise to new life ; as is illustrated by so many butterflies and other animals which die soon after reproducing. It is partly that the machinery of life is by no means perfectly self-repairing, and that the organism in living is continually going into debt to itself,—debts only payable by death ; as is illustrated by all organisms whose efforts are followed by irremediable nerve-fatigue. It is in great part also due to the fact that although the sunlight is the most powerful antagonist of the pestilence that walketh in darkness, to wit, the omnipresent disease-germs or Bacteria, the warmth and plenty of Summer days favour their fatal multiplication, as is illustrated by many fevers.

But no one can have realised what the work of Summer actually means, without feeling the profound truth of the Buddhist doctrine of reincarnations, that nothing is ever really lost in this economical world :

‘That nothing walks with aimless feet,
That not one life shall be destroyed,

Or cast as rubbish to the void,
When God hath made the pile complete.'

Matter is ever circulating, in Summer most actively ; energy is ever changing, in Summer most of all. Nothing is ever lost. The moistened dust and the quivering air become the grass, the grass the deer, the deer the huntsman, the huntsman the tiger, the tiger—with the aid of Bacteria—grass again. For so the world goes round, and, 'after Last, returns the First, though a wide compass round be fetched.'

But if one asks for more than this profound, though perhaps cold truth ; asks, in fact, not for the flowers of yester-year, but for the 'souls of the flowers,' for the psychical or metakinetic aspects of the dayflies and butterflies, the sun-stricken hay-maker, the fevered child, then we have but an answer as vague as the question is vague :—

'You must begone,' said Death ; 'these walks are mine.'
Love wept and spread his sheeny vans for flight ;
Yet ere he parted said, 'This hour is thine ;
Thou art the shadow of life, and as the tree
Stands in the sun and shadows all beneath,
So in the light of great eternity
Life eminent creates the shade of death ;
The shadow passeth when the tree shall fall,
But I shall reign for ever over all !'

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